NDT Plus (2011) 4[Suppl 3]: iii4–iii6
doi: 10.1093/ndtplus/sfr129

NDT PLUS
Nephrology Dialysis Transplantation

# Home dialysis—an international perspective

Martin Wilkie

Sheffield Kidney Institute Sheffield Teaching Hospitals NHS, Sheffield, UK

*Correspondence and offprint requests to*: Martin Wilkie; E-mail: martin.wilkie@sth.nhs.uk

**Abstract**

**Background.** There is strong evidence from a range of long-term conditions of improved outcomes where patients are involved in self-management. Against this background, the international trend for home dialysis continues to decline, with centre-based haemodialysis continuing its dominance.

**Methods.** An opinion-based commentary exploring practice patterns and drivers for home dialysis internationally. Data are drawn from a number of sources including the 2010 United States Renal Data System report.

**Results.** Drivers behind the use of home dialysis are complex including factors relating to the patient and their carers, health care team, health care system, geography and cultural factors. There are important examples where local champions or public health initiatives have had a positive impact on the use of home dialysis; however, in many settings significant barriers remain. Better systems for giving patient information, shared decision making and involving patients in their own care may have the potential to act as a driver for change.

**Conclusion.** Centre-based haemodialysis continues to dominate renal replacement therapy internationally with notable exceptions. Such dominance suggests that most patients worldwide do not get much choice when it comes to modality selection.

**Keywords:** home dialysis; international perspective; practice variation

The 2010 United States Renal Data System (USRDS) report [1] provides valuable information from 2008 on international trends in dialysis and transplantation. Notable variations across the world are seen—with the highest prevalence of end-stage renal disease (ESRD) being seen in Japan and Taiwan at 2000 cases per million of the population (p.m.p) and at the other end of the spectrum just over 100 p.m.p for Bangladesh and the Philippines. Clearly, the incidence of treatment guided by available funding is not the same as the incidence of the disease itself. Indeed, incident renal replacement therapy (RRT) rates are more often related to macroeconomic and renal service factors than measured demographic or general population health status factors [2]. The prevalence of functioning renal transplants ranges from >500 p.m.p in Norway, USA and Spain to very low rates in emerging countries, and transplantation activity clearly impacts on the demographics of the dialysis population in a particular country. There are important differences in the incidence of diabetes as a cause of ESRD contributing nearly 60% in Mexico and ~20% in the UK, and although age and co-morbidity is not reported, these will also be subject to considerable variation.

It is therefore not surprising that against this heterogeneous background, there are wide variations in the use of home dialysis. Centre-based haemodialysis (HD) is dominant, with only 9 countries of the 36 that were included reporting home therapies for >20% of prevalent dialysis patients. These are Canada, Netherlands, Iceland, Finland, Denmark, Australia, New Zealand, Mexico and Hong Kong, in order of increasing prevalence. In the UK, a declining trend meant that home dialysis fell to <20% for the first time in 2008. Among those nine countries, peritoneal dialysis (PD) is the main home therapy with a prevalence of 80% of dialysis in Hong Kong and ~65% in Mexico, and even in the countries in which home haemodialysis (HHD) is popular PD is more common. The prevalence of HHD was 15.6% for New Zealand and 9.4% for Australia, with Denmark reporting 4.6%, Finland 4%, Sweden 2.8%, Netherlands 2.4% and UK 2.1%. The only country with increased prevalent HHD over the last 5 years when reported as a percentage of all dialysis was Denmark, demonstrating an impressive doubling during that period. Equally, no country reported increased use of PD during that period. Of course, several regions where there is significant growth in dialysis are not included in the USRDS report, including India, China and the Middle East.

These data obscure trends from individual centres or regions where clinical champions have led expansion in home therapies. Indeed, this supplement of *NDT Plus* is part of such a renaissance and there is some evidence of a reverse in the declining trend in HHD in a few countries. Increases in absolute numbers on home modalities are obscured by more rapid simultaneous growth in centre-based dialysis and thus the way the data is reported is important. For example, when prevalence is reported as patients per million of the population rather than as percentage of patients on dialysis, increases over recent years are revealed in New Zealand, Canada and Finland [3]. In New Zealand, increased HHD has been contributed to by the use of shared un-staffed houses in Auckland which leads to a discussion around the definition of HHD. Indeed, self-care dialysis facilities are used in Belgium but not reported as HHD [4].

Potential reasons for the wide variation in the usage of home therapies have been discussed in detail [3, 5]. These

can be categorized into factors relating to the patient (including demographic factors, primary disease and co-morbidity), the health care team, the arrangements of health care provision including reimbursement and cultural factors [6]—for example discrepancies in patient selection criteria for HHD between USA and Australia [3]. Differences in outcome between modalities or in patient preferences do not justify these variations and a study that canvassed patient views found that about half would select PD if offered [7]. An important practice difference relates to the use of PD for acute start dialysis [8], which is a common practice in Latin America [9]. In Europe, however, PD is more likely to be used if patients start dialysis in a planned way [10]. However, standards of patient care planning onto dialysis are a major challenge, hampered by unpredictability and service bottlenecks. Provision of information, education and support to make a modality choice that most suits the patient's lifestyle is inconsistent [11], although there are examples of best practice that are inspiring [7]. Most patients do not remember receiving much education about modality choice and even if they did, they may not have the self-confidence or resources to pursue their preference if it is not available locally. This is particularly worrying since the transmission of blood-borne viruses on HD units is a major concern in many parts of the world [12].

Government intervention to manage modality use is notable in countries with higher PD use such as the 'PD first' policy in Hong Kong [13] and has been attempted regionally, for example a PD initiative in Ontario, Canada [14]. However, the success of target setting for PD usage is limited by complex potential barriers to PD including the availability of family support [15]. Despite per capita income being related to the prevalence of RRT, this association did not apply to HHD. Indeed, HHD is absent from middle-income countries despite the stated cost-effectiveness of the modality [16]. It seems that when left to market forces, centre-based HD tends to predominate, possibly because it fits best with business modelling. It is likely that where physician reimbursement is related to the number of patients occupying centre-based HD units, referrals for home therapies become a disincentive. A growth in nocturnal HHD in Australia followed alterations in reimbursement to incentivize the use of this modality. In Finland, the increase in HHD followed several changes including reimbursement as well as centralized training and systematic identification of patients [3]. Recent changes to reimbursement in the USA may have a positive impact on home therapies [17]. The Department of Health in the UK is also in the process of developing a tariff-based reimbursement system that will incentivize the use of home therapies.

Capital costs of treatment set-up can be a barrier to HHD that has greater impact in areas of the world where centre-based dialysis costs are lowest due to low staffing costs or standards of care. Even in the UK National Health Service, obtaining capital for home set-up is challenging despite the evidence of cost-effectiveness of HHD in the UK. It may be that leasing smaller machines that do not require home adaptation will provide a solution. However, it is possible that broadening patient selection criteria will lead to a reduction in technique survival impacting on cost-effectiveness, if set-up costs remain high. Median HHD technique survival in the UK is only 18 months [18] just exceeding the 14 months considered necessary to break even on set-up costs [19].

Do home modalities compete with each other for patients? A study from Toronto General Hospital suggests otherwise since the demographics of HHD patients on their programme were significantly different to those on PD. HHD patients tended to be younger and were more likely to be male than PD patients, who were more likely to have diabetes or hypertension [20]. Indeed, MacGregor *et al.* [16] noted a positive association between the use of PD and HHD, although no relation to transplantation rates. Baseline factors such as age and co-morbidity have been demonstrated to have an impact on selection for PD and HHD and clearly these vary considerably from region to region [16, 21].

Historically, HHD was the predominant treatment in many countries but increased RRT requirements led to the expansion of facility-based dialysis, the development of satellite dialysis units and the advent of continuous ambulatory peritoneal dialysis (reviewed in the Renal Association UK Home Haemodialysis Working Party Document 2010 [22]). Geography is an understandable factor that influences the choice of home therapies, as living a significant distance from the dialysis unit is a strong incentive to dialyse at home. However, its role as an overriding factor has been challenged by the observation that Australia is a more urban country than the USA (referenced in [3]). Accommodation arrangements are clearly important both for storage of supplies for PD and importantly to allow home adaptations for HHD. In the cities of the world where floor space is at a premium, it is not surprising that HHD is not popular and here, the newer generation of smaller machines may have an impact.

There is evidence of improved outcomes for a range of long-term conditions where patients are involved in self-management [23, 24]. It has been observed that in many spheres, home therapy is potentially a win–win situation—offering better care at reduced cost [25]. Within the renal domain, involving patients in their choice of dialysis modality through good quality education leads to more patients selecting self-care [26]. Would it be unreasonable to have an international objective that each renal centre should offer both hospital and home-based therapy in an unbiased way, supporting shared decision making and encouraging patients to have as much involvement as possible in their own care?

*Conflict of interest statement*. M.W. has received lecturing honoraria from Gambro, Baxter and Fresenius and has participated in clinical trials with Baxter and Fresenius.

## References

1. U.S. Renal Data System. *USRDS 2010 Annual data report*. Bethesda, MD: National Institutes of Health, National Institute of Diabetes and Digestive and Kidney Diseases, 2008. http://www.usrds.org/adr.htm (1 April 2011, date last accessed)
2. Caskey FJ, Kramer A, Elliott RF *et al.* Global variation in renal replacement therapy for end-stage renal disease. *Nephrol Dial Transplant* 2011; 26: 2604–2610
3. Agar JW. International variations and trends in home hemodialysis. *Adv Chronic Kidney Dis* 2009; 16: 205–214
4. Goovaerts T, Jadoul M, Goffin E. Influence of a pre-dialysis education programme (PDEP) on the mode of renal replacement therapy. *Nephrol Dial Transplant* 2005; 20: 1842–1847

5. Wauters JP, Uehlinger D. Non-medical factors influencing peritoneal dialysis utilization: the Swiss experience. *Nephrol Dial Transplant* 2004; 19: 1363–1367
6. Lameire N, Van Biesen W. Epidemiology of peritoneal dialysis: a story of believers and nonbelievers. *Nat Rev Nephrol* 2010; 6: 75–82
7. Oliver MJ, Quinn RR, Richardson EP *et al.* Home care assistance and the utilization of peritoneal dialysis. *Kidney Int* 2007; 71: 673–678
8. Povlsen JV, Ivarsen P. How to start the late referred ESRD patient urgently on chronic APD. *Nephrol Dial Transplant* 2006; 21 (Suppl 2): ii56–ii59
9. Riella MC, Locatelli AJ. History of peritoneal dialysis in Latin America. *Perit Dial Int* 2007; 27: 322–327
10. Marron B, Ortiz A, de Sequera P *et al.* Impact of end-stage renal disease care in planned dialysis start and type of renal replacement therapy—a Spanish multicentre experience. *Nephrol Dial Transplant* 2006; 21 (Suppl 2): ii51–ii55
11. Mehrotra R, Marsh D, Vonesh E *et al.* Patient education and access of ESRD patients to renal replacement therapies beyond in-center hemodialysis. *Kidney Int* 2005; 68: 378–390
12. KDIGO clinical practice guidelines for the prevention, diagnosis, evaluation, and treatment of hepatitis C in chronic kidney disease. *Kidney Int Suppl* 2008; 109: S1–S99
13. Li PK, Chow KM. Peritoneal dialysis patient selection: characteristics for success. *Adv Chronic Kidney Dis* 2009; 16: 160–168
14. Mendelssohn DC, Langlois N, Blake PG. Peritoneal dialysis in Ontario: a natural experiment in physician reimbursement methodology. *Perit Dial Int* 2004; 24: 531–537
15. Oliver MJ, Garg AX, Blake PG *et al.* Impact of contraindications, barriers to self-care and support on incident peritoneal dialysis utilization. *Nephrol Dial Transplant* 2010; 25: 2737–2744
16. MacGregor MS, Agar JW, Blagg CR. Home haemodialysis-international trends and variation. *Nephrol Dial Transplant* 2006; 21: 1934–1945
17. Golper TA, Guest S, Glickman JD *et al.* Home dialysis in the new USA bundled payment plan: implications and impact. *Perit Dial Int* 2011; 31: 12–16
18. Nitsch D, Steenkamp R, Tomson CR *et al.* Outcomes in patients on home haemodialysis in England and Wales, 1997-2005: a comparative cohort analysis. *Nephrol Dial Transplant* 2011; 26: 1670–1677
19. Mackenzie P, Mactier RA. Home haemodialysis in the 1990s. *Nephrol Dial Transplant* 1998; 13: 1944–1948
20. Rioux JP, Bargman JM, Chan CT. Systematic differences among patients initiated on home haemodialysis and peritoneal dialysis: the fallacy of potential competition. *Nephrol Dial Transplant* 2010; 25: 2364–2367
21. van de Luijtgaarden MW, Noordzij M, Stel VS *et al.* Effects of comorbid and demographic factors on dialysis modality choice and related patient survival in Europe. *Nephrol Dial Transplant* 2011; 26: 2940–2947
22. Mactier R, Mitra S, Boakes S *et al. Renal Association Working Party On Home Haemodialysis.* Renal Association UK 2009 http://www.renal.org/whatwedo/Publications.aspx (1 April 2011, date last accessed)
23. Speight J, Amiel SA, Bradley C *et al.* Long-term biomedical and psychosocial outcomes following DAFNE (Dose Adjustment For Normal Eating) structured education to promote intensive insulin therapy in adults with sub-optimally controlled Type 1 diabetes. *Diabetes Res Clin Pract* 2010; 89: 22–29
24. Singh D. Transforming chronic care: a systematic review of the evidence. *Evid Based Cardiovasc Med* 2005; 9: 91–94
25. Landers SH. Why health care is going home. *N Engl J Med* 2010; 363: 1690–1691
26. Manns BJ, Taub K, Vanderstraeten C *et al.* The impact of education on chronic kidney disease patients' plans to initiate dialysis with self-care dialysis: a randomized trial. *Kidney Int* 2005; 68: 1777–1783