CURRENT STATUS OF PERITONEAL DIALYSIS IN KOREA: EFFORTS TO ACHIEVE OPTIMAL OUTCOME

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Since its introduction in 1981, peritoneal dialysis (PD) has become firmly established as an effective mode of renal replacement therapy and serves an increasing patient population in Korea. The latest registry data indicate that about 3700 end-stage renal disease patients are maintained on chronic PD, representing 24.1% of the country's dialysis population. The majority (93.3%) of these patients are on continuous ambulatory peritoneal dialysis (CAPD) using the two-bag disconnect system, while only 3.3% are on automated PD. Under current renal reimbursement policies, most dialysis patients have to pay 20% of dialysis fees. Thus CAPD patients on 4 × 2-L daily exchanges pay about US $200 per month, not including medication and travel costs.

Traditionally, most PD centers in Korea have used the "standard" prescription of 4 exchanges of 2 L of solution for most of their patients. A recent survey of 1467 patients who commenced CAPD in 1997 revealed that 84% of these patients were initially prescribed 4 × 2-L exchanges, while 12% were given a daily volume of 6 L. With this standard prescription, the percentages of Korean CAPD patients initially achieving the adequacy target of Kt/V urea ≥ 2.0 and standardized creatinine clearance (SCCr) ≥ 60 L/week/1.73 m² were 74.4% and 82.1%, respectively. It is likely that, among current Korean CAPD patients, a much lower percentage will achieve the clearance targets compared to this initial outcome, but the precise data are not available. However, it is not clear whether the levels of small-solute clearance recommended for optimal PD outcomes, and proposed by the NKF-DQIG guidelines, will bring the expected benefits to Korean patients.

Overall survival of Korean PD patients appears to be as good as, or even better than, that in most other countries. Recently, a single large PD center reported patient survival of 92.1%, 85.6%, 81.4%, and 67.6% at 1, 2, 3, and 5 years respectively. Other centers also reported similar outcomes. As in other countries, cardiovascular deaths predominate among Korean patients: death was due to cardiac causes in 29%, to vascular causes in 21%, and to infectious causes in 24%.

Peritonitis is the most important barrier to prolonged use of CAPD in Korea, and more PD patients transfer to hemodialysis because of peritonitis than in other countries. To further reduce the morbidity and mortality of Korean PD patients, various control measures need to be implemented that can reduce or prevent peritonitis and other infectious complications. Also, to further improve long-term patient outcome, Korean nephrologists need to establish and practice optimal clearance targets in the chronic care of these patients.

KEY WORDS: Prescription practice; patient survival.

More than 20 years after its inception as a mode of renal replacement therapy (RRT), peritoneal dialysis (PD) has become firmly established and serves an increasing patient population all over the world (1,2). No longer is it regarded as an alternative therapy, available to manage only those patients inappropriate for hemodialysis (HD). Careful analysis of patient and technique survival indicate that, over the first 5 years, continuous ambulatory peritoneal dialysis (CAPD) is as effective as HD, and may even offer certain advantages in improving patient survival and quality of life (3–6). In spite of the same goals of patient management, individual countries (and centers) have adopted individual policies concerning initiation of dialysis, acceptance into dialysis therapy, modality selection, dialysis prescription, and chronic care. All of these choices are affected by cultural background, socioeconomic status, the type of health-care system, and other specifics of the individual countries. Many studies have shown that significant differences in PD utilization and outcome measures exist among different Asian countries (7–9).

Peritoneal dialysis was introduced into Korea in 1981, and in 1985 the first national survey of CAPD described the demographic characteristics and out-
come measures of 315 patients at 7 centers during the years 1981 to 1984 (10). A further report in 1992 summarized the experiences of 35 (83%) of the centers known to offer CAPD; the 2327 patients in the survey represented 66% of all the PD patients seen in the period from March 1981 to December 1989 (11). This report described the characteristics of these patients, the frequency of selected complications such as peritonitis, and the outcomes of CAPD.

This paper will review the current status of PD therapy in Korea, including PD utilization and systems, initiation and prescription practices, nutritional status, and relevant outcome measures such as patient and technique survival rates. We hope, through this critical review of facts and shortcomings, to identify some of the areas of PD practice that need special attention in order to improve the outcome of treatment for Korean PD patients.

RENAL REIMBURSEMENT SYSTEM IN KOREA

In view of all the nonmedical factors that affect the use of various modes of treatment for end-stage renal disease (ESRD), financial support and reimbursement policies probably have the greatest influence (12). This area must be examined before one looks at the status of PD utilization and related practices. Virtually all ESRD patients who start RRT, including PD, are covered by some form of medical insurance that reimburses 80% of fixed fees for each HD session, PD solutions, and necessary medications. Since there are no private medical insurance plans that will reimburse dialysis-related fees, patients must pay the remaining 20% of these costs. Patients on thrice weekly HD pay about US$230 per month, while CAPD patients on 4 × 2-L daily exchanges pay about US$200, not including medication and travel costs. Patients receiving erythropoietin (EPO) 2000 units twice weekly will spend an additional US$80 per month. Approximately 5% of ESRD patients are covered by a medical aid program that entitles them to free treatment. Generally, dialysis-related fees are set by the government and do not cover physician payments related to the education and care of PD patients.

PD UTILIZATION AND SYSTEMS

According to the national survey of 31 December 1997 that was conducted by the Korean Society of Nephrology (13), nearly 226 facilities were providing chronic dialysis in Korea: 26.0% of university hospitals, 39.7% of general hospitals, and 34.4% of for-profit private units. Unlike other countries, PD patients are cared for chiefly in university hospitals. As of 31 December 1997, 10 794 (230/million population) and 3468 (74/million population) patients were on HD and PD, respectively.

As Table 1 shows, since 1991 the absolute numbers of both PD patients and PD patients per million population has been rising steadily at a yearly rate of 20%; thus the number of such patients doubled every 5 years. Despite this continued increase, however, the rate of utilization of PD has ranged from 21.4% to 24.3% during the past 6 years, with little variation between 1995 and 1998. A survey of 57 PD centers that cared for almost all the PD patients throughout Korea, showed that there were 3698 PD patients as of 30 June 1998. Only 3.4% of these were on automated peritoneal dialysis (APD), and the majority (93.3%) were on CAPD, using the two-bag disconnect system. The relatively small proportion of patients on APD compared to the other countries reflects mainly the fact that this is the most expensive form of ESRD treatment.

REFERRAL AND INITIATION PRACTICES

A major but largely neglected factor affecting the morbidity and mortality of dialysis patients is the referral pattern for, and the timing of initiation of RRT in chronic renal failure. Often, late referral is associated not only with the lack of choice between modes of dialysis but, according to several studies, also determines to some extent the clinical outcome (14–16). Several investigators assert that patients who begin dialysis with relatively high levels of residual renal function (“early start”) have a lower morbidity and mortality than those who begin dialysis at a lower level of renal function (late start) (17). Although no controlled studies have demonstrated the benefits of early dialysis, many support the concept of early initiation and a proactive approach to the management of advancing chronic renal failure to avoid uremia and its consequences (18,19).

We have scant information about the referral patterns and policies concerning dialysis initiation as they affect Korean ESRD patients. Recently, a university center that did a retrospective analysis of 367 new ESRD patients who started dialysis between 1987 and 1997, reported that 52% of their patients were referred to the unit less than 1 month before the initiation of dialysis (late referral), and that 48% were known to the renal unit at least 1 month before that event. The mean serum creatinine level of the entire group was 13.3 ± 7.6 mg/dL at the start of dialysis. Patients older than 40 years tended to receive early referral (20).

The results of our own survey — which was based on a retrospective review of 184 new ESRD patients who started dialysis in 1995 — of referral patterns,
residual renal function (RRF) at the start of dialysis, and of the modes of treatment within each referral category, are shown in Table 2 (21). Including 61 patients (33.2%) who were known to the renal unit less than 1 week before the start of dialysis (urgent referral), 53% of 184 patients required dialysis within 4 weeks after they were first referred (urgent and late referral). This rate of late referral of Korean ESRD patients (over 50%) is higher than that generally reported by European centers. A recent survey of 13 European renal centers revealed an overall late referral rate of 23.7%, despite wide variations (15). It is remarkable that, at the start of dialysis, we noted no statistically significant differences between the different referral groups in serum creatinine or residual renal creatinine clearances — either mean or median values. Mean serum creatinine ranged from 13.0 to 13.5 mg/dL. However, we are concerned that these mean serum creatinine levels at initiation were substantially higher than those in Western centers, which are usually in the range of 7 – 8 mg/dL. Not surprisingly, the 1-year mortality was higher among the “urgent” referrals but did not differ significantly among the other three groups (data not shown). Although these data do not represent national figures, they suggest that most Korean ESRD patients start RRT at a far-advanced stage of uremia and with a substantially lower RRF.

Table 1: Living Dialysis and Transplant Patients in Korea (as of the End of Each Year)

<table>
<thead>
<tr>
<th>Year</th>
<th>Hemodialysis</th>
<th>CAPD</th>
<th>% CAPD</th>
<th>Transplant</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1991</td>
<td>4861 (112)</td>
<td>1392 (32)</td>
<td>22.3</td>
<td>2376 (55)</td>
<td>8628 (198)</td>
</tr>
<tr>
<td>1992</td>
<td>5890 (135)</td>
<td>1599 (37)</td>
<td>21.4</td>
<td>2862 (66)</td>
<td>10 351 (238)</td>
</tr>
<tr>
<td>1993</td>
<td>6610 (147)</td>
<td>1812 (40)</td>
<td>21.5</td>
<td>3574 (79)</td>
<td>11 997 (266)</td>
</tr>
<tr>
<td>1994</td>
<td>7387 (163)</td>
<td>2284 (50)</td>
<td>23.6</td>
<td>4116 (91)</td>
<td>13 789 (304)</td>
</tr>
<tr>
<td>1995</td>
<td>8578 (187)</td>
<td>2743 (60)</td>
<td>24.2</td>
<td>4609 (101)</td>
<td>15 930 (348)</td>
</tr>
<tr>
<td>1996</td>
<td>9635 (208)</td>
<td>2979 (64)</td>
<td>23.6</td>
<td>5324 (115)</td>
<td>17 935 (386)</td>
</tr>
<tr>
<td>1997</td>
<td>10 794 (230)</td>
<td>3468 (74)</td>
<td>24.3</td>
<td>5982 (128)</td>
<td>20 244 (432)</td>
</tr>
<tr>
<td>1998</td>
<td>11 650 (251)</td>
<td>3698 (80)</td>
<td>24.1</td>
<td>—</td>
<td>—</td>
</tr>
</tbody>
</table>

Number in parentheses represents number of patients per million population.

a Percentage of CAPD patients within total dialysis population.
b As of 30 June 1998.

to be seen. As recommended by the recent Dialysis Outcomes Quality Initiative (DOQI) guidelines, it is a total creatinine clearance of 60 L/week/1.73 m², or a weekly Kt/Vurea of 2.0 (19,23). Whether we should recommend these higher levels to Asian PD patients is a controversial issue. The satisfactory outcomes reported by Asian centers, wherein many patients do only three exchanges per day and achieve much lower small-solute clearances, suggest that there is more to a successful program than having an aggressive “adequacy” policy (24).

Since its introduction in 1981, most PD centers in Korea have prescribed the “standard” prescription of four exchanges of 2 L for most of their patients. The results of this prescription are documented in a recent survey of 57 leading PD centers in Korea. They reported on 1467 patients who commenced CAPD in 1997. Of these new patients, 84% initially received 4 × 2-L exchanges, 7.5% had 4 × 1.5-L exchanges, 4.6% had 3 × 2-L exchanges, and 2% had 5 × 2-L exchanges. Many patients who were given a daily volume of 6 L would have reached the higher clearance targets because of their smaller body size or their considerable RRF. According to a survey of 70 leading nephrologists with a principal involvement in PD care, 52.8% said they would measure the delivered dialysis dose regularly in all patients, 31.4% said they would adjust the prescription to meet adequacy targets, and 21.4% said that they would base management on their clinical judgement. Another 34% indicated that they would measure the dialysis dose only when clinically indicated. Only 27% of these nephrologists accepted the DOQI-recommended guidelines as their target clearances for optimal PD; whereas one-half of them accepted as their targets, a weekly Kt/Vurea of 1.8 – 2.0 or a standardized creatinine clearance (SCCr) of 50 – 60 L/wk/1.73 m².

To determine the proportion of CAPD patients who reach the higher clearance targets with the standard
prescription, we measured clearances of small solutes serially in a cohort of 117 patients [male:female 60:57, body surface area (BSA) 1.59 ± 0.17 m²] who were maintained on the initial standard prescription of 4 × 2 L/day for a 1-year period (25). Mean weekly Kt/Vurea was 2.32 ± 0.25 (peritoneal 1.82 ± 0.34, renal 0.52 ± 0.46); initially 74.4% of these patients had a total Kt/Vurea above 2.0. In these patients, mean SCCr was 85.2 ± 33.7 L/wk/1.73 m², and 82.1% had an initial SCCr of higher than 60 L/wk/1.73 m² (Table 3). Because of their smaller body size, the distribution of BSAs in the Korean PD population as represented by this cohort was much different than that of PD patients in North America (22). Seventy percent had a BSA less than 1.7 m², 28% had a BSA of 1.7 – 2.0 m², and only 2 patients (1.7%) had a BSA greater than 2.0 m². Of patients with a BSA of less than 1.7 m², 88% had an initial Kt/Vurea above 2.0, while 42% of those with BSA of 1.7 – 2.0 m² achieved this target. After 1 year of CAPD on the same standard prescription, only 54.4% and 52.1%, respectively, achieved the target clearances of Kt/Vurea and SCCr, chiefly due to a loss of RRF.

These preliminary data suggest that more than 74% of Korean CAPD patients achieve the DOQI-recommended clearance targets at the initiation of PD with the standard prescription of 4 × 2 L/day. However, maintained on the same regimen for 1 year, only one-half of these patients will achieve these targets, indicating that, at this time, about 50% of patients will require dosage adjustment to meet the adequacy target. About 70% of CAPD patients have a BSA of less than 1.7 m², and within this subgroup, 88% will achieve adequacy targets.

It is likely that, among current Korean PD patients, a much lower percentage will achieve the clearance targets compared to the initial outcome, but the precise data are not available at this time. Because the 2.5-L size solution is not yet marketed in Korea, and the high cost of APD, the only practical way of increasing dialysis dose is to increase the number of daily exchanges, which most patients are not willing to accept.

| TABLE 3 |
|---|---|---|---|
| Changes in Small Solute Clearance and Number of Patients Satisfying Target Kt/Vurea and Standardized Creatinine Clearance (SCCr) Maintained on the Initial Prescription of 4 × 2-L Exchanges |
| | 1 Month | 6 Months | 12 Months |
| Total Kt/Vurea (mL/min) | 2.32±0.25 | 2.10±0.45 | 2.07±0.37 |
| Peritoneal Kt/V | 1.82±0.34 | 1.75±0.35 | 1.79±0.30 |
| Renal Kt/V | 0.52±0.46 | 0.32±0.28 | 0.23±0.27 |
| SCCr (L/wk/1.73 m²) | 85.2±33.7 | 70.6±23.0 | 64.4±16.9 |
| RRF (mL/min) | 2.38±2.21 | 1.41±1.37 | 0.98±1.14 |
| Patients with Kt/V ≥2.0 | 87/117 (74.4) | 63/117 (54.4) | 63/117 (54.4) |
| Patients with SCCr ≥60 | 96/117 (82.1) | 81/117 (69.1) | 61/117 (52.1) |

RRF = residual renal function.

Data from 117 new CAPD patients (M/F: 60/57). Numbers in parentheses represent percentage satisfying target clearance. Body surface area = 1.59±0.17 (mean ±SD), range = 1.28–2.03.
NUTRITIONAL STATUS

Protein-calorie malnutrition is common in CAPD patients; most studies report a prevalence of 25% - 40% (26,27). The presence of malnutrition increases mortality and morbidity including peritonitis (23,28). Unfortunately, no national cross-sectional or prospective studies have been done to evaluate overall nutritional status, or to determine the factors responsible for the development of malnutrition in Korean CAPD patients. Several centers, using subjective global assessment (SGA) (29), found protein-calorie malnutrition in 25% - 30% of Korean CAPD patients (30,31). A recent cross-sectional study, using the method of SGA, of the nutritional status of 147 Korean CAPD patients, found that only 43 patients (29.3%) were malnourished, 42 patients had mild-to-moderate malnutrition, and only 1 patient had severe malnutrition.

We did a further analysis of nutritional status using a composite nutritional index (CNI) to get a more comprehensive evaluation. Each of 10 nutritional parameters in the CNI, including clinical (SGA), biochemical (total lymphocyte count, albumin, prealbumin, insulin-like growth factor-1, and transferrin), and anthropometric (body mass index, percent lean body mass, triceps skinfold thickness, and midarm muscle circumference), was graded from 0 to 3 (0 = normal, 1 = mildly decreased, 2 = moderately decreased, 3 = severely decreased). The mean CNI score in the entire group was 8.1 ± 4.9 with a range of 0 – 24. The CNI was found to be positively correlated with age, duration of PD, incidence of peritonitis, C-reactive protein (CRP), and dialytic protein loss, and was inversely correlated with ultrafiltration volume, hemoglobin, and normalized protein equivalent of nitrogen appearance (nPNA).

The CNI was similar in diabetic and nondiabetic patients. Multiple regression analysis suggests that the incidence of peritonitis, duration of CAPD, CRP, and dialysate-to-plasma creatinine ratio were independent predictors of CNI. Ultrafiltration volume, dietary protein intake, Kt/V urea, and nPNA were not included in this model (32).

PATIENT SURVIVAL AND CAUSE OF DEATH

As an objective outcome, patient survival depends upon many variables — some subject to control and some uncontrollable. Such survival is also a measure of the effectiveness of the renal replacement program. We do not have reliable data on the death rates in successive cohorts of Korean PD patients. Thus, we cannot say whether there have been any improvements in mortality rates over the past decade. In 1992, a survey of 2327 patients who started CAPD between March 1981 and December 1989 reported a 1-year patient survival rate of 91.4% and a 2-year survival of 83.0% (11).

Recently, a single large PD center reported a favorable survival among Korean PD patients (33). The subjects were 807 new CAPD patients of mean age 45.5 ± 13.6 years and mean PD duration 30.8 ± 25.6 months. Also, 17.4% were diabetics and 19.9% had cardiovascular diseases at initiation. These patients began CAPD treatment between January 1985 and December 1996. We included only patients maintained on PD for more than 3 months. CAPD prescription was 4 × 2-L exchanges in over 98% of the patients. Patient survival by life table analysis was 92.1%, 86.5%, 81.4%, and 67.7% at 1, 2, 3, and 5 years respectively. There was a significant difference in survival rate between diabetics and nondiabetics: 3-year survival 48.0% versus 86.5%. Other independent factors affecting survival were mean serum albumin level, presence of cardiovascular disease, and increasing age. In Hong Kong, where they have used 3 × 2-L exchanges as their routine prescription since PD was introduced in the early 1980s, patient survival was comparable to that of Western centers doing 4 × 2-L exchanges: 93% after 1 year, 82% after 2 years, 71% after 3 years, and 57% after 5 years. This led the authors to ask whether the same Kt/V urea targets should be applied to different groups of patients (8). In a cohort of 201 patients, the mean weekly Kt/V urea was 1.76, and approximately 50% of patients had a weekly Kt/V urea below 1.7 (25% were below 1.5). Although our short-term survival rates were almost identical, both the 3-year and the 5-year survivals of Korean patients were somewhat better than those of patients given 3 × 2-L exchanges in Hong Kong, in both diabetics and nondiabetics. It is not clear, however, whether this improved survival is due solely to the higher prescription volume, which increases the doses delivered to Korean patients, or is related to other factors still unknown.

To determine the impact of dialysis dose on patient and technique survival rates in PD patients, we evaluated 128 consecutive patients who commenced CAPD between May 1991 and May 1997, in whom we did regular measurements of urea kinetics at 6-month intervals (34). About one-half (n = 63) of these subjects had an average weekly Kt/V urea > 2.1 (mean ± SD, 2.4 ± 0.2), and the rest had a Kt/V urea ≤ 2.1 (mean ± SD, 1.9 ± 0.2). The mean age, associated comorbidity, and mean follow-up duration (3 years) were similar among those with a high Kt/V urea and those with a low Kt/V urea. We observed that the higher Kt/V urea did not affect the 2-year patient survival, but did improve the 5-year survival in these subjects (Table 4). Technique survival rates were similar in the two groups. Although this study had only a few patients and had
a low overall mortality rate (only 11 deaths), our general impression is that the short-term survival of Korean patients is not affected greatly by the delivered dialysis dose. Also in Hong Kong, the 1-year survival of 937 patients with different ranges of Kt/V_urea (<1.7, 1.7 – 2.0, >2.0) did not differ significantly among the three groups, and was at the level of 85% – 87% (35).

As in other countries, cardiovascular deaths predominate among Korean PD patients. During the year 1995–1996, 134 deaths were reported to the Korean CAPD Registry. Death was due to cardiac causes in 29%, to vascular causes in 21%, and to infectious causes in 24%. Our own review of 152 deaths among 980 CAPD patients during the period 1990–1997 also showed cardiac causes in 24%, vascular in 15%, and 24% due to infectious causes. The latest United States Renal Data System report (36) noted that, in both diabetics and nondiabetic PD patients, 20% of deaths were due to infection.

### TECHNIQUE SURVIVAL AND PERITONITIS RATE

Long-term PD, while a possibility, is not yet common. Indeed, to date, very few patients have been maintained on this therapy for more than 10 years (37). An earlier multicenter survey of 2327 patients, seen between 1981 and 1989 in 35 Korean PD centers, reported a technique survival of 83.3%, 71.5%, 59.2%, 46.2% and 37.2% at 1, 2, 3, 4, and 5 years, respectively (11). However, a recent study of 807 patients who commenced PD between 1985 and 1995 in our unit showed much-improved technique survival: 92% at 2 years and 75% at 5 years (33).

Peritonitis is the most important barrier to prolonged use of CAPD. The Korean CAPD Registry report of 1993 identified 138 patients who were transferred to HD from CAPD. Peritonitis was responsible for this transfer in 77.5% of patients, 8.7% were due to exit-site or tunnel infection, and in only 5 patients (3.6%) was the transfer due to ultrafiltration failure. Our review of 980 CAPD patients who commenced PD between 1990 and 1997 also confirmed that infectious complications caused a high percentage of transfers to HD in Korean PD patients (Table 5).

It is not clear why the Korean PD population suffers this unusually high rate of transfer to HD due to peritonitis and catheter-related infections, although it is possible that peritonitis is generally more frequent in our PD patients. Although no national data are available, our major PD centers report a peritonitis rate of 0.4 – 0.6 episodes/patient-year in patients using the two-bag disconnect system (38,39). (This is the system in current use in over 95% of CAPD patients in Korea.) Other possible causes are inadequate patient education; improper patient management, including the use of antibiotics for peritonitis treatment; a different distribution of responsible bacteria; and patient-related factors, such as suboptimal peritoneal defense mechanisms in Korean patients.

### SUMMARY

There have been many significant changes in the field of PD since this technique was introduced into Korea in 1981. The most notable demographic trend over the past decade has been the sustained growth in the number of patients using PD as their form of RRT. However, the proportion of dialysis patients using PD has remained stable at around 24%. The proportion of older and diabetic patients on dialysis has increased in both the PD and HD populations. During the past decade the incidence of peritonitis has
decreased as the disconnect PD system has become popular in Korea. However, peritonitis, and other infectious complications including sepsis, remains as one of the leading causes of mortality in Korean PD patients. Moreover, many more PD patients transfer to HD because of peritonitis than in other countries. If we are to increase the proportion of dialysis patients maintained on PD, and further reduce the mortality and morbidity of Korean PD patients, we must undertake an active investigation into the causes of peritonitis, and, when identified, implement the control measures that will prevent or reduce this distressing complication. Late referral and late start of dialysis seem to lead to a poor PD outcome in Korea. We need to evaluate and correct the socioeconomic and medical factors responsible for these delays.

Despite these shortcomings, overall survival of Korean PD patients appears to be as good as, or even better than, that in most other countries. However, we cannot accept that these survival and other outcome measures truly reflect the overall effectiveness of PD therapy, because our outcomes are not based on accurate and complete national registry data. In this regard, the entire Korean nephrology community must give great attention to maintaining a high-quality registry program that will provide the precise information that is critical to any further improvement of the outcome of dialysis patients, both PD and HD.

Recently, studies showing the relationship between dialysis dose and mortality in PD-treated patients has stimulated interest in using increased dialysis doses in PD patients. Overall, most Korean PD patients can achieve the clearance target for adequate dialysis with the standard prescription, as this is used routinely at the initiation of therapy. However, it is not clear whether, or to what degree, this general interest in increasing and adjusting PD doses (to compensate for the declining RRF) is being applied to the daily care of current PD patients. Because of inadequate renal reimbursement policies and the socioeconomic burdens borne by many Korean patients, it is not easy to implement many of the clinical practices recommended to maximize PD clearance. Also, it is not clear whether the levels of small-solute clearance recommended for optimal PD outcome proposed by the NKF-DOQI guidelines will bring equal benefit to Korean PD patients. At present, the most reasonable clinical practice for Korea appears to be to provide the most dialysis that can be delivered to the individual patient, within the constraints of socioeconomic circumstances, quality of life, lifestyle, and cost. Also, many Korean nephrologists believe that proper management of volume status, adequate control of blood pressure, and proper control of associated comorbid diseases are at least as important as small-solute clearances in achieving a good outcome for their PD patients.

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