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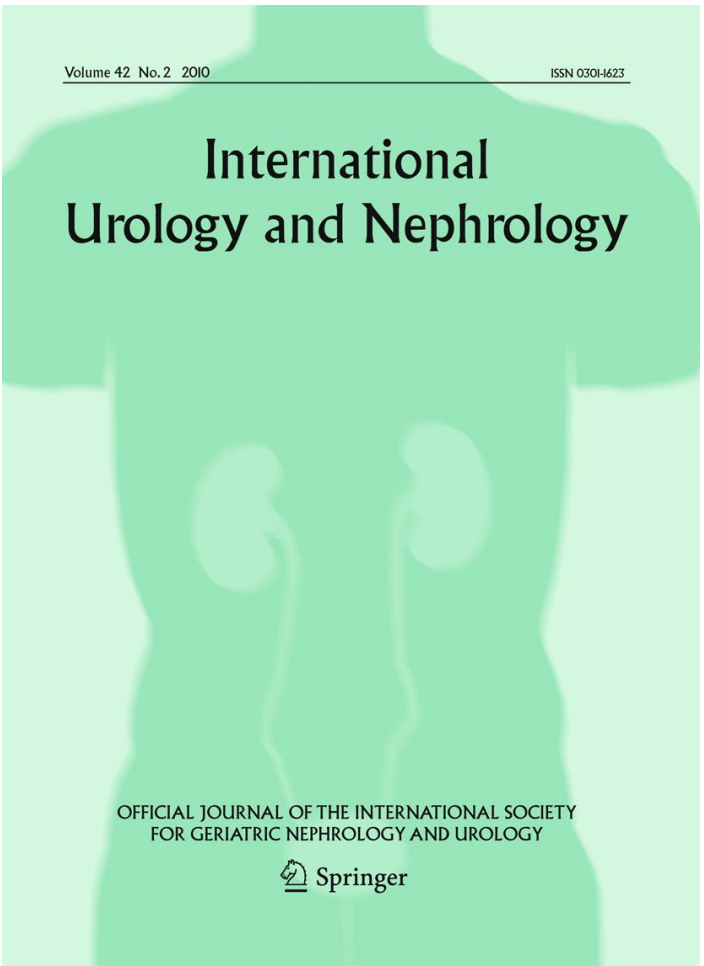

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NEPHROLOGY – ORIGINAL PAPER

Peritoneal dialysis in the nursing home

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Abstract The mean age of patients with end-stage renal disease increases steadily. The elderly on dialysis have significant comorbidity and require extra attention to meet their dialysis, dietary, and social needs, and some may need to be treated at a long-term care facility such as a nursing home (NH). Providing dialysis and caring for elderly patients in a nursing home (NH) presents a number of challenges. Few data are available in the literature about elderly patients on peritoneal dialysis (PD) in an NH. This paper describes our experience of starting and maintaining a peritoneal dialysis program in three community-based nursing homes.

Results During the period 2004–2008, after the nursing home personnel had received appropriate training, we established a PD program in three community-based nursing homes and admitted 38 patients on peritoneal dialysis. We educated 112 NH staff over the three-year period. Mean age of the patients at entry was 77.3 ± 8.5(18.4%) were male. The main causes of end-stage renal disease were diabetes mellitus (DM) 21 (55.8%) and hypertension 13 (34.2%). Comorbid conditions included DM (27, 71.1%), hypertension (26, 68.4%), coronary artery disease (18.5%), chronic heart failure (11, 28.9%), cerebrovascular event (12, 31.6%), and cancer(3, 7.9%). The average total time on chronic peritoneal dialysis was 36.5 ± 29.8 months, (median 31, range: 1–110 months) of which the average time in the NH program, as of the time of this report, was 18.4 ± 13.1 months (median 15.5, range: 1–45 months). During the study period, 16 (42.1%) of the patients died, 2 (5.3%) transferred to HD, **2** (5.3%) stopped treatment, and 18 (47.4%) are still in the program. Actuarial patient survival from entry into the NH program was 89.5% at six months, 60.5% at 12 months, 39.5% at 24 months and 13.2% at 36 months. Patient survival from initiation of chronic dialysis was 89.5% at six months, 76.3% at 12 months, 63.1% at 24 months, and 39.5% at 36 months. We observed 28 episodes of peritonitis with a rate of one episode every 40.3 treatment-months. Two PD catheters had to be replaced, giving a rate of one in every 362.5 patient months.

Conclusion Our results with elderly patients in a nursing home show an excellent patient and technique survival and a low peritonitis rate. With appropriate training of the NH nursing staff, peritoneal dialysis could be performed successfully in these nursing homes. Successful peritoneal dialysis in a nursing home requires a close collaboration

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between the nursing home staff and PD dialysis unit.

Keywords Nursing home · Peritoneal dialysis · End-stage renal disease · Hemodialysis

Introduction

The mean age of patients in the end-stage renal disease (ESRD) program has been increasing steadily [1–6]. Data from various national registries indicates that hemodialysis is the preferred form of renal replacement for the elderly patient with ESRD. However, older patients on dialysis have significant comorbidity, difficulties with vascular access, other complications, thrice-weekly visits to the hospital, and poor tolerance of the dialysis procedure [1–12].

Those who do not tolerate hemodialysis (HD) or have no vascular access, those who live a long distance from a dialysis center, and those who live in a nursing home, may do better on PD. Peritoneal dialysis allows the elderly to be dialyzed at home and is safer for those with increased cardiovascular morbidity, peripheral vascular disease, or bleeding diathesis. However, in many countries, the use of peritoneal dialysis decreases with advancing age and elderly patients are less likely to start or continue on peritoneal dialysis (PD) especially if they are unable to perform the exchanges themselves [7, 13–15]. One promising development in the care for such elderly dialysis patients is the integration of nursing homes (NH) and peritoneal dialysis units. PD performed by trained nurses/staff in nursing homes provides the elderly patient with a convenient, comfortable and safe means of dialysis in a familiar environment without reliance on other family members.

Despite increasing demand for dialysis for patients residing in an NH setting, the literature contains little data concerning the characteristics and outcomes of these patients and even less information concerning the delivery of dialysis in the NH [15–21].

This study reviews our experience with 38 patients with end-stage renal disease (ESRD) who were treated with peritoneal dialysis (PD) in a nursing home. It describes their demographic and clinical characteristics, evaluates the success of the CAPD technique and gives the patient outcomes.

Patients and methods

We did a retrospective review of the patients treated with peritoneal dialysis (PD) in a nursing home (NH) between 2004 and 2008. The program comprised three NHs located throughout Scarborough, Toronto, each designed and equipped specifically for staff-assisted chronic PD.

Patients access to treatment

Patients were referred to the NH at their own request. On admission, they were assessed by a nephrologist of the Scarborough Regional Dialysis Program (SRDP). Their medical management was undertaken by the SRDP. To ensure consistency, the medical management of the NH patients was assigned to only one nephrologist, who was responsible for conducting all the NH clinics for all patients in all three nursing homes. Each nursing home facility was assigned a primary care nurse from the SRDP who assisted the NH staff to monitor the patients. An on-call system provides the nursing staff of the NH with 24-hour support.

Education of nursing home staff

The SRDP assumed the responsibility for the training of the NH nursing staff. With staff turnover and the arrival of new staff, the SRDP has trained 112 registered nurses and registered practical nurses over the past three years. The sessions were limited to eight participants at a time. A 37-h training session covered the practical aspects of peritoneal dialysis and, at the end of the session the attendees were evaluated for their grasp of this knowledge. The teachers were the staff of the home dialysis program. The examination had a written portion that required an 80% pass and a practical examination in which the student had to demonstrate his/her skills with an expected 100% accuracy. The staff of the nursing care facility were provided with ongoing education in the form of monthly educational rounds, as well as occasional seminars on topics related to the nursing care for patients on dialysis. The NH nursing staff were provided with the policies and procedures documents of the SRDP as these related to PD. The SRDP home

dialysis informed the NH's nursing staff about any updates or changes to protocol or procedures.

Data was collected from hospital charts, hospitalization records, and NH charts. We collected baseline characteristics (demographic, clinical, and laboratory data) at entry into the NH dialysis program. Demographics included age and gender; assessed comorbid conditions included coronary artery disease (CAD), congestive heart failure (CHF), cerebrovascular events (stroke or transient ischemic attack), peripheral vascular disease (PVD), chronic obstructive pulmonary disease (COPD), cancer, hypertension (HTN), and diabetes mellitus (DM). Laboratory data collected included serum creatinine, albumin, hemoglobin, calcium, phosphorous, creatinine clearance, urine volume, p Kt/v, UKt/v. The means of these data from all visit measurements was calculated for each subject. Follow-up data included time spent in the NH dialysis program and the eventual outcome for each patient (death, discharge from the NH, withdrawal of PD, transfer to HD, or continuation in the program by May 27, 2008). The cause of death was obtained from NH charts.

Peritonitis and exit-site infection rates were calculated in episodes/patient months, only for the period spent in the nursing home. Patient survival was calculated using Kaplan–Meyer curves. For comparisons, Mann–Whitney U test was used. $P < 0.05$ was considered significant).

Results

Patients

There were 38 patients (31 women and 7 men). Their mean age at entry to NH was 77.3 ± 8.5. The main causes of end-stage renal disease (ESRD) were diabetes mellitus (21, 55.8%), HTN (13, 34.2%), chronic glomerulonephritis (2, 4.5%), and others (2, 4.5%).

Comorbid conditions included DM (27, 71.1%), hypertension (26, 68.4%), coronary artery disease (18, 50%), chronic heart failure (11, 28.9%), cerebrovascular problems (12, 31.6%), and cancer (3, 7.8%) (Tables 1, 2, 3).

Outcome

The overall average time on chronic peritoneal dialysis was 36.5 ± 29.8 months, (median 31, range: 1–110 months). Of this total time on dialysis, the mean time spent in the NH program was 18.4 + 13.1 months, (median 15.5, range: 1–45 months). The total observation period at the NH was 698 patient months. During this study period, 16 (42.1%) of the patients died, two (5.3%) were transferred to HD, two patients (5.3%) stopped dialysis, and 18 (47.4%) remained in the program as of May 27, 2008. Actuarial patient survival from entry into the NH program was 89.5% at six months, 60.5% at 12 months, 39.5% at 24 months and 13.2% at 36 months. The mean survival was 19.1 ± 12.9 months. Crude survival on NH is shown in Fig. 1. Overall patient survival from initiation of chronic dialysis was 89.5% at six months, 76.3% at 12 months, 63.1% at 24 months and 39.5% at 36 months. The mean survival was 34.4 ± 27.5 months (Fig. 2). Two PD catheters had to be replaced, giving a rate of one in every 362.5 patient months. There were 22 acute hospital admissions that is one admission every 31.7 patient months.

Table 1 Outcomes

Number of the patients (female/male)	38 (31/7)
Age at the entry into NH	77.3 ± 8.5
Mean time in nursing home (months) ± standard deviation	18.4 ± 13.1
Median time and range in nursing home (months)	15.5, 1–45
Mean duration time in PD (months) ± standard deviation	36.5 ± 29.8
Median duration time and range in PD (months)	(31, 1–110)
Died	16 (42.1%)
Transferred to HD	2 (5.3)
Stopped treatment	2 (5.3)
Active	18 (47.4)

Laboratory features

Mean serum creatinine on entry into the NH was 482.0 ± 168.1 mmol/L, albumin 27.8 ± 5.9 g/L (Table 2). Mean serum creatinine during follow-up was 501.9 ± 179.5 mmol/l, albumin was 27.8 ± 5.3, hemoglobin 114.1 ± 9.9 g/L, calcium 2.1 ± 0.1 mmol/L and phosphorous 1.29 ± 0.29 mmol/L.

We observed 28 episodes of peritonitis (1 episode every 40.3 treatment-months). Of these, 13 (46.4%) were caused by gram-positive micro-organisms; 13 (46.4%) were caused by gram-negative micro-organisms. In two

Table 2 The mean of laboratory results of the patients in nursing home

	Mean ± std. deviation
Hemoglobin (g/L)	114.1 ± 9.9
Urea (mmol/L)	16.5 ± 6.2
Creatinine (μmol/L)	501.9 ± 179.5
Phosphorus (μmol/L)	1.3 ± 0.3
Calcium (μmol/L)	2.2 ± 0.1
Albumin	27.8 ± 5.3
Cholesterol (mmol/L)	3.7 ± 0.9
HDL (mmol/L)	1.1 ± 0.3
LDL (mmol/L)	1.8 ± 0.5
Triglyceride (mmol/L)	1.9 ± 1.3
Urine volume (ml)	279.6 ± 338.0
Peritoneal creatinine clearance ml/week	52.6 ± 12.8
Residual creatinine clearance (L/week)	1.8 ± 2.5
P_Ktv	1.6 ± 0.4
U_KtV	0.3 ± 0.4
nPCR	0.9 ± 0.4
Systolic blood pressure (mm/Hg)	127.8 ± 22.8
Diastolic blood pressure (mm/Hg)	68.3 ± 11.2

Table 3 Comorbid conditions

	Number (%)
Gender (male)	7 (18.4)
Diabetes mellitus	27 (71.1)
Hypertension	26 (68.4)
Coronary artery disease	18 (47.4)
Chronic heart failure	11 (28.9)
Cerebrovascular event	12 (31.6)
Cancer	3 (7.9)
New myocard infarction in NH	1 (2.6)
New stroke in NH	1 (2.6)
Hospitalization	22 (57.9)
Erythropoietin usage	36 (94.7)
Use of lipid lowering treatment	19 (50)
Use of angiotensin converting enzyme blockers	8 (21.1)
Use of angiotensin II receptor blockers	14 (36.8)
Use of loop diuretics	8 (21.1)
Use of beta blocker	15 (39.5)

episodes (7.1%), there was no growth (Table 4). We observed 17 exit-site infections (1 episode every 42.4 treatment-months).

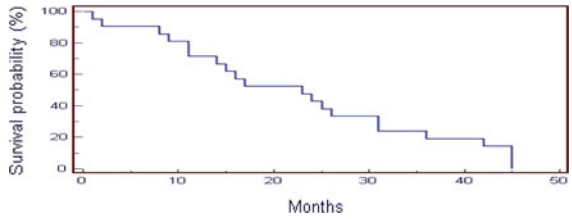

Fig. 1 Actuarial patient survival from entry into the nursing home program

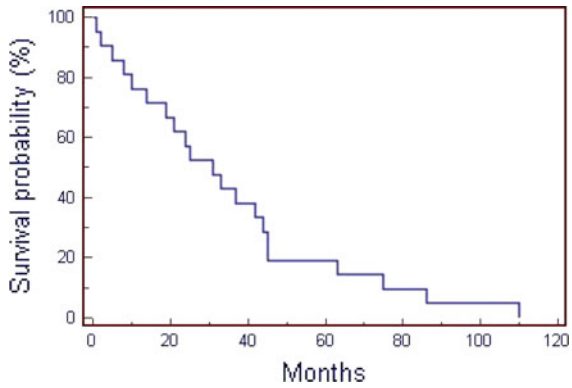

Fig. 2 Patient survival from initiation of chronic dialysis

Table 4 Microbiology of peritonitis

Organism	Number of episodes
Staphylococcous epidermidis	5
Staphylococcous aureus	1
Other Staphylococcous coagulose-negative species	4
Non hemolytic Streptococuous	1
Enterobacteriaceae	4
Enterococcus	1
Escherichia coli	3
Corynebacterium	1
Pseudomonas	3
Klebsiella	3
No growth	2

Outcome

Patients who died during follow-up were significantly older than those who survived (81.0 ± 7.2 years vs. 74.9 ± 8.4 years) ($P < 0.05$). During the follow-up of the patients who died, we found that their serum urea and albumin levels were significantly lower than

Table 5 Mean overall laboratory tests of patients who survived and died during the follow-up period

	Patients who survived number: 18 Mean ± standard deviation	Patients who died number: 16 Mean ± standard deviation	*P*
Age (years)	74.9 ± 8.4	81.0 ± 7.2	$P < 0.05$
Duration in NH (months)	22.9 ± 14.2	14.1 ± 9.5	$P < 0.05$
Total duration of PD (months)	33.2 ± 31.6	41.6 ± 27.4	NS
Hemoglobin (g/L)	113.0 ± 10.4	114.5 ± 10.1	NS
Urea (mmol/L)	19.4 ± 6.7	14.4 ± 4.5	$P < 0.05$
Creatinine (μmol/L)	502.6 ± 209.2	510.7 ± 168.8	NS
Phosphorus (μmol/L)	1.3 ± 0.3	1.3 ± 0.4	NS
Calcium (μmol/L)	2.2 ± 0.1	2.2 ± 0.2	NS
Albumin (g/L)	30.5 ± 4.2	26.3 ± 5.1	$P < 0.05$
Cholesterol (mmol/L)	3.7 ± 0.8	3.8 ± 0.8	NS
HDL (mmol/L)	1.1 ± 0.3	1.1 ± 0.2	NS
LDL (mmol/L)	1.7 ± 0.5	1.9 ± 0.6	NS
Triglyceride (mmol/L)	2.0 ± 1.4	1.9 ± 1.4	NS
P_CrCl	51.2 ± 9.3	54.5 ± 17.7	NS
R_CrCl	1.7 ± 2.8	2.3 ± 1.9	NS
P_Ktv	1.6 ± 0.3	1.6 ± 0.6	NS
U_KtV	0.3 ± 0.4	0.4 ± 0.4	NS
nPCR	0.9 ± 0.3	0.8 ± 0.4	NS
Systolic blood pressure (mm/Hg)	127.3 ± 20.3	128.6 ± 24.9	NS
Diastolic blood pressure (mm/Hg)	66.6 ± 6.2	69.4 ± 14.6	NS

NS: nonsignificant

those found in patients who survived ($P < 0.05$). There was no statistically significant difference between patients who died and patients who survived with regard to mean hemoglobin, serum creatinine, calcium, phosphorus, cholesterol, high density cholesterol, low density cholesterol, triglyceride, peritoneal clearance, residual creatine clearance, KT/V, nPCR, systolic, and diastolic blood pressure during follow-up ($P > 0.05$) (Table 5). Duration of living in NH was statistically lower in patients who died ($P < 0.05$). According to total duration on PD program ($P > 0.05$), there was no statistically significant difference between the patients who died and patients who survived.

Discussion

Providing dialysis and care for elderly patients in NH presents a number of challenges. Few studies have addressed the delivery of dialysis to NH. In 1990, Anderson et al. [17] reported on the three-year follow-up of 44 continuous ambulatory peritoneal dialysis (CAPD) patients admitted to a single NH. They reported that six-month and 12-month survival rates were very low at 53 and 29%, respectively but that the hospitalization and peritonitis rates were similar to those of an outpatient CAPD population. Survival analysis using the Cox model showed that patients with a better functional status on admission, as measured by activity of daily living scores, and who had previously been in an outpatient dialysis program before admission survived longer and were more often discharged. In 1993, Anderson et al. [18] did a prospective survey of 156 dialysis centers to determine whether they had admitted end-stage renal disease (ESRD) patients or had begun dialysis in a nursing home during a 21-month period. They identified 228 NH patients treated with CAPD and found a survival rate of 38 and 27% for six and 12 months [15]. In 1997, Anderson et al. [19] described a 10-year experience with 109 patients in a single nursing home. Six- and 12-month survival rates were 51.7 and 37.2%, respectively, and the peritonitis and hospitalization rates were essentially unchanged in the intervening four years. In their second study [18],

Anderson et al. found that patients who were older (>75 years) had a low physical activity, diabetes, or coronary artery disease had a worse outcome than younger patients with a higher physical activity, or who were admitted for rehabilitation [19]. Discharge home was more likely for those admitted for rehabilitation and with higher functional status, and less likely for those aged 75, or with coronary artery disease or diabetes.

Wang et al. [20] reported their experience with eight peritoneal dialysis patients who started peritoneal dialysis in a community-based long-term care facility. At the time of admission, the average age of the eight patients was 77.3 ± 7.2 (range 69–91). All these patients had several comorbid diseases, and six of the eight were bedridden. The patients stayed in the facility for a total of 29.57 patient-months. Four of them died in hospital. One died in the nursing home. One patient remained in the nursing home at the time of the study. Carey et al. [21] found that the average age of 84 peritoneal dialysis patients placed in a nursing home was 65.3 and that patient survival was 50% at six months and 40% at 12 months.

In our group, the age at entry was 77.3 ± 8.5, and patient survival from entry into the NH program was 89.5% at six months, 60.5% at 12 months, 39.5% at 24 months, and 13.2% at 36 months. However, when patient survival is assessed from the time of entry into the ESRD program, the patient survival rates at 6-, 12-, 24-, and 36-month years were 89.5, 76.3, 63.1, and 39.5%, respectively. These figures are comparable to the two-year adjusted survival rate of 66.3% in the total US PD population [22] and 44.4% in patients older than 75. The United States Renal Data System reported [22] one-year and two-year survival probability for patients between 65 and 74 years to be 81.9 and 66.5, respectively and for patients older than 75 and older than 75.7 years and 30.9, respectively. In our study, patients who died during follow-up were significantly older than patients who survived (81.0 ± 7.2 years vs. 74.9 ± 8.4 years).

Some studies reported higher peritonitis rates among NH PD patients compared to those living at home [19–21]. This higher rate was ascribed to incontinence, reduced mobility, reduced appetite, cognitive impairment, a less active immune system, and an increased propensity to intestinal disease such as diverticulitis. Contrary to previous observations, Troidle et al. [23] reported that the peritonitis rate among 77 nursing home patients on PD was significantly lower than that of patients in their normal peritoneal dialysis program. They also found that the spectrum of organisms in the peritonitis acquired in the nursing home was different from that in their normal peritoneal dialysis program, with more culture-negative organisms in the nursing home setting [17]. In the 36 patients in this study, we observed 28 episodes of peritonitis (1 episode every 40.3 treatment-months), a rate similar to that of our overall patient population. Of these, 28 episodes 13(46.4%) were caused by gram-positive micro-organisms; 13 (46.45%) were caused by gram-negative micro-organisms. In two episodes (7.1%), there was no growth. Only two PD catheters were replaced, giving a very low rate of catheter removal.

To provide PD in nursing home facility, we need to address the cost of staff training, as well as ongoing maintenance training. These funds were provided by the provincial government in the form of start-up costs for the training hours and ongoing maintenance training. The actual cost that was provided and continues to be allocated was the hourly rate of the staff salaries. For ongoing care for the patients, the government provides funding (33.44 dollars-day) for each patient residing in the nursing home. All required PD supplies such as solutions, connections, and cyclers were provided to the nursing home by the Regional Dialysis Program.

The main limitations of our study are its retrospective analysis and the relatively small numbers of patients studied. However, we believe that it is a representative of the new trends and of the results that can be achieved in a nursing home with well-trained staff.

In conclusion, we achieved excellent patient survival, PD technique survival, and a low incidence of acute peritonitis in three nursing homes. Our experience shows that with appropriate training of nursing staff, and an integration of the nursing home and the PD dialysis unit, one can provide excellent care for older patients with end-stage renal disease on PD. PD in NH is a feasible and safe option for renal replacement for the frail, elderly, and physically dependent patient with end-stage renal disease if nursing home staff is trained appropriately and if there is close collaboration with the renal unit staff throughout the patient's care.

References

1. Oreopoulos DG, Dimkovic N (2003) Geriatric nephrology is coming of age. J Am Soc Nephrol 14:1099–1101
2. Canadian Institute for Health Information (2005) Treatment of end-stage organ failure in Canada. Ottawa, Ontario
3. Mallick NP, Jones E, Selwood N (1995) The European (European Dialysis and Transplantation Association-European Renal Association) registry. Am J Kidney Dis 25:176–188
4. Disney APS (1995) Demography and survival in patients receiving treatment for chronic renal failure in Australia and New Zealand: report on dialysis and renal transplantation treatment from the Australia and New Zealand dialysis and transplant registry. Am J Kidney Dis 25:165–175
5. USRDS Annual Data Report (2006) Chapter 6 Morbidity and mortality. 121–144
6. Grünberg J (2009) "Pedogeriatrics": a pediatric nephrologist's outlook on common challenges facing pediatric and geriatric nephrologists. Int Urol Nephrol [Epub ahead of print]
7. Jager KJ, Korovaar JC, Dekker FW, Krediet RT, BoeschotenEW, for the Netherlands Cooperative Study on the Adequacy of Dialysis (NECOSAD) Study Group (2004) The effect of contraindications and patient preference on dialysis modality selection in ESRD patients in The Netherlands. Am J Kidney Dis 43:891–899
8. Ogawa T, Shimada M, Ishida H, Matsuda N, Fujiu A, Ando Y, Nitta K (2009) Relation of stiffness parameter beta to carotid arteriosclerosis and silent cerebral infarction in patients on chronic hemodialysis. Int Urol Nephrol 41(3):739–745
9. Bessias N, Paraskevas KI, Tziviskou E, Andrikopoulos V (2008) Vascular access in elderly patients with end-stage renal disease. Int Urol Nephrol 40(4):1133–1142
10. Kutner NG (2008) Promoting functioning and well-being in older CKD patients: review of recent evidence. Int Urol Nephrol 40(4):1151–1158
11. Busuioc M, Gusbeth-Tatomir P, Covic A (2008) Dialysis or not in the very elderly ESRD patient. Int Urol Nephrol 40(4):1127–1132
12. Dimkovic N, Oreopoulos DG (2008) Assisted peritoneal dialysis as a method of choice for elderly with end-stage renal disease. Int Urol Nephrol 40(4):1143–1150
13. Oreopoulos D, Thodis E, Paraskevas KI (2008) The promising future of long-term peritoneal dialysis. Int Urol Nephrol 40:405–410
14. Pliakogiannis T, Trpeski L, Taskapan H, Shah H, Ahmad M, Fenton S, Bargman J, Oreopoulos D (2007) Reverse epidemiology in peritoneal dialysis patients: the Canadian experience and review of the literature. Int Urol Nephrol 39:281–288
15. Maitra S, Sekercioglu N, Baloch S, Cook WL, Jassal SV (2007) Causes of death in older peritoneal dialysis patients—can we depend on registry reports? Int Urol Nephrol 39(1):345–350
16. Schleifer C (1990) Peritoneal dialysis in nursing homes. In: Khanna R, Nolph KD, Prowant BF, Twardowski ZJ, Oreopoulos DG (eds) Advances in peritoneal dialysis, vol 6. Peritoneal Dialysis Bulletin, Toronto, pp 86–91
17. Anderson J, Sturgeon D, Lindsay J, Schiller A (1990) Use of continuous ambulatory peritoneal dialysis in a nursing home: patient characteristics, technique success, and survival predictors. Am J Kidney Dis 16:137–141
18. Anderson J, Kraus J, Sturgeon D (1993) Incidence, prevalence, and outcomes of end-stage renal disease patients placed in nursing homes. Am J Kidney Dis 21:619–627
19. Anderson JE (1997) Ten years' experience with CAPD in a nursing home setting. Perit Dial Int 17(3):255–261
20. Wang T, Izatt S, Dalglish C, Jassal SV, Bargman J, Vas S, Tziviskou E, Oreopoulos D (2002) Peritoneal dialysis in the nursing home. Int Urol Nephrol 34(3):405–408
21. Carey HB, Chorney W, Pherson K et al (2001) Continuous peritoneal dialysis and the extended care facility. Am J Kidney Dis 37:580–587
22. Unites States Renal Data System (2008)
23. Troidle LK, Gorban-Brennan N, Kliger AS, Finkelstein FO (1998) Peritonitis in the extended-care facility. Adv Perit Dial 14:127–130