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Need for an incentive-based reimbursement policy toward quality care for dialysis patient management

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Need for an incentive-based reimbursement policy toward quality care for dialysis patient management.

Background. In view of the growing dialysis population and the increasing reimbursement cost in the industrialized countries, a critical evaluation of the dialysis economy is warranted.

Methods. Data for the reimbursement and dialysis patients' statistics were collected from the National Medical Care Expenditure (NMCE), 1979–1996, which was published by the Japanese government, and the article "An overview of regular dialysis treatment in Japan," 1979–1998, by the Japanese Society for Dialysis Therapy, as well as unpublished data from the Yokohama Dai-ichi Hospital and 10 affiliated urban dialysis centers.

Results. From 1979 to 1996, the dialysis population increased 5.2 times and the NMCE increased 2.5 times, whereas the end-stage renal disease (ESRD) payment increased only 1.8 times. Because of a drastic reduction in the dialyzer cost and the dialysis-related technical fee, both the percentage of ESRD-related payment within NMCE and ESRD payment per capita per year decreased from 5.4 to 4.1% and from 16.3 million yen to 5.6 million yen, respectively. Despite this drastic cost reduction, the patient survival and quality of life determined by the social rehabilitation rate did not decline.

Conclusion. The Japanese health insurance policy for dialysis management achieved a successful cost cut during the 1979–1996 period by using an incentive-based payment system toward quality care. However, the forthcoming further exponential increase in the dialysis population may put the dialysis economy and hence dialysis care quality in jeopardy. Effort must be made to reduce the ESRD-related cost through prevention of the progression of kidney diseases, propagation of renal transplantation, and internationalization of continuous ambulatory peritoneal dialysis and erythropoietin cost. A reduction in dialysis reimbursement, if necessary, must be achieved through an incentive-based system toward quality patient care.

Developed countries are facing the problem of a rapidly growing dialysis population and hence increasing dialysis-related cost. Justifiable allocation of medical resources for end-stage renal disease (ESRD) treatment has been a major concern for the medical professionals and policy makers [1, 2].

Although dialysis in Japan is known to have the world's highest prevalence rate (1473 per million, 1998) and the lowest crude one-year death rate (9.2%, 1998) [3], little is known about its socioeconomic status and reimbursement policy.

Here, the statistical data on the dialysis-related reimbursement and evaluations of cost and cost-effectiveness of dialysis in Japan are presented.

METHODS

Statistical data for dialysis in Japan

Hospital reimbursement and statistical data relating to dialysis in Japan were collected from several published articles. They include the National Medical Care Expenditure (NMCE) annual report 1979–1996 [4], the Report on the Survey of Medical Care Activities in Public Health Insurance (SMCA-PHI) annual report 1996 [5], and the Revised Point Fee System for Social Insurance 1967–1998 [6]—all of which were published by the Ministry of Health and Welfare—as well an article entitled, "An Overview of Regular Dialysis Treatment in Japan," which was published annually during the period of 1973–1998 by the Japanese Society for Dialysis Therapy (JSDT report) [3, 7]. Data were also obtained from the claims and the statistics from 833 dialysis patients treated at the Yokohama Dai-ichi Hospital and 10 urban satellite clinics in the Kanagawa district (YDH; unpublished data).

Also quoted for international comparison are excerpts of the United States Renal Data System Annual Data Reports (USRDS) in 1995, 1996, 1998, and 1999 [8–18], and data from the 1993 *Nephrology News and Issues* [19].

ESRD expenditure in Japan

The NMCE, the only statistics that cover all health insurance expenditures and payments by patients in Japan, has reported ESRD expenditure data since 1979. ESRD expenditures were listed as the expenditures for

Key words: Japanese dialysis, hospital reimbursement, dialysis cost, CAPD, erythropoietin.

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Table 1. Dialysis patient characteristics

	YDH	JPN	USA
Age (average)	58.3	59.9	56.0
Primary disorder %			
CGN	39.3	52.5	17.2
DM-N	16.3	24.0	33.2
NS	8.5	4.4	24.0
Dialysis modality %			
Center HD	99.2	94.6	84.9
Home HD	0	0.04	0.9
CAPD	0.8	4.4	9.1
Blood access graft %	3.7	4.8	63.5
Use of EPO %	59.0	78.0	83.5

Abbreviations are: YDH, Yokohama Dai-ichi Hospital and 10 affiliated clinics (833 patients) are urban type dialysis chain in the Kanagawa district; JPN, Japanese Society for Dialysis Therapy (JSDT) report 1998; USA, USRDS report 1996, 1998 and 1999; CGN, chronic glomerulonephritis; DM-N, diabetic nephropathy; NS, nephrosclerosis.

Table 2. Standard hemodialysis prescription and outcome

	JPN prescribed dose	USA delivered dose
Qb *mL/min*	190	361
Length of dialysis session *minutes*	241	197
Dialyzer surface area m^2	1.49	1.32
Kt/V	1.33	1.18~1.32
Dialyzer reuse %	0	71
Hospital admissions per year	0.59	1.41
One-year crude death rate %	9.2	23.3

Abbreviations are: JPN, JSDT report, 1995–98; USA, USRDS report, 1995–'96, '98 and '99.

"nephritis, nephrosis and renal failure" that were defined according to the classification of the ICD, version 9 [20]. In addition to the dialysis cost, therefore, these expenditures include the cost for nephrology-related disorders, such as glomerulonephritis, acute renal failure, conservative ESRD treatment, and although small, the fee for renal transplantation.

The SMCA-PHI annual report consists of the claims to the government-managed insurance and the national health insurance, which collectively cover 65.2% of the Japanese population. However, the SMCA-PHI annual report does not include the patients' out-of-pocket payment. It lacks the exact number of the patients on dialysis, and it is limited to the claims in June [5]. According to the SMCA-PHI data from June 1996, which differentiate the "renal failure" expenditure [5,328,321 155 points ($444,026,763) 1 point = ¥10] from the "nephritis, nephrosis and renal failure" expenditures combined [5,921,116 580 points ($493,426,382)], 90% of the "nephritis, nephrosis and renal failure" expenditure (although these nomenclatures were changed to "glomerular disease, tubulointersititial disease and renal failure" since 1995 according to ICD version 10) [21] is attributed to the "renal failure" expenditure.

In Japan, renal transplantation contributes little to the renal failure treatment, and in 1998, only 658 renal transplantations were performed (including 149 cadaver sources) [22]. Based on the average expenses for the living-related and cadaveric transplantation [23], the renal transplantation cost is estimated to contribute to less than 1.0% of the renal failure expenditure in Japan.

Although constantly overestimated by 10%, the "glomerular disease, tubulointerstitial disease and renal failure" expenditure in the NMCE data are regarded as the representative reimbursement for ESRD in Japan throughout these discussions.

USRDS reports have shown the impact of aging and primary kidney diseases, especially that of diabetic nephropathy (DM-N), on the medical care reimbursement [10]. Together with the tendencies of aging population and growing diabetic population among Japanese dialysis patients, the influence of these factors on the YDH claims are examined (Mann–Whitney *U*-test).

Japan has the highest prevalence rate of dialysis population

Japan is known to have the world highest prevalence rate of dialysis [17]. The reason for this high prevalence rate is not entirely known. In the past, some incidences of "needless" dialysis or dialysis performed "too early" were speculated [24, 25]. In order to assess whether "needless" or "too early" dialysis are in practice in Japan at an unusually high rate, YDH patients who were initiated hemodialysis at the Yokohama Dai-ichi Hospital after 1995 were examined for their predialysis serum creatinine levels at the first dialysis and for the presence or absence of uremic symptoms at that time.

RESULTS

Characteristics, hemodialysis prescription, and the outcome of Japanese patients

The summary for standard hemodialysis patient characteristics, hemodialysis prescription, and outcome in Japan [3, 7] and the United States [8, 9, 11–15] are presented in Tables 1 and 2.

As shown in Table 1, Japanese patients have fewer incidences of diabetes as the primary disorder and prefer outpatient (non-home) hemodialysis and subcutaneous arteriovenous fistula as the blood access. Japanese dialysis patients are given less erythropoietin (EPO) than patients in the United States because of the specific instructions given by the Ministry of Health and Welfare, namely, that their hematocrit values must not exceed 30%. Because of the notoriously strict policy set by the local health insurance payer's judge of the Kanagawa district, the use of EPO is even more restricted for the YDH group. Japanese hemodialysis practice has the characteristics of milder and longer dialysis sessions with

Table 3. Standard hospital reimbursement for outpatient hemodialysis (HD) in Japan

	Japanese yen	U.S. dollars[b]
Comprehensive fee (4 hours dialysis), including dialysis solution, anticoagulant, and labor cost (Dr., Ns., CE, etc.)	¥21.100/HD	$175.8/HD
Medical management fee for outpatient dialysis, including routine lab exam, routine chest x-ray, routine EKG	¥29.000/mo	$241.7/mo
Dialyzer cost *<1.5 m^2, high flux*	¥4.020/HD	$33.5/HD
EPO *1.500 U × 3/weeks*	¥46.215/mo	$385.1/mo
Medication other than EPO[a]	¥22,471/mo	$187.3/mo
Other including revisiting fee and hospital lunch	¥17,810/mo	$67.9/mo
Grand total	¥442,056/mo	$3,683.4/mo

[a] Estimated from SMCA-PHI data (June 1996)
[b] $1 = ¥120 rate

higher Kt/V values than those in the Unites States. The dialyzer is not reused in Japan.

As for outcome, Japanese patients have a lower incidence of hospital admission-required problems and a lower one-year crude death rate than patients in the United States (Table 2).

The standard reimbursement costs for outpatient center hemodialysis were calculated from the Revised Point Fee System for Social Insurance 1998, and SMCA-PHI data are shown in Table 3 [5, 6].

The Japanese point fee system for reimbursement

The Japanese point fee system for hemodialysis has given an incentive toward longer dialysis session since 1978, larger dialyzer since 1981, and better efficiency dialyzer (sieving coefficient for β_2 microglobulin >0.4) since 1996. Also, a short-term incentive has been given to non-ETO sterilization, to reverse osmosis water purification, and to stable ultrafiltration. At present, the same incentive payment is included in the comprehensive fee. For example, the use of a dialyzer with better efficiency is paid 64 to 66 points ($5.3 to $5.5) more than of conventional ones, and a dialysis session of four hours or more is paid 480 points ($40) more than that of a treatment less than four hours (1 point = ¥10; Table 4) [6]. Extra payments for night dialysis, holiday fee, and initiation period fee are not included in Table 4.

ESRD payment and NMCE

In 1979, 525.7 billion yen ($2.5 billion) or 5.4% of the NMCE was spent toward the total ESRD payment. Despite the exponential increase in dialysis population during the subsequent 17 years, in 1996, only 4.1% [938.6 billion yen ($8.6 billion) out of 23.0 trillion yen ($210.8 billion) for NMCE] was spent toward the ESRD payment (Table 5).

In contrast to the steep linear increase in NMCE, the ESRD payment showed only a mild increase, and as a consequence, the percentage of the ESRD payment over NMCE declined during these 17 years (Fig. 1).

As shown in Figure 2, during the 5.2 time increase in dialysis population, the ESRD payment per patient had a drastic decrease to a level that is only 35% of 1979, which is mainly a result of the reduction in the dialyzer cost and the dialysis-related technical fee. As a consequence, the ESRD payment versus NMCE decreased from 5.4 to 4.1% (Table 5).

Despite the previously mentioned drastic decrease in the ESRD payment per patient, as shown in Figure 3, the one-year crude death rate, five-year survival rate, and social rehabilitation rate under age 60 (including students, part-time workers, and housewives) showed no deterioration during the 1973 to 1989 period [7].

Of note, a slightly unfavorable tendency has been seen in the one-year crude death rate and five-year survival rate since 1989.

Aging of the Japanese dialysis population

The Japanese population is known to have aged very rapidly during the latter half of the 20th century [26], and even faster aging is occurring among the dialysis population, as shown in Figure 4. JSDT reports revealed that the average age of the incidence and the prevalence of dialysis patients were 50.0 and 46.2 years, respectively, in 1981, and 62.7 and 59.9 years, respectively, in 1998 [3, 7].

No influence of aging, except for the age <19-year-old group, was noted on the dialysis cost in the YDH claims [¥298,390 per month ($2486 per month) for the <19-year-old age group; ¥461,532 per month ($3486 per month) for the 20 to 44-year-old group; ¥479,378 per month ($3,955 per month) for the 45 to 64-year-old group; ¥454,940 per month ($3,791 per month) for the 65 to 74-year-old group; ¥449,146 per month ($3,743 per month) for the age >75-year-old group; and ¥468,644 per month ($3,905 per month) on the average].

Increasing DM-N patients

As in other industrialized countries [27], Japan's population of DM-N patients is increasing. JSDT reports have shown that both the percentage of incidence and the prevalence of DM-N patients rose from 11.0 and 5.2%, respectively, in 1981 to 35.7 and 24.0%, respectively, in 1998. In contrast, the incidence and the prevalence of chronic glomerulonephritis decreased from 61.5 and 75.7%, respectively, in 1981 to 35.0 and 52.5%, respectively, in 1998. (Fig. 5) [3, 7].

The claim for DM-N patients [¥481,106 per month ($4,009 per month)] was slightly higher than that of other disorders [¥475,032 per month ($3,959 per month) for chronic glomerulonephritis, ¥450,015 per month ($3,750 per month) for nephrosclerosis, and ¥468,644 per month

Table 4. Major change in incentive-giving Point Fee System

Year	Outpatient technical fee	Fee for { dialysis solution / saline / anti-coagulant }	Dialyzer cost (HFK only)
1978	Including dialyzer cost $1 = ¥210	3,100p 5 h > session ($148) 4,000p 5 h ≦ session < 9 h ($190) 4,100p 9 h ≦ session ($195)	Claims as needed	
1981	$1 = ¥221	1,300p 5 h > session ($59) 2,000p 5 h ≦ session < 9 h ($90) 2,100p 9 h ≦ session ($95)	Claims as needed	900p < 1.5 m² ($41) 1.5 m² ≦ 930p < 2.0 m² ($42) 2.0 m² ≦ 960p ($43)[c]
1988	$1 = ¥128	1,250p 4 h > session ($98) 1,700p 4 h ≦ session ($133)	Claims as needed[a]	700p < 1.5 m² ($55) 1.5 m² ≦ 740p < 2.0 m² ($58) 2.0 m² ≦ 760p ($59)[c]
1994	MMF-1 comprehensive fee $1 = ¥102	1,600p 4 h > session ($157) 2,100p 4 h ≦ session ($206)	Included in the comprehensive fee[b]	505p < 1.5 m² ($50) 1.5 m² ≦ 525p ($51)[c]
1996	MMF-1 comprehensive fee $1 = ¥109	1,600p 4 h > session ($147) 2,080p 4 h ≦ session ($191) 2,100p 5 h ≦ session ($193)	Included in the comprehensive fee[b]	group I 435p < 1.5 m² ($40) 1.5 m² ≦ 455p ($42) group II 455p< 1.5 m² ($42) 1.5 m² ≦ 475p ($44)[c]
1998	MMF-2 comprehensive fee $1 = ¥120	1,630p 4 h > session ($136) 2,110p 4 h ≦ session < 5 h ($176) 2,210p 5 h ≦ session ($184)		group I 326p < 1.5 m² ($27) 1.5 m² ≦ 354p ($30) group II 402p < 1.5 m² ($34) 1.5 m² ≦ 418p ($35)

Abbreviations are: p, point (1 point = ¥10); HFK, hollow fiber kidney; MMF-1, medical management fee for outpatient; 2,500 points/mo ($208/mo); MMF-2, medical management fee for outpatient; 2,900 points/mo ($242/mo); '98 comprehensive fee, includes fee for routine laboratory examinations, chest x-ray and EKG. Group I used a standard dialyzer, UFR >3.0 mL/mm Hg/hour, and group II used a high flux dialyzer, UFR >5.0 mL/mm Hg/hour and sieving coefficiency for β_2-microglobulin >0.4.

[a] RO fee; 30 points ('88–92; $2.5)

[b] UFR controller fee; 30 points ('94–'97; $2.5)

[c] Non-ETO sterilized dialyzer fee; 30~15 points ('81–'96) ($2.5~$1.3)

($3,905 per month) for the average], although not significantly ($P = 0.17$).

Serum creatinine levels and associated symptoms at the initiation of dialysis

Dialysis was initiated on 179 patients at the Yokohama Dai-ichi Hospital after 1995, and their mean serum creatinine level was 11.9 mg/dL with a wide distribution from 5.0 mg/dL in a 64-year-old DM-N patient under respiratory distress to 31.2 mg/dL in a 45-year-old chronic glomerulonephritis patient with uremic symptoms.

As shown in Figure 6, their initial serum creatinine levels were as such that the serum creatinine level had a reciprocal relationship with age. Although consideration must be made on the influence of the individual patient's unique features, especially those of DM-N patients, the YDH patients had 3.0 to 3.7 mg/dL higher initial serum creatinine levels than those of the USRDS patients [18] for all age groups. As shown in Table 1, the prevalence rate of DM-N among the dialysis population differs markedly in the United States versus Japan. The influence of DM-N on the initial serum creatinine levels of the YDH patients (56.9 years on the average) is shown in Figure 6, where the average initial creatinine value of 10.0 mg/dL exceeds that of the USRDS cases except for the age 20 to 44-year-old group.

Of the 179 YDH patients, only 9 patients (5%) were asymptomatic at the onset of dialysis, and 95% had either

Table 5. Change in NMCE, ESRD payment and dialysis population

Year	NMCE	ESRD payment	ESRD payment/ NMCE %	Dialysis population	ESRD payment/ dialysis patient/year
	¥ billion				*¥ thousand*
1979	9,074.3	525.7	5.4	32,331	16,259.9
1980	10,534.9	572.5	5.4	36,397	15,729.3
1981	11,252.3	496.0	4.4	42,223	11,747.2
1982	12,105.3	539.1	4.5	47,978	11,236.4
1983	12,699.0	450.1	3.5	53,017	8,489.7
1984	13,192.7	571.3	4.3	59,811	9,551.8
1985	14,028.7	543.2	3.9	66,310	8,191.8
1986	14,920.9	469.1	3.1	73,537	6,379.1
1987	15,816.3	553.0	3.5	80,553	6,865.0
1988	16,399.6	590.3	3.6	88,534	6,667.5
1989	17,249.7	565.6	3.3	83,221	6,796.4
1990	17,976.4	668.8	3.7	103,296	6,474.5
1991	18,995.1	807.3	4.3	110,303	6,941.3
1992	20,316.6	705.4	3.5	123,926	5,692.1
1993	20,975.7	838.9	4.0	134,298	6,246.5
1994	21,576.5	845.2	3.9	143,709	5,881.3
1995	21,863.3	929.3	4.2	154,413	6,018.2
1996	22,979.0	938.6	4.1	167,192	5,613.9

Abbreviations are: NMCE, National Medical Care Expenditure; ESRD, end-stage renal disease.

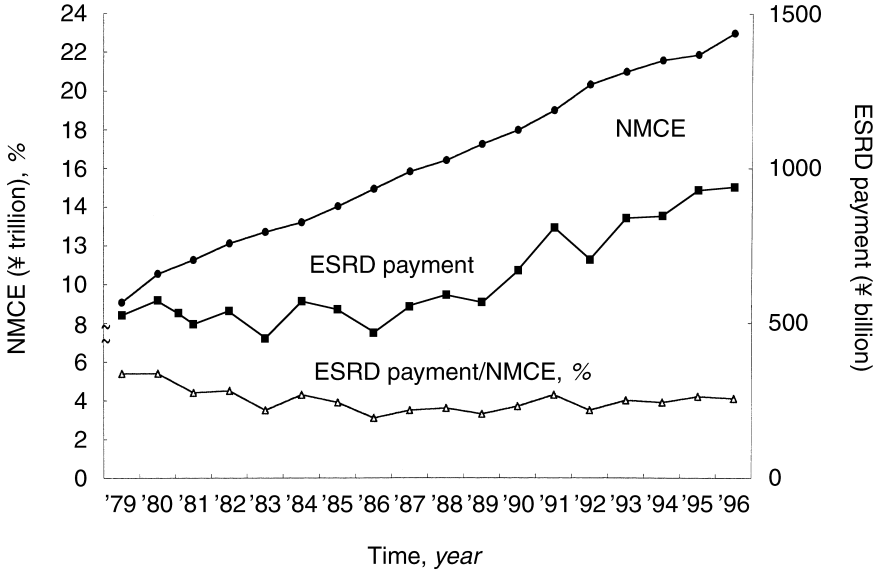

Fig. 1. Annual change of NMCE and ESRD payment. The National Medical Care Expenditure (NMCE) increased linearly from 9074.3 billion yen ($43.2 billion) in 1979 up to 22,979 billion yen ($191.5 billion) in 1996 (2.53 times in yen), whereas the end-stage renal disease (ESRD) payment increase was modest [525.7 billion yen ($2.5 billion) in 1979 to 938.6 billion yen ($7.8 billion) in 1996 (1.79 times in yen)]. Symbols are: (●) NMCE in trillion yen; (■) ESRD payment in billion yen; (△) ESRD payment/NMCE in percent.

uremic or congestive heart failure symptoms such as anorexia, nausea, vomiting, lethargy, bleeding tendency, palpitation, and/or dyspnea. Most of the nine patients who started dialysis without any symptoms sought early initiation in order to achieve a prompt social rehabilitation.

DISCUSSION

The Japanese health care system and the point fee system

As for funding resources, the Japanese health care system belongs to the Bismarck model, as those in Germany and France.

The Japanese health care system, consisting primarily of the Social Health Insurance Organization and the Governmental Health Insurance Organization, covers 100% of their population.

As for the quality outcome of the national health care system in general, the Japanese system achieves the lowest premature mortality and stillbirth rates among developed countries. Japanese life expectancy at birth is the longest, despite that the gross national product spending on health care is 7.3%, which is the lowest among the countries that carry a Bismarck-type of health care system [28].

In Japan, care providers are consisting of both public

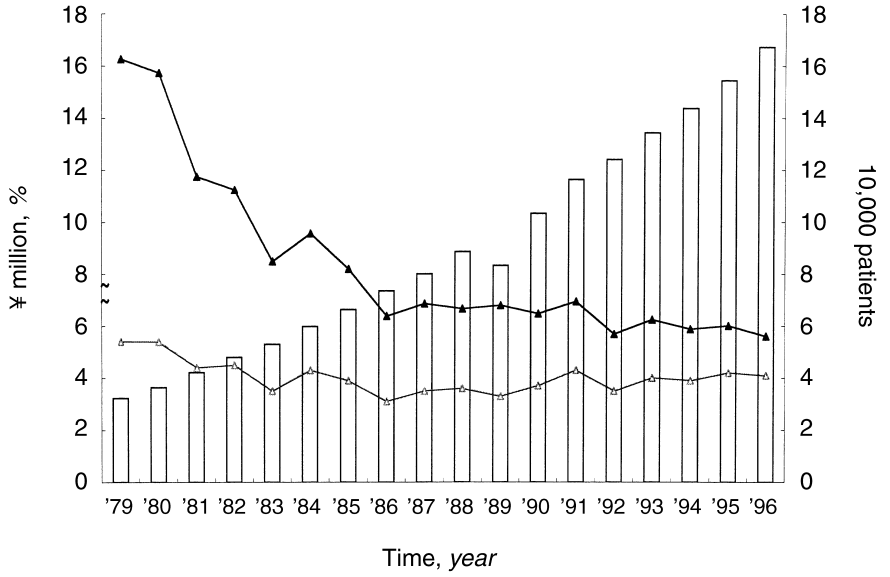

Fig. 2. Annual change of dialysis population and ESRD payments. Despite a 5.2 times increase in dialysis population from 1979 to 1996, ESRD payment had a drastic decrease from ¥16,259,900 per capita per year to ¥5,613,900 per capita per year ($77,428 per capita per year to $46,283 per capita per year). As a result, ESRD payment per NMCE declined from 5.4 to 4.1%. Symbols are: (□) dialysis population; (▲) ESRD payment/dialysis patient/year; (△) percent ESRD payment/NMCE.

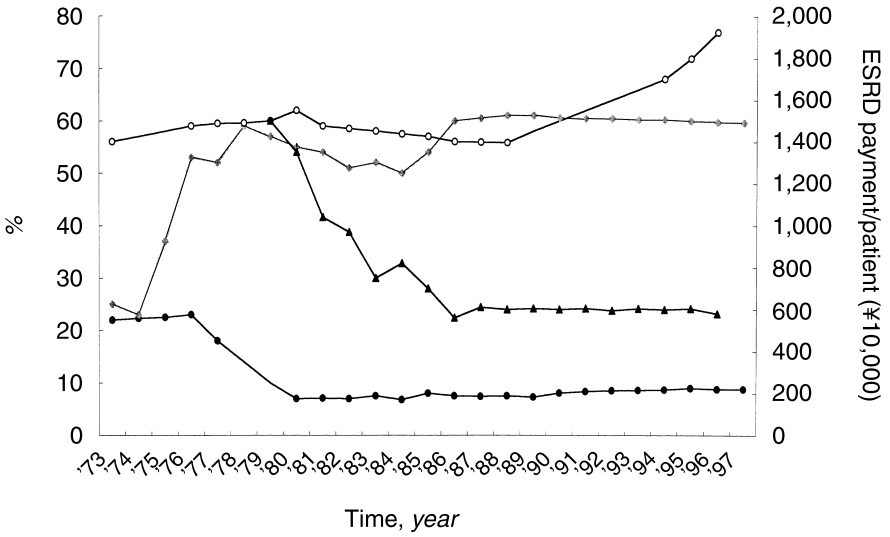

Fig. 3. Annual change in the one-year crude death rate (●), five-year survival rate (◆), social rehabilitation rate (○), and ESRD payment per patient (▲). During the 1979–89 period, when ESRD payment per patient was reduced to 35%, one-year crude death, five-year survival, and social rehabilitation rates were not worsened. The social rehabilitation was defined as for those aged <60 years and included students, part-time workers, and housewives.

and private organizations, and in the field of dialysis, 72.4% (2235 out of 3085) belong to the private organizations, which provide their service to 77.7% (144,804 out of 186,251) of all Japanese dialysis patients [3].

As for reimbursement, a fee-for-service system is adopted in which a fixed fee, counted from the number of points (1 point = ¥10) for each item of services, is paid toward the monthly bill from the care providers.

These billed points are subjected to review at two levels: first by the allied offices of the Social and National Health Insurance Unions in each prefecture and second by the patient's own health insurance offices. Through this two-review process, some of the billed points are declined. For example, high points from EPO are declined if the hematocrit value of the patient exceeds over 30%.

Although the technical fee, the medical management fee and the comprehensive fee are defined by the point fee system, neither doctors, clinical engineers (CEs), nor nurses are given these payments. All of the point fees become the income of the care providers, while the care providers pay salaries to the medical staff, including doctors, on fixed wage bases [28].

Features of Japanese dialysis

In Japan, the quality of dialysis provided to patients is uniform. All dialysis patients are covered by either social insurance or welfare aid so that even an extremely affluent patient does not have to pay more than ¥10,000 ($83.3) per month. As shown in Table 2, dialyzers are never reused except for experimental purposes, although

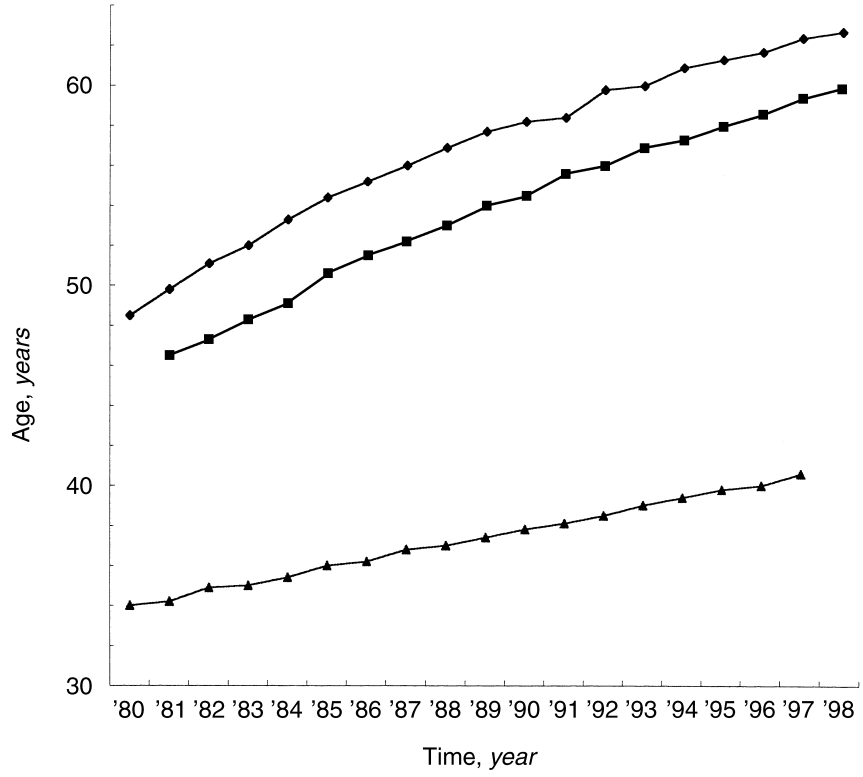

Fig. 4. Aging of Japanese dialysis patients. The speed of aging of the dialysis population in Japan is markedly faster than that of the general Japanese population. Symbols are: (◆) incident patients; (■) prevalent patients; (▲) general population.

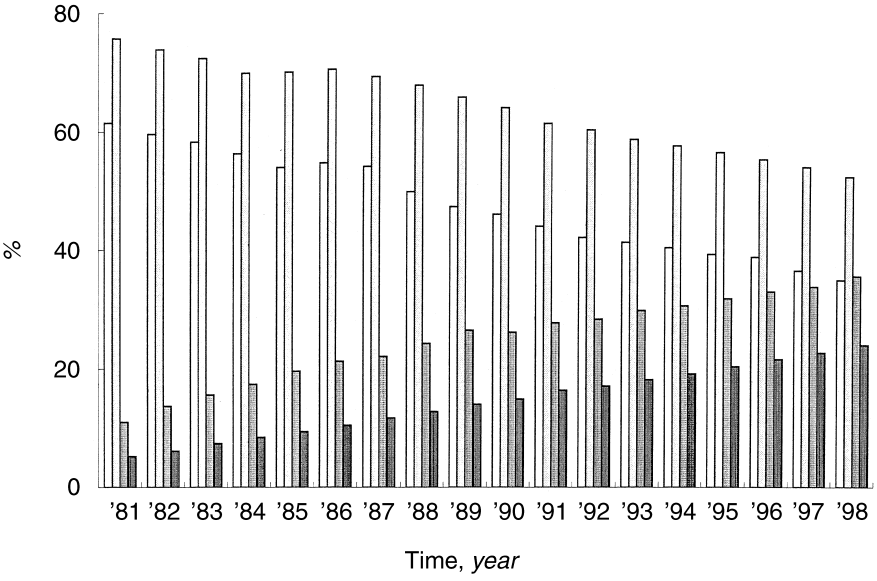

Fig. 5. Annual change of incidence and prevalence rate for chronic glomerulonephritis (CGN) and diabetic nephropathy (DM-N). As in other developed countries, the prevalence and the incidence of DM-N patients are increasing yearly, and finally in 1998, the incidence of DM-N patients (35.7%) surpassed that of chronic glomerulonephritis (35.0%). Symbols are: (□) incident CGN patients; (▩) prevalent CGN patients; (▩) incident DM-N patients; (■) prevalent DM-N patients.

their law does not preclude reuse. Patients prefer outpatient center hemodialysis due not only to their "white coat"-dependent behavior, but also to the relatively easy access to their hemodialysis centers (71.5% of the patients can commute to their center within 30 min) [29].

Under these socioeconomic circumstances, together with the incentive created by the high dialysis fee in the 1970s [30], the dialysis population increased exponentially ($y = 1.7743 \times 10^2X^2 - 2.3208 \times 10^4X + 7.5644 \times 10^5$; $r = 0.9742$) [31].

However, because of the subsequent drastic reduction in cost payment per patient, the overall ESRD expenditures achieved a modest increase, and the ESRD expenditure/NMCE, instead, had a tendency to decrease.

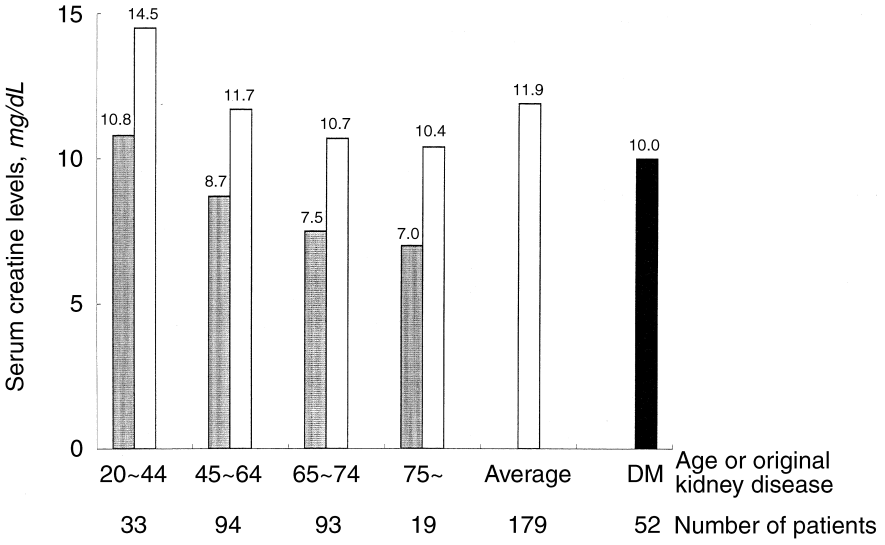

Fig. 6. Average serum creatinine level at initiation of dialysis. From January 1995 until June 1999, 179 patients initiated dialysis at the Yokahama Dai-ichi Hospital and 10 urban satellite clinics in the Kanagawa district (YDH), and their serum creatinine levels before their first dialysis session are shown here. In comparison with the USRDS patients who initiated dialysis between 1995 and 1997, the YDH patients had 3.0 to 3.7 mg/dL higher initial serum creatinine levels for every age group than that of the USRDS patients. Symbols are: (■) USRDS 1995–1997; (□) YDH 1995–1999; (■) YDH-DM 1995–1999.

Success of Japanese dialysis in the field of medical economy

Since no decline was noted in the survival or social rehabilitation rate during this period, the Japanese dialysis system can be regarded as having attained a success even in the area of medical economy [31]. This success is attributed, at least part, to the incentives for higher pay given toward the dialysis with better quality, in that the session length affects payment scale (Table 4).

However, the further exponential increase in dialysis population, especially those in aged or diabetic patients, may jeopardize both medical economy and dialysis quality. The reason for Japan's highest prevalence rate of dialysis population, in addition to its very low renal transplantation rate, and its high survival rate on dialysis (represented by a 49-year-old male in Niigata prefecture who has dialysis history for 32 years at December 1998) must be investigated not only for the medical and socioeconomic factors, but also for cultural and religious factors.

Initiation of dialysis "too early"?

Since the YDH patients were shown to have high initiation serum creatinine levels and associated initiation symptoms, the so-called "needless" or "too early" initiation of dialysis are unlikely reasons for the high dialysis prevalence rate, at least in the Kanagawa district. Although no nationwide data are currently available, at the time of debating the "too early" dialysis theory, the 1989 JSDT data showed an average initial serum creatinine level of 12.8 mg/dL for the age 20 to 44 group, 10.7 mg/dL for the age 45 to 64 group, 9.5 mg/dL for the age 65 to 74 group, 8.7 mg/dL for the age >75 group, and 9.0 mg/dL for DM-N, which are 1.0 to 1.7 mg/dL lower than those of YDH, but 1.7 to 2.0 mg/dL higher than those of the USRDS data [24, 25]. The most significant causes for the high prevalence rate for dialysis may be the uniformity in the quality of dialysis, with no or very little out-of-pocket payment by the patient, and the convenient access to a dialysis center. A high referral rate of ESRD patients to dialysis facilities by general practitioners, who have no "exclusion policy," may be another contributing factor.

The USRDS reports revealed that a significantly higher cost was paid for the aged or diabetic patients than others [10]. The YDH claims observed the same tendency for diabetics, although this was without statistical significance.

Prevention of catastrophic increase in the dialysis expenditure

To avoid a further catastrophic increase in the dialysis expenditure, every effort should be made to prevent progression of kidney diseases, including DM-N, for propagating renal transplantation, and for internationalization of the medication cost and continuous ambulatory peritoneal dialysis (CAPD) cost.

Among developed countries, Japan has the lowest renal transplantation rate in ESRD patients [17]. Although the Organ Transplantation Act passed the Japanese Diet in 1997 [33], renal transplantation from heart-beating cadavers is yet to be fully approved by the Japanese society. The Japanese Ministry of Health and Welfare should allocate more funds and make more effort toward propagation of renal transplantation, as renal transplantation may improve the quality of life of ESRD patients [34] and may keep the reimbursement at a level below half of that of dialysis [16, 35].

Internationalization of the EPO and CAPD cost

The pharmaceutical expenditure per patient in Japan is known to be prominent among developed countries

[36]. The high price tag for drugs, such as EPO and low molecular weight heparin, when compared with that in other countries is considered to be one of the major contributing factors [37]. For example, the cost of EPO is $47.7 for 1500 units in Japan, whereas the cost is $15 to U.S. Medicare in 1995 (assuming EPO cost in USA was proportional to the units contained and assuming $1 was equivalent to ¥100) [6]. If Japan's EPO price were the same as that for U.S. Medicare, 7.5% of the Japanese ESRD payment could have been saved during the period of 1990 to 1998 [32].

Although the price for 1500 units of EPO in Japan decreased to $29.6 in 1998 ($1 = ¥120), Japan's EPO price is still about twice that in the United States.

The cost of CAPD is less than that of hemodialysis in all countries in the world except in Japan [17, 38], and hence, several countries maintain a policy to promote CAPD. In contrast to other countries, since 1988, the reimbursement for CAPD in Japan has been set higher than hemodialysis because of a foreign political pressure. For example, hemodialysis payments versus CAPD payments per patient per year in Japan [39], the United States [16], and France [40] are $44,121 versus $56,781, $50,000 versus $44,000, and $80,000 versus $42,000, respectively. Internationalization of the CAPD cost is needed, too.

Dialyzer reuse cannot be practical in Japan

Dialyzer reuse is a widely accepted practice in the world mostly because of economic reasons, although controversy still exists with regard to the influence on the morbidity and mortality of reuse [41, 42]. Apart from the medical validity of the reuse practice, the dialyzer reuse practice has several obstacles in Japan.

As the Japanese medical payment system is based on the principle of fee-for-service [although there is some tendency toward the diagnosis-related group (DRG) payment system such as one seen in the comprehensive fee shown in Tables 3 and 4], the dialyzer cost is paid in addition to the technical fee.

As a result, the care providers are reluctant to reuse dialyzers, as they cannot receive a financial benefit from the margin between the fixed rate from the point fee system and the market price by refusing it. In 1998, this margin was estimated to be 17.5%.

Also, in 1987, the Diet has passed "The Clinical Engineer Act" to improve the competency level of the medical technicians involved in dialysis, extracorporeal circulation, and artificial respiration [43]. Those who are the candidates for the registered CE must pass a national examination after graduating from either a three-year professional school or a four-year university (science and engineering schools).

These CEs can operate life-sustaining apparatuses, including dialysis machines and dialyzers, and their wages are almost equal to those of registered nurses. The Clinical Engineer Act prohibits dialyzer handling, including reprocessing dialyzers, by nonlicensed personnel.

Considering the expensive labor cost for reprocessing dialyzers and the cost for reprocessing machines with expensive charges for the extra rooms, the author does not think that reusing dialyzers is a cost savings in Japan.

Apart from the economy, reuse of the dialyzer may become an inevitable practice in the future because of the need for reducing pollution by waste products, including dialyzers and other disposables.

Medicare policy and outcome

The U.S. Medicare policy in the past was directed toward curtailing the direct cost for dialysis; this was to restrain and fix the composite rate per one dialysis session to approximately $140 ($21,840 per year), regardless of the inflation rate [44].

This Medicare policy forced care providers to slash their costs by reducing the number of registered nurses, using small, reused dialyzers, and shortening the dialysis sessions for the purpose of multiple shifts per day, which improves the efficiency of investment on the dialysis equipment.

As a result of this "cheap" dialysis practice pattern, complications occurred frequently, necessitating multiple hospital admissions of dialysis patients [45–48]. Because of the resulting expensive average admission fee of $20,000 per year, the Medicare payment ($51,174) and the extra Medicare payment totaled as high as $55,763 in 1993 [19]. This number exceeds the average Japanese dialysis payment of $51,229, which also includes hospital admission fees (estimated from NMCE · SMCA-PHI data, 1992) [4, 32, 49].

As for the outcome of this "cheap" dialysis, in addition to the frequent hospital admissions, the United States has the highest one-year crude death rate recorded among all of the industrialized countries every year [50].

Caution must be used in the country-to-country comparisons of medical outcome and medical economy, in light of the obvious differences in the patients' features, including transplantation rates, diabetic population, racial disparity for the death rates [51], and the differences in the definition and payment system of the cost [52]. Nevertheless, the author hopes that the Japanese policy makers learn from the U.S. Medicare's outcome when planning for a reduction in the ESRD expenditure in the future.

Maintenance of a quality-based payment system for dialysis

Although a further reduction of the ESRD expenditure is mandatory, caution must be paid in curtailing the reimbursement for dialysis therapy. We must carefully

evaluate the impact on expeditious reduction in the direct cost for dialysis.

From the overall cost-saving viewpoint, it is not feasible to drastically curtail the direct dialysis fee further. Should the dialysis comprehensive fee be reduced, an incentive must be given to maintain the dialysis quality, for example, by paying more for longer session dialysis [53] and less for facilities where qualified dialysis personnel, for example, nurses and CEs, are understaffed [54].

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