



# Home haemodialysis: how it began, where it went wrong, and what it may yet be

John W. M. Agar<sup>1</sup> · Katherine A. Barraclough<sup>2</sup> · Giorgina B. Piccoli<sup>3,4</sup>

Received: 30 January 2019 / Accepted: 10 February 2019 / Published online: 19 March 2019  
© Italian Society of Nephrology 2019

In the first period of maintenance dialysis (circa 1960–1972/3), there was a hope—even an expectation—among the pioneers of dialysis [Shaldon and Buoncrisiani in the UK and Europe (both pictured), and Scribner in the US] that dialytic therapies may evolve into a primarily home-delivered self-care process that could be held at arms' length from the hospital precinct. And ... for a time, this goal seemed achievable (Figs. 1, 2).

However, as fate would have it, politics dealt home dialysis an unintended consequence [1]. One week prior to the US presidential election in 1972, an 11th hour addendum to the Social Security Amendment Act H.R.1 (Section 2991) saw Medicare assume responsibility for the provision of and payment for maintenance dialysis in the US—an addendum that opened the flood gates for for-profit dialysis in 'centres' while—likely unintentionally—fiscally biasing against home management. Home dialysis—at that time accounting for some 50% of all patients on dialysis in the US—was dead in the water. Most other jurisdictions followed suit.

Ironically as it turns out, in that very same year, a new Labor government came to power in Australia with a highly popular platform to introduce universal healthcare for all. A stated and rapidly legislated subtext of that platform was that all dialysis modalities and regimens would be provided, free

of charge, and at any site (home or centre), for any and all Australians who might reach end-stage renal failure [2]. That promise rapidly translated to legislation, and has remained in place to this day.

So, here are two countries—so similar in many ways—yet with starkly divergent political policies around dialysis, both hatched contemporaneously. Not surprisingly and in relative terms, home dialysis continued to flourish in Australia, while it progressively withered across the US. At the end of 2017, ~18% of all dialysis in Australia is at home [3]. In the US, cumulative home peritoneal and haemodialysis was 8.3% [4]. Meanwhile, putting all to shame, at the end of 2017 47% of all patients in New Zealand were dialyzing at home [3].

Further, in Australia, where home dialysis is ~2/3rds the annual per-patient cost of centre-based dialysis [5], home dialysis modalities have been encouraged and actively supported. In the US, where profit-taking still dominates dialysis-delivery models, the lack of a profit margin in home management has remained a disincentive to growth in home care. This is so, despite clear data that demonstrates better outcomes and survival in home care programs [6].

In Europe, the development of home hemodialysis in the UK quickly triggered a similar interest in France, then Italy [7]. But no parallel legislative framework emerged to regulate home therapies. When the first Italian patient began

This article is part of the topical collection on Home Haemodialysis.

✉ John W. M. Agar  
johna@barwonhealth.org.au

<sup>1</sup> Renal Services, University Hospital Geelong, Barwon Health and Deakin University School of Medicine, 74–76 Swanston Street, Geelong, VIC 3220, Australia

<sup>2</sup> Department of Nephrology, Royal Melbourne Hospital, Parkville, Australia

<sup>3</sup> Service de Néphrologie, Centre Hospitalier Le Mans, Le Mans, France

<sup>4</sup> Department of Clinical and Biological Sciences, University of Torino, Torino, Italy



**Fig. 1** Stanley Shaldon, one of the fathers of home hemodialysis used to say: “our dream, dialysis as the insulin for diabetics” (the interview is available at Era-Edta—PIONEERS OF THE EUROPEAN NEPHROLOGY) (Courtesy of Gil Richero)



**Fig. 2** Umberto Buoncristiani built the first portable artificial kidney with recirculated dialysis fluid to allow one of his patients, a fisherman and a painter, to go in vacation with his children (the interview is available at <https://www.youtube.com/watch?v=ILbWLSetyT8>) (Courtesy of Gil Richero)

overnight home hemodialysis in Torino in 1971, the caring physicians were warned that they may be pursued—though less likely condemned—for ‘stealing’ hospital supplies. This led to the introduction of regional Italian legislation to regulate home hemodialysis 2 years later.

Like in the US, hemodialysis reimbursement policies in most European countries strongly favored for-profit centre-based care. These policies rapidly reduced enthusiasm for home-care models, and dominated dialysis practice for 30 years. Only recently have European patient associations and governments—perhaps encouraged by a trifecta of perceived positives: lower costs, better outcomes, and enhanced mobility—began to rekindle a widening interest in home dialysis.

As yet, robust home programs in Europe are few, legislative reimbursement disincentives must still be overcome, patient ‘empowerment’ is still a term often used but seldom practiced, and the notion that hemodialysis—if well supported at home—can be successfully incorporated into daily life, are hurdles to be overcome. The perceived complexity of dialysis treatment is often used as an alibi for facility-only models of care, and much work is needed to re-establish a ‘cultural belief’ in the capacity of ordinary people to manage self-care. Finally, mending bridges in the largely lost concept of patient-physician cooperation and partnership is a critical factor [8].

In the last decade, there has been some positive movement in home hemodialysis in the US. In this period, and aided by the increasing popularity of the NxStage family of hemodialysis systems, US home HD numbers have more than trebled from ~0.4% of all dialysis to ~1.5% of all dialysis. Though the US home share of all dialysis remains far less than the shared bi-national home hemodialysis tally of 10% of all dialysis in Australia and New Zealand (ANZ), the move is heartening and the numbers at home, in absolute terms, are now significant.

That said, home practice patterns remain vastly different. ANZ home hemodialysis regimens favor long, slow, frequent and overnight HD with most patients availing upwards of 25 h of dialysis per week. In contrast, the short daily home regimens still in favor in the US often fail to materially alter the total number of hours delivered per week—a factor that ANZ nephrologists broadly believe to be crucial.

In several European countries, the availability of new and more portable hemodialysis systems aimed at simplifying home hemodialysis has resulted in a new enthusiasm for home-based self-care, though the power of industry pressure to influence treatment choice remains strong. The current US short daily care model is consistent with previous European experiences, and in particular with the pioneer work of Umberto Buoncristiani in Italy [9, 10], and will likely be the dominant European home-care model in most countries.

That said, as several newer systems are emerging that favor home and/or self-care, and as a growing number of patients demand more mobile systems, further growth in the uptake of home haemodialysis in the near-to-medium term seems likely, as does a proliferation of personal choice in the frequency and duration of trans-weekly sessional care.

It seems timely, therefore, to take stock of current global trends in home haemodialysis in order that better planning and service provision can be assured into the future.

## Compliance with ethical standards

**Conflict of interest** JWMA is a member of the Medical Advisory Board of Quanta Dialysis Technologies.

**Ethical approval** This article does not contain any studies with human participants performed by any of the authors.

## References

1. Rettig R (1991) Origins of the medicare kidney disease entitlement: the Social Security Amendments of 1972. Biomedical Politics. National Academies Press. <https://www.nap.edu/read/1793/chapter/6>. Accessed 25 Jan 2019
2. Agar JWM, George C, Kerr PG (2018) Dialysis: history, development and promise. In: Ing TS, Rahman MA, Kjellstrand CM (eds) Book Chapter: history of dialysis. World Scientific Press, Singapore (ISBN-10: 9814289752/ISBN-13: 978-9814289754)
3. ANZDATA: Annual Report 2018 (2019) [http://www.anzdata.org.au/v1/report\\_2018.html](http://www.anzdata.org.au/v1/report_2018.html). Accessed 30 Jan 2019
4. USRDS (2018) Report: Chapter 1. Incidence, prevalence, patient characteristics, and treatment modalities. [https://www.usrds.org/2018/view/v2\\_01.aspx?zoom\\_highlight=percentage+on+Home+dialysis](https://www.usrds.org/2018/view/v2_01.aspx?zoom_highlight=percentage+on+Home+dialysis). Accessed 30 Jan 2019
5. Cass A et al (2019) The economic impact of kidney disease in Australia: projections to 2020. Kidney Health Australia. <https://kidney.org.au/cms/uploads/docs/kha-economic-impact-of-eskd-in-australia-projections-2020.pdf>. Accessed 25 Jan 2019

6. Marshall MR, Polkinghorne KR, Kerr PG, Hawley CM, Agar JWM, McDonald SP (2016) Intensive hemodialysis and mortality risk in Australian and New Zealand populations. *Am J Kidney Dis* 67(4):617–628
7. Shaldon S (2004) History of home hemodialysis. *J Nephrol* 17(2):316–317
8. Piccoli GB, Bermond F, Mezza E, Quaglia M, Pacitti A, Jeantet A, Segoloni GP (2002) Home hemodialysis. revival of a superior dialysis treatment. *Nephron* 92(2):324–332
9. Buoncristiani U (1998) Fifteen years of clinical experience with daily haemodialysis. *Nephrol Dial Transplant* 13(Suppl 6):148–151
10. Kjellstrand CM, Buoncristiani U, Ting G, Traeger J, Piccoli GB, Sibai-Galland R, Young BA, Blagg CR (2008) Short daily haemodialysis: survival in 415 patients treated for 1006 patient-years. *Nephrol Dial Transplant* 23(10):3283–3289

**Publisher's Note** Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.