

Home dialysis first: a new paradigm for new ESRD patients

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ABSTRACT

Patients with end-stage renal disease (ESRD) were treated with either in-center hemodialysis (ICH) or one of the modes of home-based dialysis (HBD) – peritoneal dialysis (PD) or home hemodialysis (HHD). Home-based dialysis modes showed better outcomes than ICH (PD for the first 2-3 years and HHD for the long-term). Home PD has become more attractive with overnight cyclers for PD and the use of home helpers. Home dialysis (PD or HHD) offers a high quality of life and a high degree of independence and is financially attractive. This review will propose a paradigm shift in the initial form of dialysis offered to new patients with ESRD: instead of selecting between in-center dialysis and PD, patients after they are advised of the advantages of dialysis at home (either PD or HHD) should be offered a choice between dialysis at home (PD or HHD) or in hospital. We will review the advantages of home-based dialysis and the arguments for this simple but vital change in the process by which new patients requiring dialysis choose their treatment option.

Key words: *End-stage renal disease, Home dialysis, In-center dialysis, Peritoneal dialysis*

INTRODUCTION

Patients with progressive renal insufficiency are faced with a multitude of decisions and choices during the continuum of their care. Those who require renal replacement face complicated decisions among modes of dialysis or kidney transplantation. Others may decide on nondialysis therapy. Empowerment of patient choice autonomy is now central to medical decision-making (1, 2). However, many patients with end-stage renal disease (ESRD) still report that they did not receive all the information they required to make an informed choice about mode of dialysis (3). In the United States, conventional hemodialysis (HD) is the dominant form of renal replacement therapy (RRT) (4). In contrast, in Hong Kong, over 80% of new ESRD patients undergo peritoneal dialysis (PD) with excellent clinical results (5). The reasons for this variation in choice of dialysis are complex and multifactorial, and include heterogeneity in the education of health care providers, reimbursement policies, availability of home-based dialysis and patient preference, among others (6, 7).

Jassal et al (8) asked 132 directors of nephrology units in Great Britain and Ireland to identify those factors that determine the patient's choice of dialysis mode. Patient prefer-

ence was the most important, with a score of 4.4/5, quality of life (QoL) was second with 3.8/5 and morbidity and mortality were third with 3.6/5. These directors regarded treatment costs as the least important factor (8). Although several surveys indicate that nephrologists agree that we make excessive use of in-center HD, they also regarded many factors to be contraindications to PD (8, 9). The successful French assisted-PD (APD) program demonstrated that deterrents such as lack of personal hygiene, poor visual acuity or lack of social support can be overcome by the assistance of trained staff at home (10). In a retrospective study, Zhang et al. (11) emphasized the rationale for promoting home-based therapies, including improvement in QoL and cost-effectiveness for new patients starting RRT. These authors studied a cohort of 486 patients with ESRD who attended the multidisciplinary renal replacement clinic at the University Health Network in Toronto. They found that 61% of new patients requiring dialysis chose a home dialysis modality. In this study, the major barriers to home dialysis were patients' disinterest and lack of family support.

Cornelis et al (12) assessed the feasibility of home dialysis (PD and home hemodialysis [HHD]) in patients who developed ESRD after nonrenal solid organ transplant. The median home dialysis follow-up for 25 patients (PD: n=15, HHD: n=10), was 24 months. The median values of blood pressure, phosphate, calcium, parathyroid hormone and hemoglobin were within the K/DOQI targets. The hospitalization and infection rates were 1 every 22 and 29 patient-months, for PD and HHD, respectively. The authors concluded that home-dialysis (PD and HHD) are feasible and sustainable, offer improved hemodynamic control and should be actively considered for this cohort.

Low use of home dialysis is due partly to nephrologists who do not discuss these options (PD or HHD) with patients possibly owing to their concerns about higher mortality, as well as being due to inadequate training of nephrologists, nephrologists' bias against PD, pressures to fill HD beds, late referral to nephrologists and other reasons (13, 14).

As far as training of nephrology fellows is concerned, there is a wide variation in the number of PD patients available to fellows during their training and in the length of time fellows spend providing care to patients on PD (14). A report from 2002 found that 29% of US nephrology training programs had fewer than 5 PD patients per fellow; in 14% of programs, fellows spent less than 5% of their time receiving training in the care of PD patients (15). Given that the prevalence of PD has declined so dramatically, we may be in the midst of a vicious cycle whereby physicians feel inadequately prepared to provide care for PD patients, thus further reducing the use of PD and training opportunities

(16). In this connection we would like to reaffirm our belief that the reformulated integrated care concept proposed by Mendelssohn and Pierratos (17), and recently restated by Oreopoulos and colleagues (13) is congruent with the political agenda of most governments and provides an ethical, patient-centered approach to care. This model focuses on timely referral of patients to a nephrologist and early management of cardiac risk factors and comorbidities in an effort to slow the progression to ESRD. Thus patients requiring kidney replacement should be considered for preemptive live-donor transplantation if a donor is available and, following detailed review of the pros and cons of the various dialysis options, they should be given the choice between home-based dialysis therapies (both HHD and PD) or in-center HD. Most importantly, patients themselves should be intimately involved in this decision-making throughout the continuum of their care (18, 19). Below we describe some of the advantages of the 2 forms of home dialysis.

HOME PERITONEAL DIALYSIS

Use of PD varies across the world, from 85% in Mexico and 42% in Australia, to as low as 4% in Bulgaria and Japan (14). PD use in the United States has declined steadily from a high of 14.4% of the dialysis population in 1995 to a low of 6.2% in 2008 (20-22). Nephrologists consider home dialysis (PD) to be the best option for new patients starting RRT when compared with continuous ambulatory peritoneal dialysis / APD or in-center HD / hemodiafiltration (49% of physicians); this support for PD was strongest among European physicians (60%) (23). PD is a better option than in-center HD for young children, an equal option for young adults, and a better option for retired persons 65-75 years of age. For those over 75 years who have no assistance, in-center HD is a better option; if home assistance is available however, PD at home is a better option (8, 10, 13, 24, 25). In a survey of 11 centers in Canada and the United States, only 18% of new patients with ESRD had medical contraindications against starting dialysis (PD) at home (26).

An increasing number of nephrologists agree that chronic PD at home offers many advantages for new elderly patients with ESRD, including independence from hospitals, simplicity of access, good control of hypertension, better cardiovascular stability (less hypotension and fewer arrhythmias) and slow solute removal. There is no convincing evidence that elderly patients on PD have more modality-related complications or a lesser QoL than younger patients do (27-29). French investigators (10) and the Toronto Group (30) have proposed dialysis at home with assistance provided by home care nurses. The Toronto Group reported that

availability of home care assistance to new elderly patients with ESRD increased new patients' choice of PD to 75%; as a result, over 30% of their prevalent patients are now on PD. They found that the annual cost of assisted home dialysis, was Can \$12,000 less than the cost of in-center HD. The last 15 years have seen a steady improvement in patient and technique survival on PD, preservation of residual renal function, lower cost and higher QoL (31-35).

HOME HEMODIALYSIS

Misinterpretation of the results of the National Cooperative Dialysis Study (NCDS) and improvements in technology led to a progressive decrease in HD treatment times, which were 8 hours 2 or 3 times per week (36). Despite the results of the HEMO study (37), nephrologists began to consider increasing the frequency of dialysis, showing an increasing interest in this approach worldwide. Chertow et al in a recent study concluded that "indeed home HD offers the opportunity to increase the weekly time of dialysis" (38).

The results of many studies show improvements of outcomes including (but not limited to) cardiovascular outcomes (blood pressure control, reduction of left ventricular hypertrophy), anemia management, phosphate management, nutritional status and QoL (39-42).

In many studies (43-45), total costs for in-center conventional HD were higher than for home-based daily HD; savings with the latter are estimated to be between US \$5,000

and US \$10,000 per patient-year. Home programs were less expensive even when one excluded patient-specific savings, for example reduction in hospitalization (46).

SURVIVAL AND QUALITY OF LIFE: COMPARISONS BETWEEN HOME DIALYSIS MODALITIES (PD/HHD) AND IN-CENTER HD

In Canada and the United States (47, 48), studies have shown that, compared with patients on in-center HD, patients who started dialysis on home PD had similar and, at least for the first 2 years, better survival rates. Mehrotra et al (21) found that from 1996-1998 to 2002-2004, survival on PD had improved when compared with survival on HD. Survival did not differ between patients starting PD or HD (Tab. I) in several reports. During the first 2 years, for most populations except elderly female diabetic patients, the relative risk of death was lower on PD than on HD (49, 50). The latest Canadian registry report indicates that, for up to 5 years, patients on PD have better survival than those on in-center HD (51) (Tab. II). "In 2007 Collins presenting data of USRDS stating that "contrary to in-center hemodialysis, first-year mortality on PD has continued to improve and that, in a pure intend-to-treat analysis, the overall survival showed that peritoneal dialysis and hemodialysis have similar outcomes" (52).

There are no adequate data with which to compare the various types of HHD to conventional thrice-weekly HD.

TABLE I
ADJUSTED SURVIVAL OF PATIENTS ON HD OR PD FOR UP TO 5 YEARS IN 3 COHORT PERIODS

Year of Follow-up	Cohort period								
	1996-1998			1999-2001			2002-2004		
	HD, %	PD, %	p Value	HD, %	PD, %	p Value	HD, %	PD, %	p Value
1	78	76	<001	78	77	NS	78	79	NS
2	63	59	<001	63	60	<001	63	62	NS
3	51	46	<001	51	47	<001	52	51	NS
4	41	36	<001	41	37	<001	43	41	NS
5	33	29	<001	33	30	<001	35	33	NS

Table from (21).

HD = hemodialysis; NS = not significant; PD = peritoneal dialysis.

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TABLE II

UNADJUSTED 3-MONTH, 1-YEAR, 3-YEAR AND 5-YEAR PATIENT SURVIVAL* FOR INCIDENT DIALYSIS PATIENTS BY INCIDENCE, DIALYTIC MODALITY AND DIABETIC STATUS† IN CANADA, 1993-1997

	Nondiabetic HD (n=7,367)	Diabetic HD (n=3,660)	Nondiabetic PD (n=2,962)	Diabetic PD (n=1,791)
3 months	94.8	96.3	98.3	98.5
1 year	80.7	79.9	89.2	86.4
3 years	59.9	50.5	66.8	53.6
5 years	44.1	29.0	48.9	31.3

Table from (48).

HD = hemodialysis; PD = peritoneal dialysis.

* Patients were censored at the time of their first kidney transplant.

† Diabetic status is based on primary diagnosis and comorbidity status.

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Woods et al reported a 5-year patient survival of 80% on short daily HD (53). The London Daily Nocturnal Hemodialysis Study (54) found no difference in number of emergency visits in each of the nocturnal and conventional HD groups. Over the study period, there were 3 deaths in the nocturnal control population, 3 deaths in the nocturnal population and no deaths in the daily study group or in the controls. The annual access-related infection rate for HHD patients decreased significantly from 2.52 ± 4.53 episodes during the prestudy period to 0.052 ± 1.14 ($p=0.081$), during the study phase. The authors concluded that home-based daily HD is more natural than conventional HD and results in better patient outcomes. Because patients on HHD are younger and have a lower incidence of diabetes, one must be cautious about bias toward the beneficial effects of HHD despite all efforts at adjustment. Although equivalent survival of patients choosing a dialysis modality is a matter of considerable importance to physicians discussing modality selection, survival does not seem to be a major factor in patients' decisions about dialysis (55, 56). Patients' choices appear to be driven by considerations of autonomy, which many patients find attractive. Many studies suggest that PD offers equivalent or better QoL, than in-center HD (54-57).

PD is a home treatment that spares the patient repeated visits to the dialysis unit; holidays and travel are more flexible, because the individual is not confined to an area that has a renal unit. Starting RRT with PD gives patients more control of their life and offers to facilitate the chance for rehabilitation (58-62). Wu et al (63) reported

that, after 1 year, patients on in-center HD and home PD had similar health-related QoL, with some domains of QoL better for home PD (i.e., financial well-being, higher scores for ability to travel, diet, etc.) and others (i.e., sexual function) better for in-center HD. These authors suggest that before starting RRT, the attending physician discuss those specific aspects of QoL that are important to individual patients.

Other studies compared HHD (daily and/or nocturnal) with in-center HD, using QoL scores (time trade-off, SF-36, global health index, etc.). All have favored home dialysis modalities (daily/nocturnal HD), over conventional in-center HD (63, 64).

COST OF IN-CENTER VERSUS HOME DIALYSIS

In many countries, home PD is less expensive than in-center HD (65, 66). PD saves money not only because the treatment itself costs less, but also medical costs are lower among patients on PD. In Canada the cost for in-center HD is almost double the cost of home PD (67). Total cost for in-center HD was higher than that for home daily HD in all studies.

HOME DIALYSIS FIRST FOR NEW ESRD PATIENTS: A NEW PARADIGM

The studies reported above showed that home-dialysis modalities (PD and HHD) prolong survival, improve QoL and are more cost-efficient than in-center HD (64-66). In a recent

paper, the authors studied and described the overall satisfaction with renal services among older patients dialyzing with HD or PD at home. They concluded that older patients trained to dialyze at home using PD or HD are highly satisfied with the nephrology service (staff, information provision, involvement in decision-making and confidence in managing dialysis) – even when living remote from the nephrology unit (68). In 1997 the Canadian Society of Nephrology recommended that “home (and self care) dialysis modalities, which generally are most cost effective, should be encouraged by renal care providers.” We support the proposed approach to new ESRD patients requiring dialysis. If the patient has a potential living-related donor, a preemptive transplantation should be encouraged. Otherwise, patients

should be presented with the advantages of home dialysis and offered the option to choose between dialysis at home (PD or HH) or in-center HD.

Financial support: None.

Conflict of interest statement: None.

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Accepted: March 24, 2011