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## Home Hemodialysis: Belgrade Shows The Way

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### Introduction

The acceptance rate of people onto renal replacement therapy (RRT) is likely to continue to rise over the next ten years. Added by continued pressures to improve the quantity and quality of treatment (1), further demands will most certainly be placed on the already limited resources available to renal units.

Since its first use in the UK in the early 1960s (2,3), many renal centers have offered home hemodialysis (home HD) therapy to those patients that met the medical and psychosocial criteria for self-care dialysis. In spite of the superior clinical outcomes, better survival rates and quality of life that are associated with home hemodialysis (4-6), the proportion of people using this as a treatment modality has fallen. The reason for this has been attributed to a number of factors, notably: the development of a network of self-care and limited-care center, the popularity of continuous ambulatory peritoneal dialysis and of renal transplantation, the increasing age and co-morbidities of patients with end-stage renal failure, the reduced availability of partners needed for home hemodialysis, and finally poor perception of home HD based on outdated knowledge. However, interest for home HD as a viable treatment option has been renewed recently (7) and many arguments are in favour of home HD. The ageing of dialysis population was not linked to a decrease in younger patients but to an increase of elderly subjects needing dialysis (8). Also, the technical advances occurred in the last decades may allow a safe dialysis in patients previously considered at high risk. In addition, the waiting list for renal transplantation is still too long in many countries and in-hospital dialysis centers are already overcrowded.

### The rationale for home hemodialysis

The most convincing arguments for home hemodialysis are linked to a treatment per se. Home HD should provide greater independence and personal freedom, an opportunity for full-time employment and rehabilitation, better time management and control of treatment and freedom from frequent travel time. More importantly, the home dialysis setting provides the ideal environment for the patient to undertake long-hour dialysis, which is associated with prolonged survival and low morbidity (6).

Since its introduction, it becomes obvious that home HD offers better survival than hospital hemodialysis. According to Mailloux et al, home HD offered 5-year survival to 89% of patients compared to 56% to those on CAPD and 39% to

those on hospital HD (9). Charra reported the best results: 55% of those on home HD gained a 15-year survival (10). However, patients were younger than those on hospital HD and only 20% of them had "high risk" etiological diagnosis and their mean Kt/V was 1.67. Following adjustment for case mix and co-morbidity, home HD was in further advantage against hospital HD (11).

### Our experience with home hemodialysis

History of home hemodialysis in former Yugoslavian countries The first dialysis in former Yugoslavia had been done on patients with acute renal failure; notably in 1958 by hemodialysis and in 1962 by peritoneal dialysis. Maintenance hemodialysis was established in 1968. The first home hemodialysis have been performed in 1971, only 10 years after the method has been introduced for the first time in England by Stanley Shaldon. The first successful transplantation has been done in 1975 and the first CAPD in 1980. That means that history of home hemodialysis started 33 years ago.

Prerequisites for home hemodialysis Apart from patients' wish it is Center's policy to take into consideration these prerequisites: medical opinion, haemodialysis machine and reverse osmosis, suitable space at home, water and electricity supply, phone line and proper training. Home hemodialysis is not advised to those who are older than 65 and who have serious co-morbid conditions such as: malignant hypertension, serious peripheral vascular disease (including difficulties in creating AV fistula), serious heart disease, seriously impaired vision and psychic disorder that influence adherence to therapy. If patient has stable diabetes mellitus, he is offered to perform home HD. Hemodialysis machine should perform at least bicarbonate dialysis with controlled ultrafiltration. National Health Insurance covers consumables while the Association of Nephrology Dialysis and Transplant Patients usually organize the supply.

### Training of patients for home hemodialysis

Patients are recruited for home HD in pre-dialytic phase of renal failure, during in-hospital treatment or from Limited-Care Unit. It is doctor's responsibility to select the patients who are in good clinical condition, with no co-morbidity and who have stable family life and no short-term perspective of a renal graft. Those patients are encouraged to find the resources and buy the dialysis machine. Patients who are familiar with dialysis procedure (those previously treated in Limited-care Unit) may proceed directly to home HD. Oth-

erwise, they need around three months of in-hospital training that also includes their family member. After training, the whole team (doctor, nurse, technician) start the first dialysis at home and, if patient feels comfortable, he thereafter continues the treatments with family member.

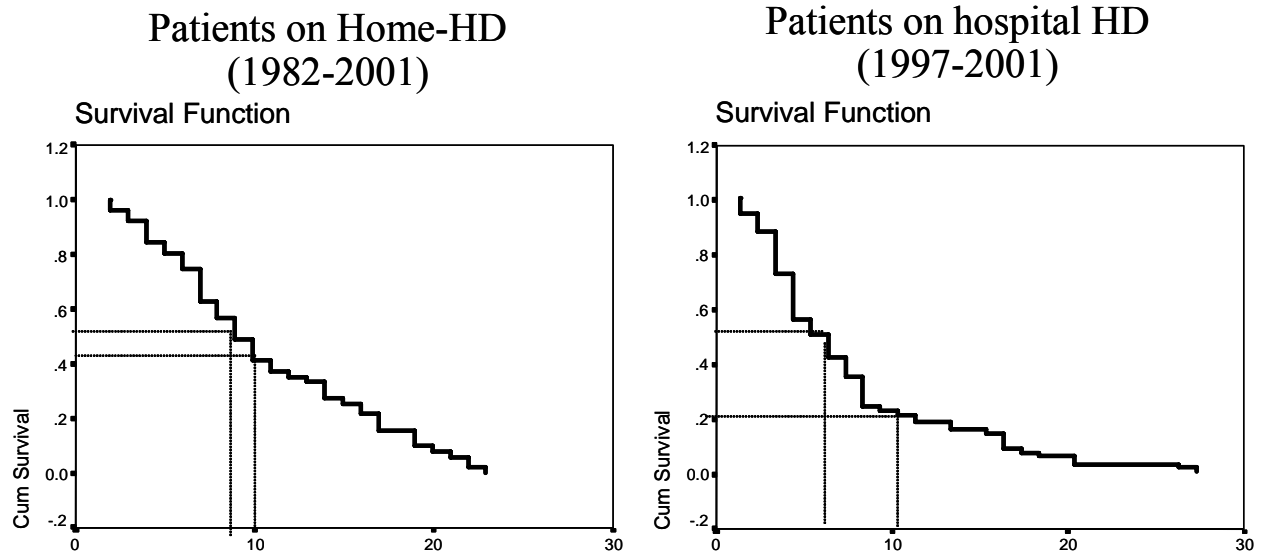
**Results of treatment**

- General data During the last decades, 126 patients were treated by home HD. At the moment, 70 patients are still on treatment while 56 patients died. Their results of treatment were compared to those of patients on hospital HD. Patients on home HD were younger and had high/mid education more frequently than those on hospital HD who had more frequently low education. The most frequent cause of ESRD was glomerulonephritis (home HD) and vascular disease (hospital HD); diabetes was more frequent among patients on hospital HD (9.5% vs. 2.1%). According to a specially prepared questionnaire, 27% of hospital patients were interested in home HD if they were provided with a hemodialysis machine.
- Dialysis procedure Patients were treated by acetate HD (home HD vs. hospital HD = 0 vs. 12.5%), with low-flux membrane (home HD vs. hospital HD = 0 vs.27.2%), and by HDF (home HD vs. hospital HD = 12.9% vs. 10.1%). Dialysis time was 75-90 h (home HD) and 52 h (hospital HD) per month. Dialysers were not re-used neither in home nor in hospital setting.
- Serology There were no differences in hepatitis prevalence between patients (anti-HCV: 27.2% vs. 27%, HbsAg: 3.6% vs. 9%). The most probable reason is that patients on home HD have been inoculated during in-hospital

treatment. There were no HIV positive patients neither on home or on hospital dialysis treatment.

- Laboratory data Patients on home HD had better haemoglobin level (10.5 vs. 8.5 g/dl) since 31% of them were on erythropoietin therapy as compared to only 13% of those on hospital HD. Mean ferritin level was 640 ug/l for those on home HD and 707 ug/l for those on hospital HD due to frequent blood transfusions. Calcium/phosphate metabolism revealed better profile in patients on home HD: they had higher mean calcium (2.41 vs. 2.28 mmol/l) and lower mean phosphate level (1.46 vs. 1.56 mmo/l). The mean ALP level was 79.2 +33.2 IU (home HD) and 181+162 IU (hospital H), mean PTH 379 +236 pmol/l (home HD) and 601+64 pmol/l (hospital HD). Parathyroidectomy was performed in 20% of patients on home HD and in 8.6% of patients on hospital HD. About 22% of patients (home HD) and only 8% (hospital HD) had PTH level les than ULN that means that it was in the range of adynamic bone disease.
- Hospitalisation rate and survival Patients on home HD had 1 hospitalisation per 10 patient years and patients on in-hospital HD had 1 hospitalisation per 3 patient years. Vascular access thrombosis (home HD) and cardiovascular disease (hospital HD) were the most frequent reasons for hospitalisation. Kaplan-Mayer survival curve revealed significantly better survival rate of those on home HD (Figure 1).

**Figure 1. Survival: Kaplan Mayer curves**



Around 42% for those on home HD and only around 20% for those on hospital HD had ten-year survival. The most

frequent mortality reasons in both groups were cardiovascular disease, cerebrovascular disease and infection.

- Rehabilitation Patients on home HD are very attached to their treatment, they are compliant and no drop-outs were registered. They tailored their HD program in relation to dialysis time (mostly 6 hours per session) and their weekly schedule (usually every other day). They significantly improved their intradyalitic tolerance; they had better appetite and less restricted diet. Patients on home HD had better overall rehabilitation; about 45% of them are employed compared to 20% of those on hospital HD.

#### Comment

Even though the results of treatment are better in home than in hospital setting, some of the patients "have got their independence" which meant that they avoided regular monthly control or could even improvise their treatment. In order to avoid this, we need more staff to perform regular home visiting. The problems of machine supply and repair/substitution together with providing the nursing during the dialysis procedure could not be solved without national project and support from the Ministry of Health and National Found of Health.

#### Conclusion

Our experience clearly confirmed that the result of treatment of patients on home HD is significantly better than the results of treatment of patient on hospital hemodialysis. Favourable results can be only partially explained by younger age, underlying renal disease and fewer comorbid conditions in patients on home HD. They have longer dialysis time, they use high-flux membrane for dialysis more often, and they have more dialysis sessions and dialysis hours per months as compared to patients on hospital HD. As a consequence, in home HD patients anaemia and disturbance of calcium/phosphate metabolism were less pronounced. Their hospitalisations were less frequent and their survival longer. Although the interest for home HD is present in about 27% of patients on hospital HD, substantial number of patients refuse home HD. This may change in favour of home HD by better pre-emptive education, more available machines for dialysis and by more flexible approach i.e., acceptance

of those with comorbidity and by providing different degrees of nursing help for those with logistical problems.

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