

Intensive and home hemodialysis : acute effects and long-term outcomes

Citation for published version (APA):

Cornelis, T. (2015). *Intensive and home hemodialysis : acute effects and long-term outcomes*. [Doctoral Thesis, Maastricht University]. Datawyse / Universitaire Pers Maastricht. <https://doi.org/10.26481/dis.20150610tc>

Document status and date:

Published: 01/01/2015

DOI:

[10.26481/dis.20150610tc](https://doi.org/10.26481/dis.20150610tc)

Document Version:

Publisher's PDF, also known as Version of record

Please check the document version of this publication:

- A submitted manuscript is the version of the article upon submission and before peer-review. There can be important differences between the submitted version and the official published version of record. People interested in the research are advised to contact the author for the final version of the publication, or visit the DOI to the publisher's website.
- The final author version and the galley proof are versions of the publication after peer review.
- The final published version features the final layout of the paper including the volume, issue and page numbers.

[Link to publication](#)

General rights

Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

- Users may download and print one copy of any publication from the public portal for the purpose of private study or research.
- You may not further distribute the material or use it for any profit-making activity or commercial gain
- You may freely distribute the URL identifying the publication in the public portal.

If the publication is distributed under the terms of Article 25fa of the Dutch Copyright Act, indicated by the "Taverne" license above, please follow below link for the End User Agreement:

www.umlib.nl/taverne-license

Take down policy

If you believe that this document breaches copyright please contact us at:

repository@maastrichtuniversity.nl

providing details and we will investigate your claim.

As the objective of the analysis was to compare the cost-effectiveness of high dose HD (both in-centre and at home) with conventional in-centre HD, the key parameters of the analysis were quality of life and the survival rates of the studied treatments. The quality of life of a dialysis patient can be determined by health-profile measures which assess health status on a number of domains, such as physical, emotional, or social impairments²². They allow the quantification of utilities of dialysis patients on a scale from 0 to 1, in which 1 corresponds to a perfect health state of the patient. Benefits of high dose HD compared to conventional HD in terms of quality of life were derived from Culleton et al.²³. Within economic evaluations, the health benefit of a therapy can be expressed in quality adjusted life years (QALYs). QALYs are determined by adjusting the life expectancy (survival) of the patient for the quality of life lived during those years. In this cost-effectiveness analysis, high dose HD therapy (5 sessions of 4 hours HD per week for in-centre high dose HD, and 5 sessions of 7 hours HD per week for high dose home HD) was compared with the current standard-of-care therapy, i.e. in-centre conventional HD (ICHHD) (3 sessions of 4 hours HD per week). The differences in cost were weighed against the differences in health benefit ('effect'); this ratio is called the 'incremental cost-effectiveness ratio' (ICER).

$$\text{Incremental Cost-Effectiveness Ratio (ICER)} = \frac{\Delta \text{ COST}}{\Delta \text{ EFFECTIVENESS}} = \frac{\text{Total cost}_{\text{high dose HD}} - \text{Total cost}_{\text{conventional ICHD}}}{\text{QALY}_{\text{high dose HD}} - \text{QALY}_{\text{conventional ICHD}}}$$

In our model, costs included treatment initiation (dialysis access), treatment (weekly tariffs based on Achmea, including erythropoietin), medication (especially phosphate binders and antihypertensives), complications (hospitalizations), and transportation costs. The willingness to pay (WTP) in the Netherlands lies between €20.000 and €80.000 per QALY. In scenario 1 (100% of patients starting on in-centre conventional HD versus 100% of patients starting on high dose in-centre HD), the ICER was €279.521 per QALY, which lies far above the WTP threshold of €80.000 per QALY. Although high dose HD results in a health benefit increase (+0,267 QALYs) in comparison with conventional in-centre HD, the additional cost (+€74.589) for treating the patient with this treatment in-centre is higher than the agreed maximum limit for a treatment. In scenario 2 (100% of patients starting on in-centre conventional HD versus 100% of patients starting on high dose home HD), the ICER was €16.331 per QALY, and thus lies below the WTP. High dose HD increased the health benefit of dialysis (+0,478 QALYs) for an acceptable cost (+€7.795) when the patients were treated at home in comparison with in-centre conventional HD. In scenario 3 (100% of patients starting on in-centre conventional HD versus 100% of patients starting on conventional home HD),

the ICER was dominant (-€87.613 per QALY), signifying that there is an additional health benefit (+0,242 QALYs) when treating patients conventionally at home instead of conventionally in-centre for less costs (-€21.205). In conclusion, also in the Netherlands, home HD is a cost-effective alternative to centre-based HD. These results support our strategy to increase the adoption of home dialysis in our patients with ESRD.

References

1. Grassmann A, Gioberge S, Moeller S, Brown G. ESRD patients in 2004: global overview of patient numbers, treatment modalities and associated trends. *Nephrol Dial Transplant* 2005;20:2587-93.
2. US Renal Data System. Costs of ESRD. In: *USRDS 2013 Annual Data Report*. www.usrds.org/2013/v2_ch11_13.pdf
3. Ashton T, Marshall MR. The organization and financing of dialysis and kidney transplantation services in New Zealand. *Int J Health Care Finance Econ* 2007;7:233-52.
4. Cass A, Chadban S, Gallagher M, et al. The economic impact of end-stage kidney disease in Australia: projections to 2020. Sydney, Australia; The George Institute for Global Health; 2010.
5. Manns BJ, Mendelssohn DC, Taub KJ. The economics of end-stage renal disease care in Canada: incentives and impact on delivery of care. *Int J Health Care Finance Econ* 2007;7:149-69.
6. US Renal Data System. International comparisons. In: *USRDS 2013 Annual Data Report*. www.usrds.org/2013/v2_ch12_13.pdf
7. McDonald S, Clayton P, Hurst K. The Australia and new Zealand Dialysis and Transplant Registry 35th Annual Report. Adelaide, Australia: ANZDATA; 2012.
8. US Renal Data System. *USRDS 2013 Annual Data Report: Atlas of End-Stage Renal Disease in the United States. Vol 2 – Atlas ESRD. International Comparisons*. National Institutes of Health, National Institute of Diabetes and Digestive and Kidney Diseases. Bethesda, MD. 2013: 333–344. Available at: www.usrds.org/2013/pdf/v2_ch12_13.pdf. Accessed June 2, 2014.
9. 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;20:1842-7.
10. Goovaerts T, Jadoul M, Goffin E. Influence of a predialysis education program on the choice of renal replacement therapy. *Am J Kidney Dis* 2012;60:499; author reply 499-500.
11. http://intraspect4.azm.nl/root/diensten_root/projectenENDossiers_root/visieopzorg_root/visiedocument+medici.pdf. Accessed January 28, 2015.
12. Walker RC, Hanson CS, Palmer SC, et al. Patient and caregiver perspectives on home hemodialysis: a systematic review. *Am J Kidney Dis* 2015;65:633-48.
13. Walker R, Marshall MR, Morton RL, McFarlane P, Howard K. The cost-effectiveness of contemporary home haemodialysis modalities compared with facility haemodialysis: a systematic review of full economic evaluations. *Nephrology* 2014;19:459-470.
14. McFarlane PA, Bayoumi AM, Pierratos A, Redelmeier DA. The quality of life and cost utility of home nocturnal and conventional in-center hemodialysis. *Kidney Int* 2003;64:1004-11.
15. Kroeker A, Clark WF, Heidenheim AP, et al. An operating cost comparison between conventional and home quotidian hemodialysis. *Am J Kidney Dis* 2003;1:49-55.
16. Gonzalez-Perez JG, Vale L, Stearns SC, Wordsworth S. Hemodialysis for end-stage renal disease: a cost-effectiveness analysis of treatment-options. *Int J Technol Assess Health Care* 2005;21:32-9.
17. Malmstrom RK, Roine RP, Heikkila A, et al. Cost analysis and health-related quality of life of home and self-care satellite haemodialysis. *Nephrol Dial Transplant* 2008;23:1990-96.
18. Howard K, Salkeld G, White S, et al. The cost-effectiveness of increasing kidney transplantation and home-based dialysis. *Nephrology* 2009;14:123-32.
19. Klarenbach S, Tonelli M, Pauly R, et al. Economic evaluation of frequent home nocturnal hemodialysis based on a randomized controlled trial. *J Am Soc Nephrol* 2014;25:587-94.
20. Beby AT, Cornelis T, Zinck R, Culleton B. The cost-effectiveness of high dose hemodialysis in the Netherlands: in-centre and at home. Manuscript in preparation.
21. Kirby L, Vale L. Dialysis for end-stage renal disease. Determining a cost-effective approach. *Int J Technol Assess Health Care* 2001;17:181-189.
22. Liem YS, Bosch JL, Hunnink MG. Preference-based quality of life of patients on renal replacement therapy: a systematic review and meta-analysis. *Value in Health* 2008;11:733-741.
23. Culleton BF, Walsh M, Klarenbach SW, et al. Effect of frequent nocturnal hemodialysis vs conventional hemodialysis on left ventricular mass and quality of life: a randomized controlled trial. *JAMA* 2007; 98:1291-99.