How Economics Can Drive Home Dialysis Use

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DISCLOSURES

- Lecture Fees – Fresenius Medical Care
- Research Grants
  - Industry – VIFOR Pharma and Novartis
  - Funding Bodies – National Institute for Health Research, Kidney Research UK

How Economics Can Drive Home Dialysis Use? Overview – It's all about Perspective

- Principles of Health Economics
  - Core goals
  - Informing data and techniques
  - Perspective
- What Health Economics thinks about home dialysis
- What policy makers, clinicians and patients think about the economics of home dialysis

ECONOMICS CONCERNS HOW SOCIETY ALLOCATES ITS RESOURCES AMONG ALTERNATIVE USES.

(When it is working well)

What is health and how do we put a value on it?

What influences supply and demand

Economic Evaluation

Relating the costs and benefits to alternative ways of delivering care

Cost Minimisation

Minimise total cost

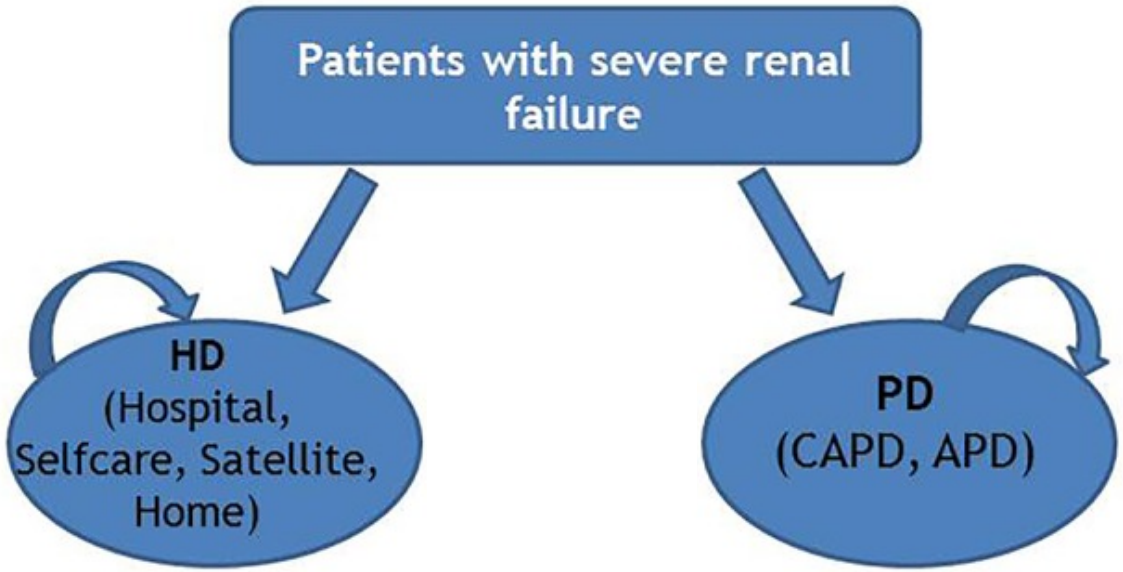
Cost Effectiveness

Cost to prevent an event

Cost Utility

Cost per QALY

How do we evaluate the health economics of home dialysis?

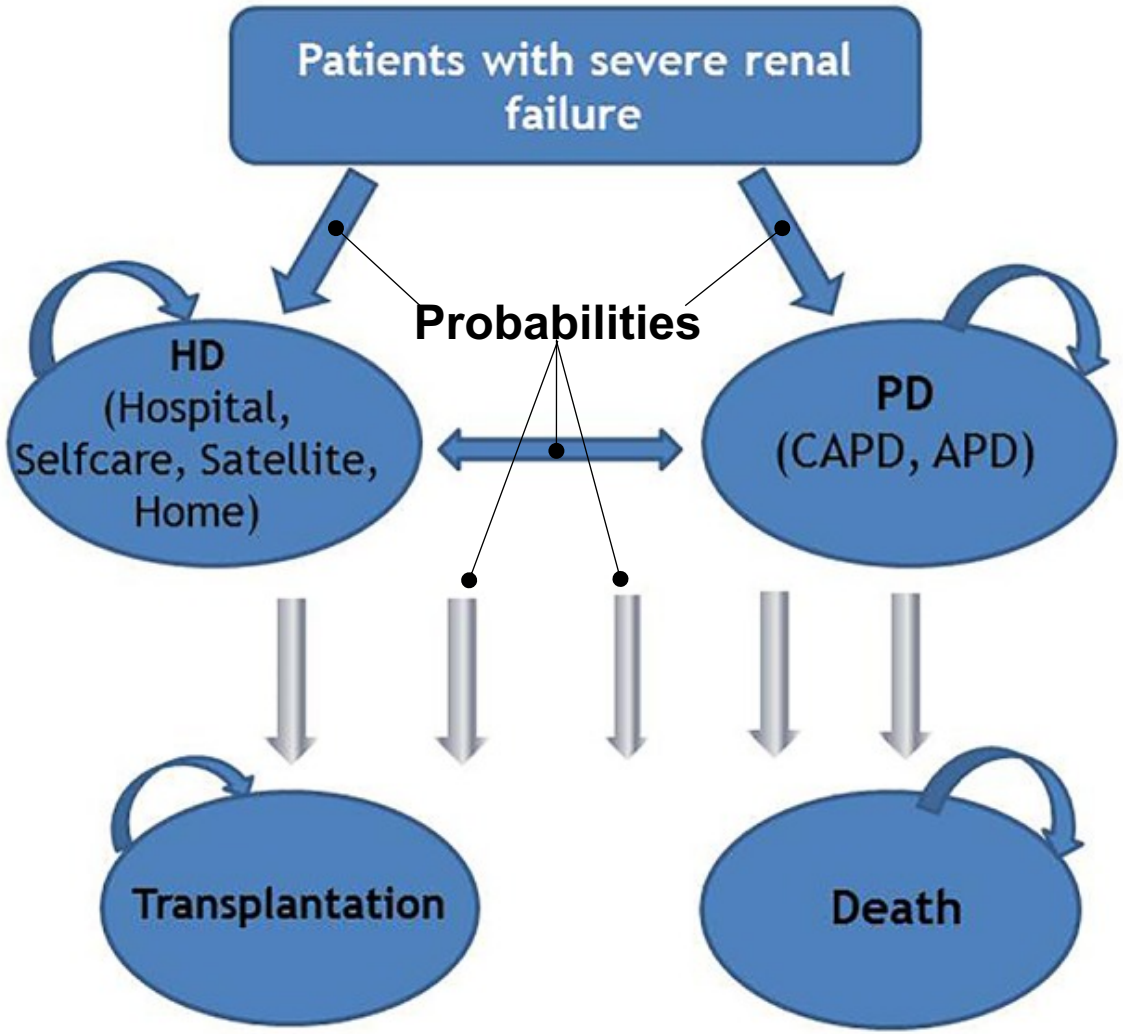


COSTS

	HD hospital	HD self-care	HD satellite	HD home	PD
Personnel costs	32K	24K	32K	4K	5K
Dialysis supplies	86K	86K	86K	408K	274K
Training	0K	1K	0K	10K	6K
Medication	106K	84K	106K	96K	26K
Complications	24K	24K	21K	19K	31K
Capital costs	45K	45K	45K	5K	6K
Transport costs	227K	227K	166K	160K	110K

Pike E, Hamidi V, Ringerike T et al. More use of peritoneal dialysis gives significant savings: a systemic review and health economic decision model. J ClinMed Res 2017; 9: 104–116

How do we evaluate the health economics of home dialysis?



PROBABILITIES

	Annual Probability Range
PD to HD	0.05 – 0.14
HD to PD	0.01 – 0.03
Dialysis to Transplant	0.07 – 0.13
Dialysis to Death	0.10 – 0.23

UTILITIES

(Health Related Quality of Life, 0:Dead, 1:Perfect Health)

	Annual Probability Range
Dialysis	0.54
Infection	0.35
Acute Myocardial Infarction	0.27
Sepsis	0.26

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WHAT DO THESE EVALUATIONS CONCLUDE?

Table 2. Results of the Base-Case Cost-Effectiveness Analyses Over a 5-Year Time Horizon From a Societal Perspective (Discounted) (EUR1.00 ≈ NOK7.47)

	Total costs (EUR)	Effects (QALYs)	Versus PD			Sequential ICER (EUR/QALY)
			Incremental cost (EUR)	Incremental effect (QALYs)	ICER (EUR/QALY)	
PD	164,741	1.6825				
HD home	228,362	1.8613	63,621	0.1788	355,822	355,822
Dominated strategies						
HD hospital	317,501	1.7169	152,760	0.0344	4,440,698	Dominated by HD home
HD self-care	261,260	1.7170	96,519	0.0344	2,805785	Dominated by HD home
HD satellite	352,048	1.7181	187,308	0.0356	5,261,461	Dominated by HD home

All HD strategies were compared to PD, because none of the more effective strategies were cost-effective compared to PD. QALY: quality-adjusted life year; ICER: incremental cost-effectiveness ratio; INHB: incremental net health benefit; HD: hemodialysis; PD: peritoneal dialysis.

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PERSPECTIVE 1: THE COUNTRY

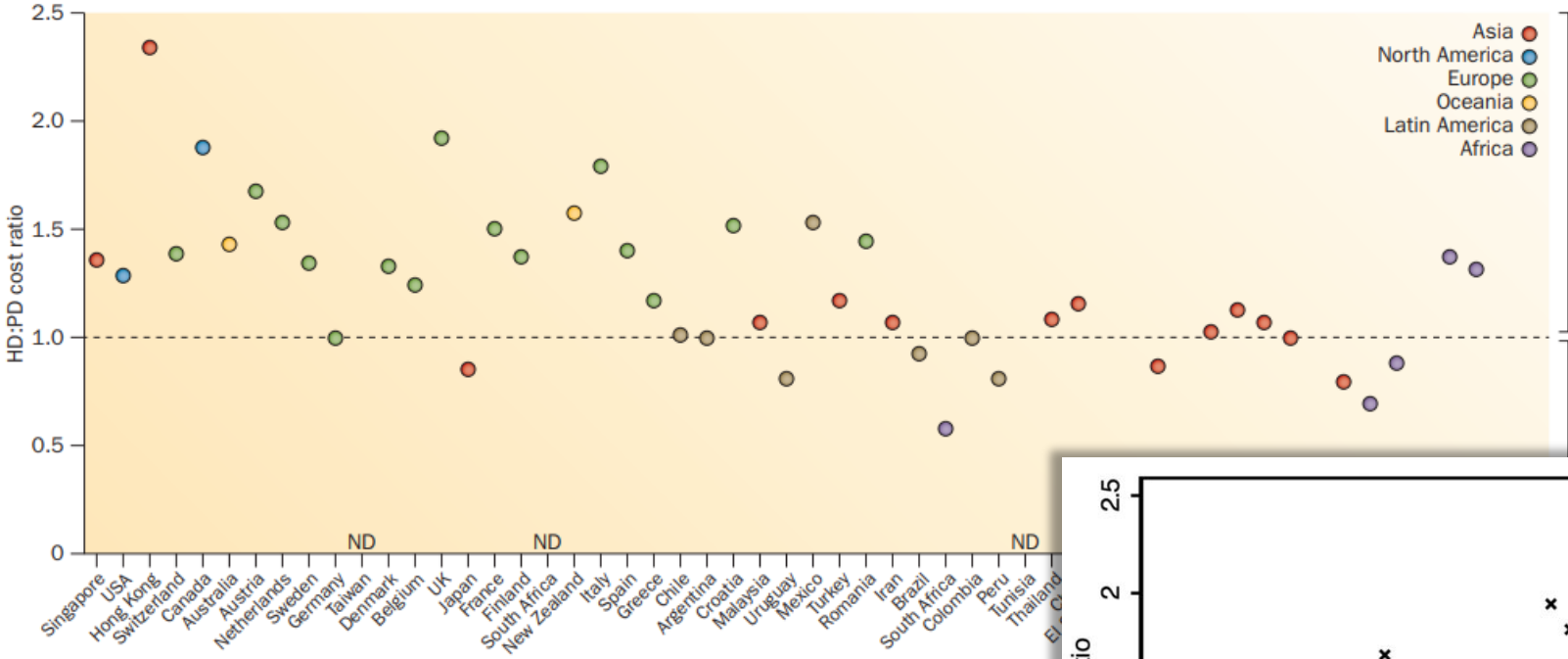
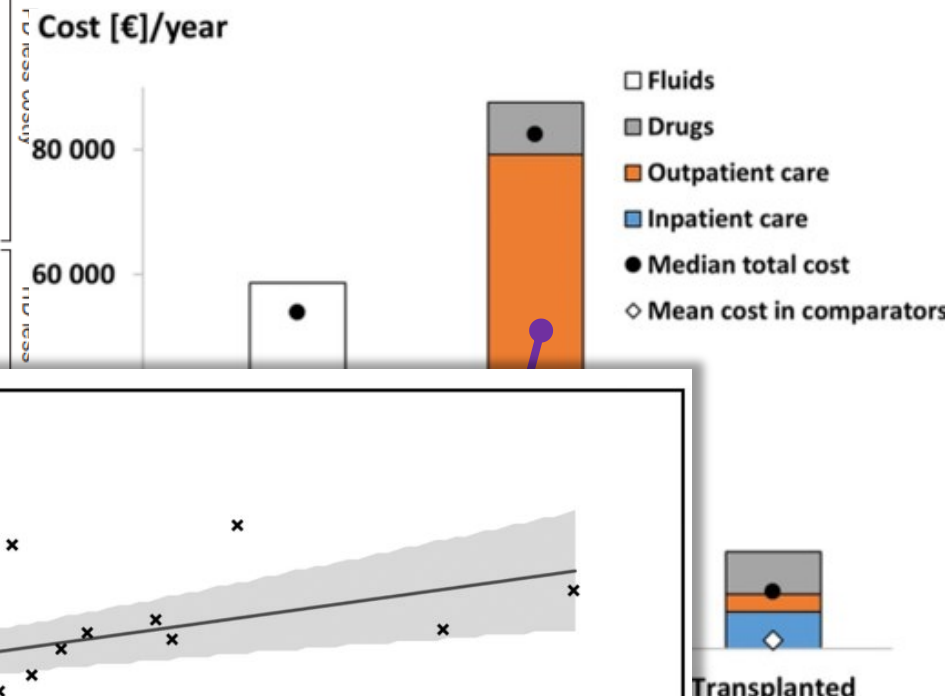
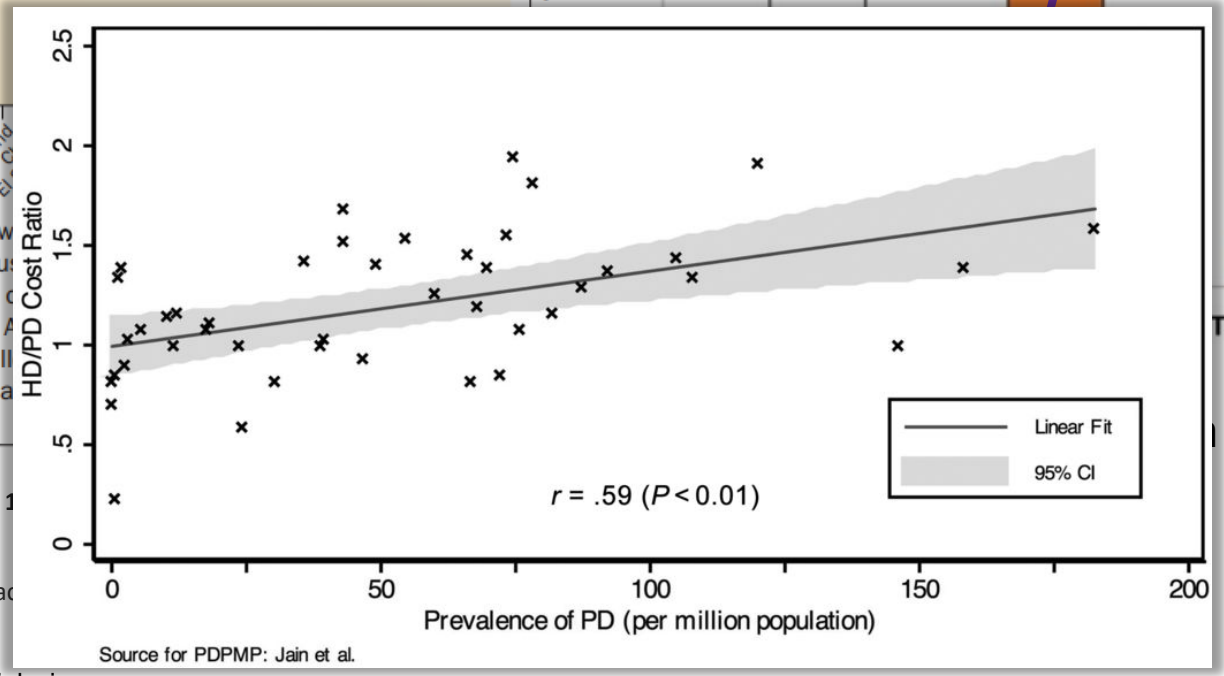


Figure 2 | National variations in HD:PD cost ratios in 46 countries worldw
to lowest GDP per capita (based on International Monetary Fund data[76] u
HD:PD ratio >1 indicates that PD is less costly than HD, whereas a ratio
option. In high-income 'developed' countries, particularly those in North A
associated with lower costs than HD. In 'developing' countries with small
PD is less costly in many nations, particularly in African nations. Abbrevia
peritoneal dialysis.





Klarenbach, S., Tonelli, M., Chui, B. *et al.* Economic evaluation of dialysis therapies. *Nat Rev Nephrol* 1
(2014). https://doi.org/10.1038/nrneph.2014.145

Eriksson JK, Neovius M, Jacobson SH, *et al* Healthcare costs in chronic kidney disease and renal replac
doi: 10.1136/bmjopen-2016-012062

Karopadi, A. N., Mason, G., Rettore, E. & Ronco, C. Cost of peritoneal dialysis and haemodialysis across the world. *Nephrol. Dial. Transplant*. 28, 2553–2569 (2013).

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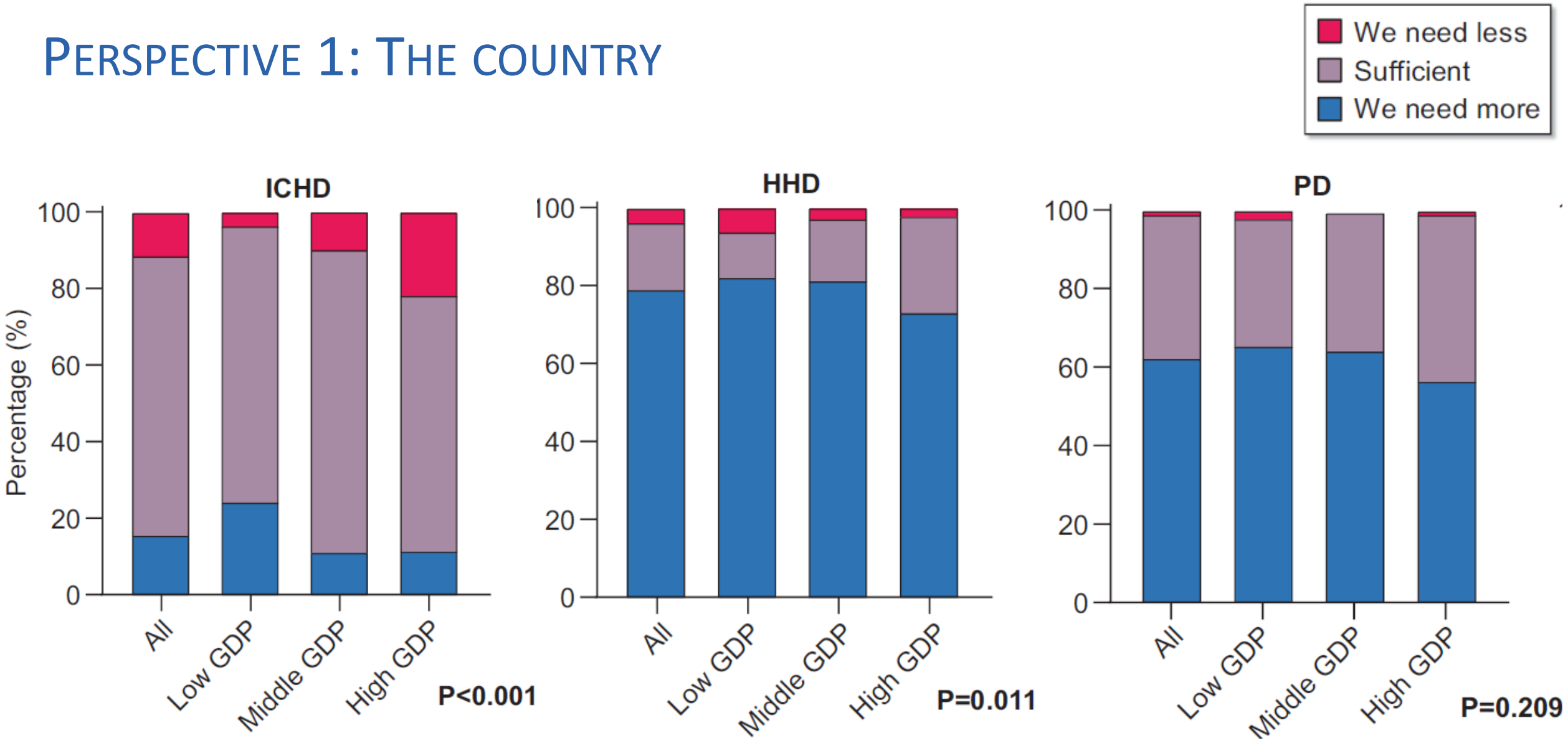

Rianne W de Jong et al, Results of the European Effect of Differing Kidney Disease Treatment Modalities and Organ Donation and Transplantation Practices on Health Expenditure and Patient Outcomes nephrologist survey on factors influencing treatment modality choice for end-stage kidney disease, *Nephrology Dialysis Transplantation*, 2021;, gfaa342, https://doi.org/10.1093/ndt/gfaa342

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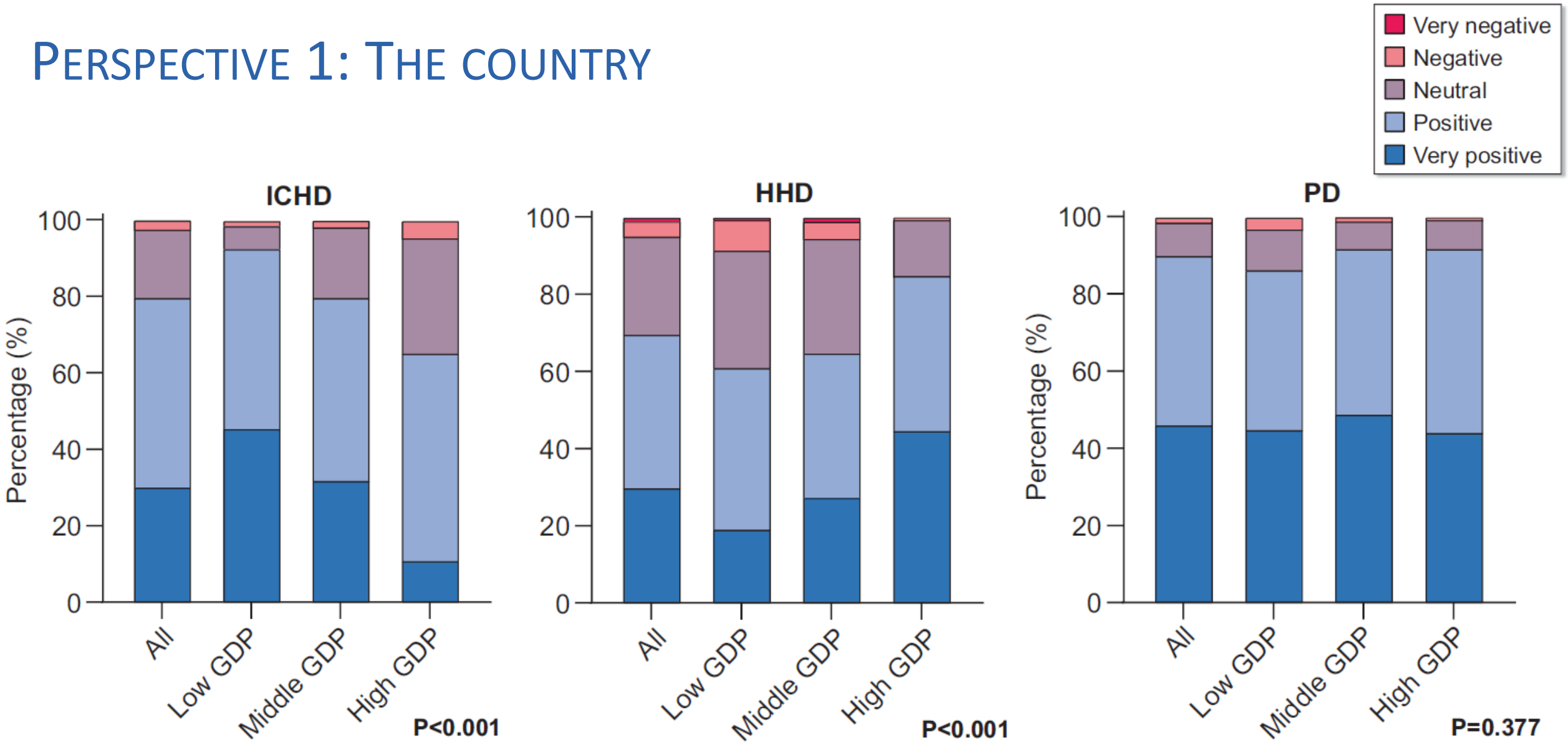

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What is driving these differences?

- Staffing costs
- PD fluid costs – location of manufacture
- Remuneration mechanism (next bit)

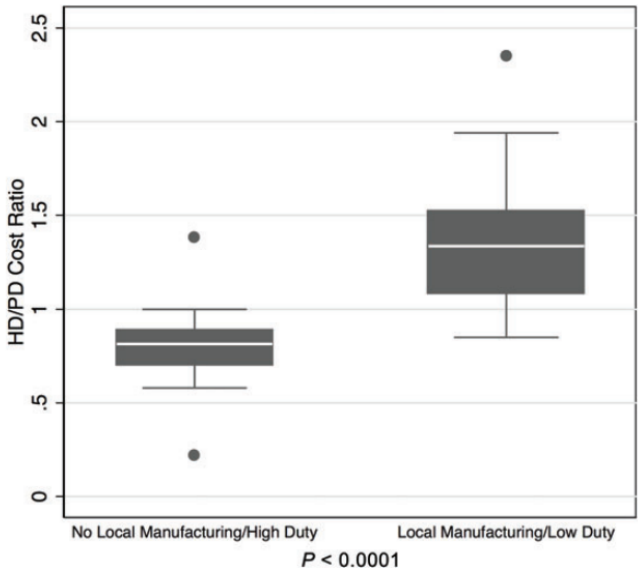
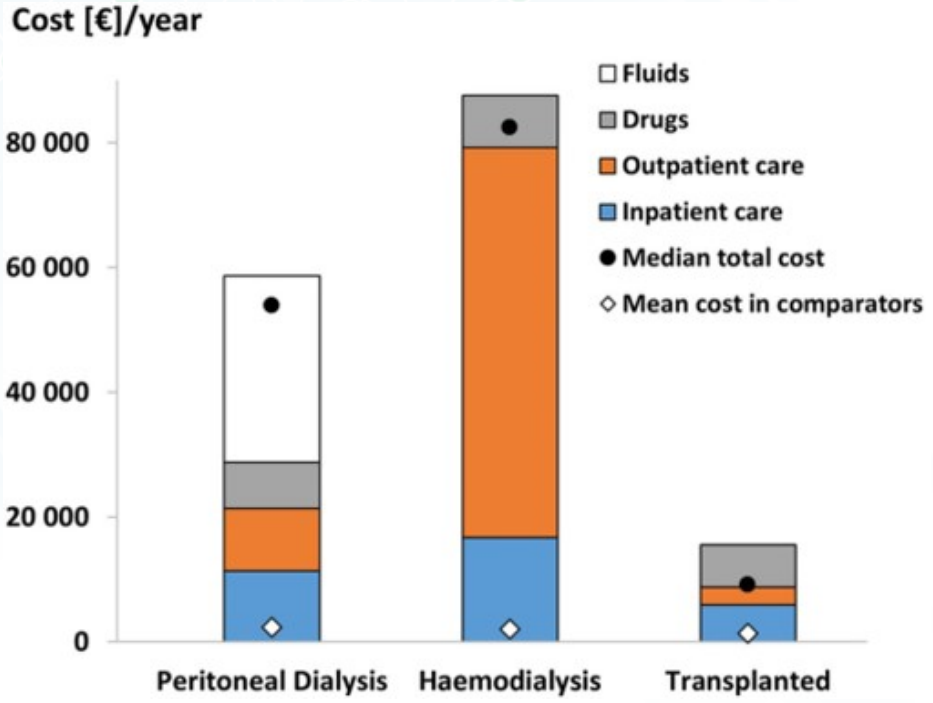


FIGURE 3: Boxplot of the HD/PD cost ratio across two groups of countries. Countries with local manufacturing of PD equipment, or which impose little or no duty on the import of PD equipment; countries without local manufacturing of PD equipment, or which impose significant duty on the import of PD equipment.



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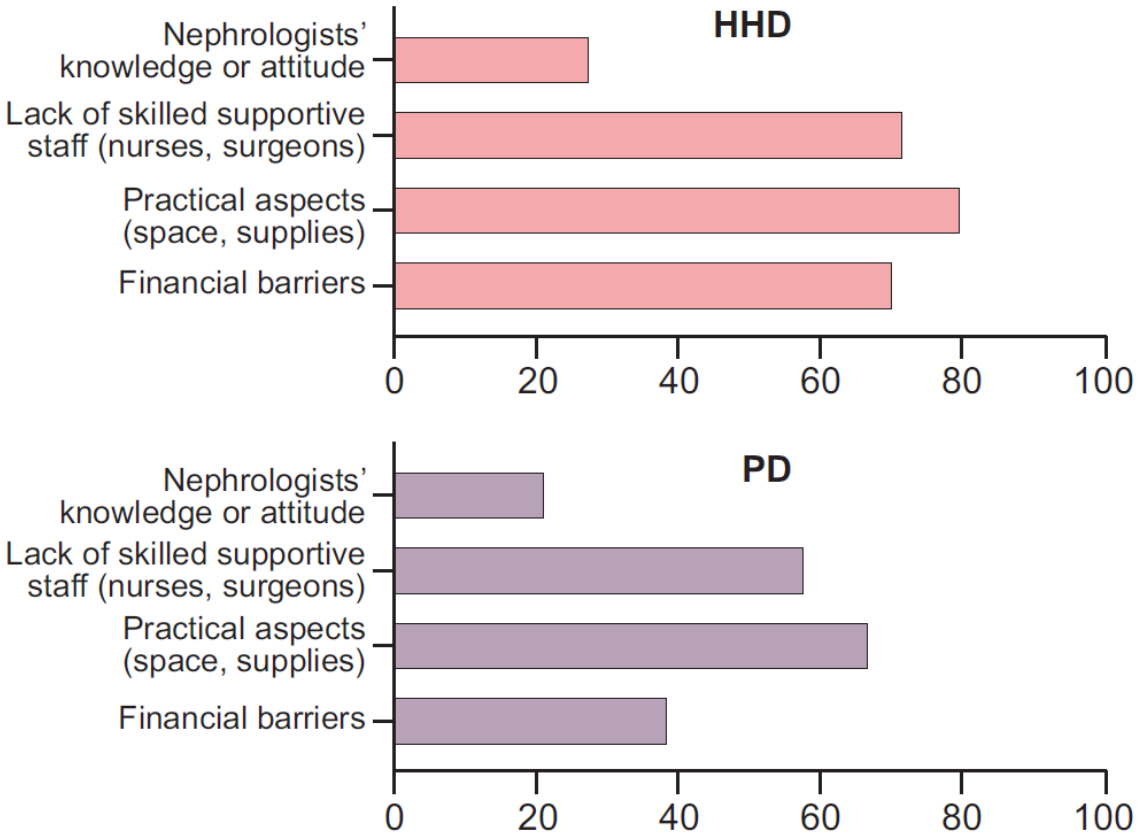
WHAT DO CLINICIANS THINK OF THE ECONOMICS

Responses in those **without** access to home dialysis



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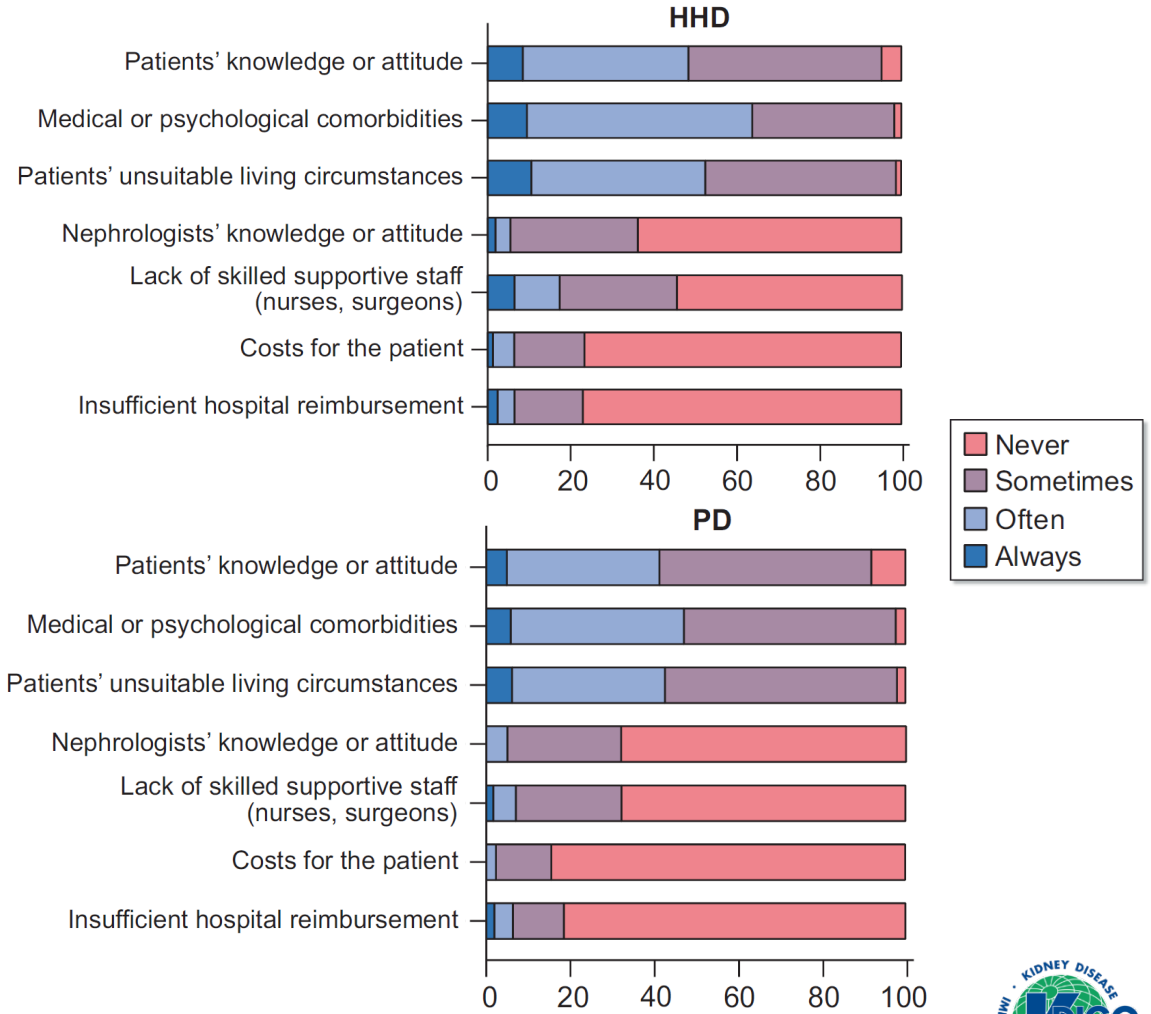

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WHAT DO CLINICIANS THINK ABOUT (AND RESPOND TO) THE ECONOMICS OF HOME THERAPIES?

Table 3. Summary of barriers to the deployment of home dialysis around the world

Category	Percentage of countries (n = 11)	List of countries	Percentage of interview sessions (n = 16)
Financial barriers	100	Australia, Brazil, Canada, Colombia, Germany, Hong Kong, Hungary, Iran, Jordan, Singapore, Thailand	94
Technological barriers	36	Australia, Hong Kong, Iran, Singapore	31
Infrastructural barriers	91	Australia, Brazil, Canada, Germany, Hong Kong, Hungary, Iran, Jordan, Singapore, Thailand	63
Governance and political barriers	27	Singapore, Hong Kong, Iran	19
Institutional and cultural barriers	91	Australia, Brazil, Canada, Germany, Hong Kong, Hungary, Iran, Jordan, Singapore, Thailand	88
Patient barriers	91	Australia, Brazil, Canada, Germany, Hong Kong, Hungary, Iran, Jordan, Singapore, Thailand	88

Table 4. Description of each of the barrier categories

Barrier	Barrier description
Financial	Patients in home dialysis require a personal dialysis machine (either home hemodialysis or peritoneal dialysis) and a constant supply of clean water (mainly for home hemodialysis), energy, and various machine consumables. Because the practice of home dialysis is new in many countries, many current health care financing and reimbursement models do not enable or support home therapies of this nature. Thus, many patients currently cannot afford the costs associated with setting up, running, and maintaining dialysis equipment in their homes.

WHAT DO POLICY-MAKERS THINK ABOUT THE ECONOMICS OF HOME THERAPIES?

- How are you remunerated and does these matter?

Global Budgets
fixed amount of funding for a dialysis facility

Fee-for-service
payment for each service

Pay-for-performance
payment based on meeting targets in care, quality or safety

Activity-based funding
based on the number and type of dialysis patients

MOVEMENT BETWEEN THESE MECHANISMS HAS BEEN ASSOCIATED WITH CHANGES IN HOME DIALYSIS USE

Braden Manns, John W M Agar, Mohan Biyani, Peter G Blake, Alan Cass, Bruce Culleton, Werner Kleophas, Paul Komenda, Thierry Lobbedez, Jennifer MacRae, Mark R Marshall, Nairne Scott-Douglas, Vikas Srivastava, Peter Magner, Can economic incentives increase the use of home dialysis?, *Nephrology Dialysis Transplantation*, Volume 34, Issue 5, May 2019, Pages 731–741, https://doi.org/10.1093/ndt/gfy223

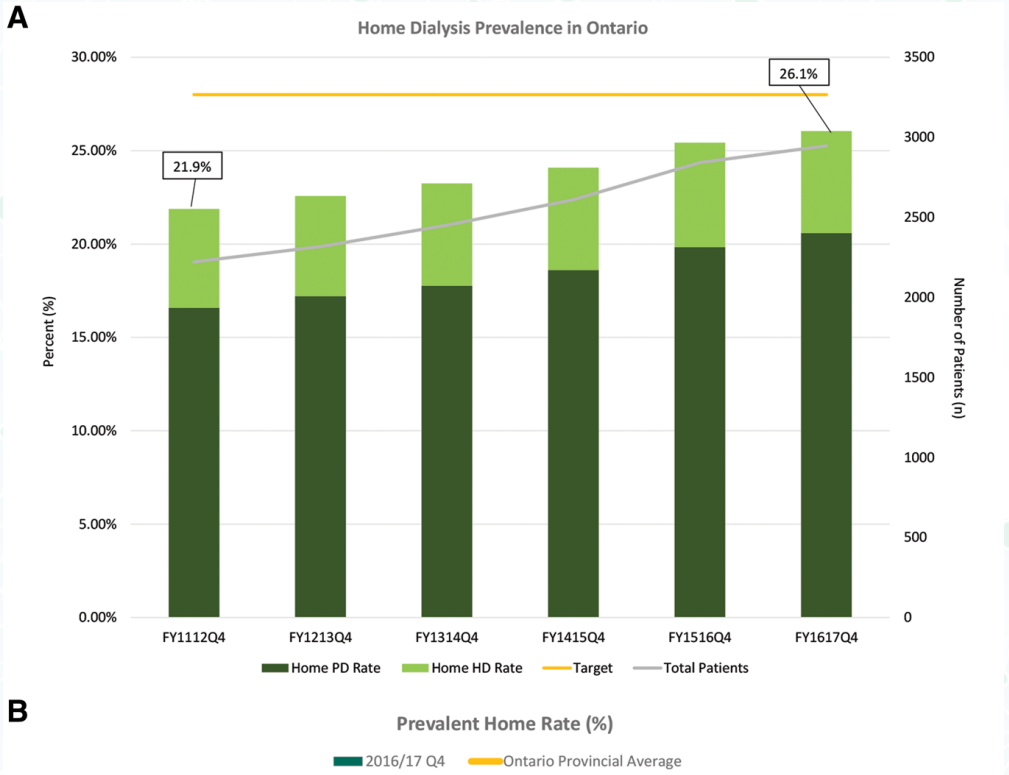
MOVEMENT AWAY FROM PREFERENTIAL PAYMENT MODELS FOR IN-CENTRE HEMODIALYSIS

Quantitative policy data derived from before/after studies

Widely perceived physician payment models influence practice

These statements are rarely qualified

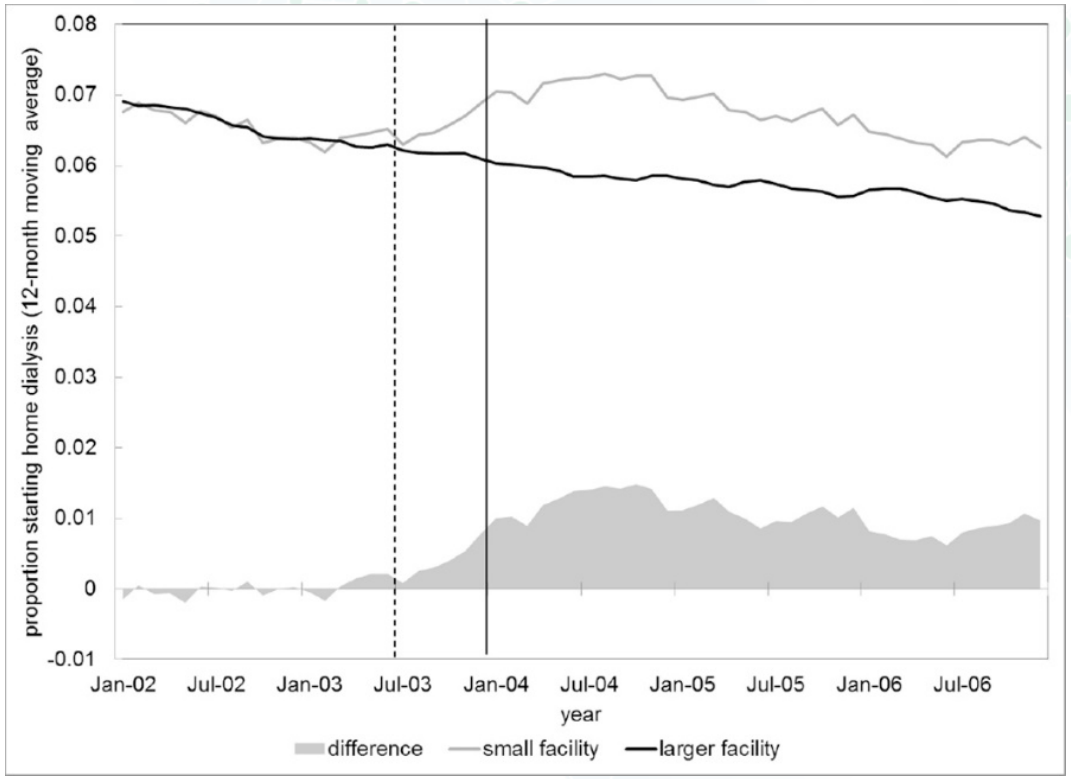
Generally questionnaire-based



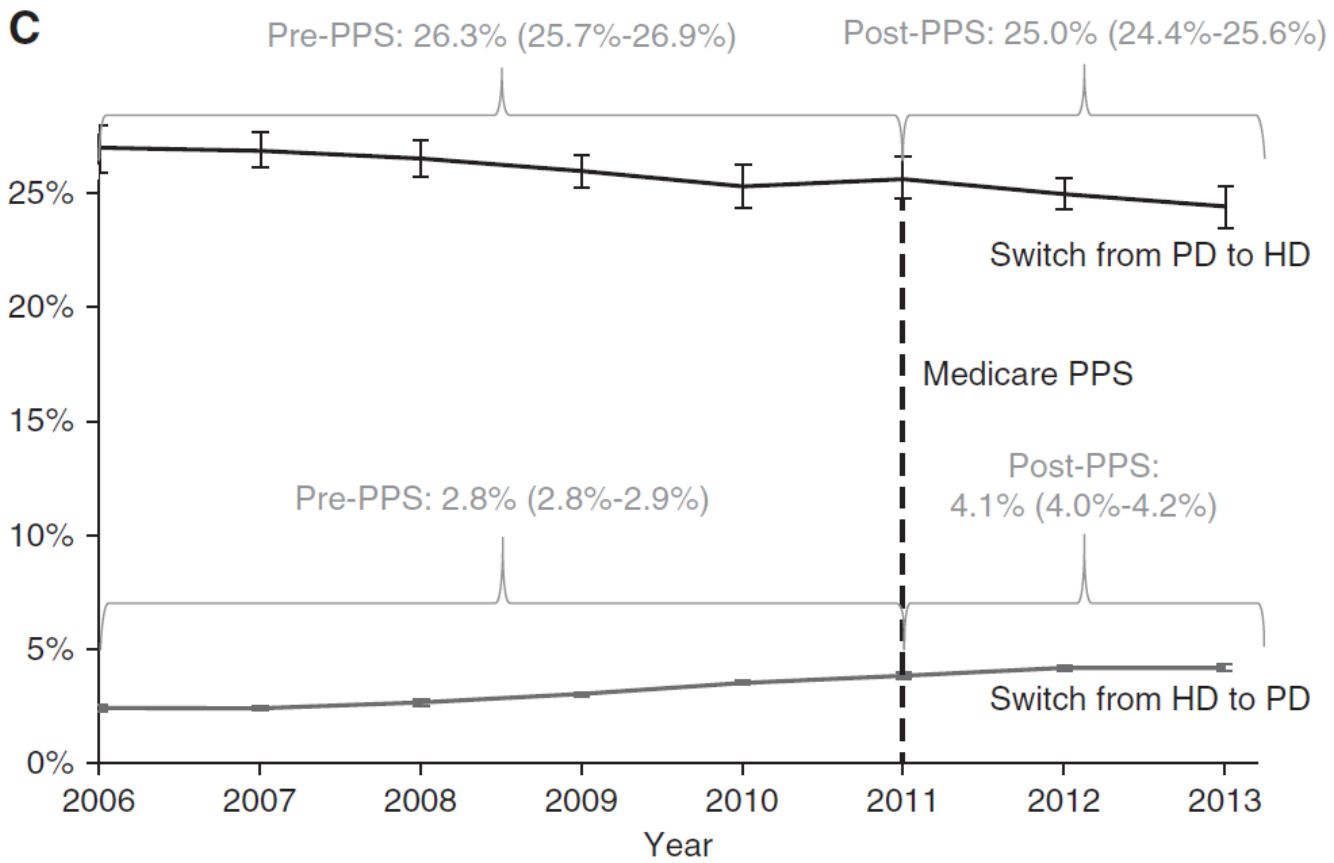
CANADA: Move from global to activity-based formula with generous estimates for home dialysis costs

Braden Manns, John W M Agar, Mohan Biyani, Peter G Blake, Alan Cass, Bruce Culleton, Werner Kleophas, Paul Komenda, Thierry Lobbedez, Jennifer MacRae, Mark R Marshall, Nairne Scott-Douglas, Vikas Srivastava, Peter Magner, Can economic incentives increase the use of home dialysis?, *Nephrology Dialysis Transplantation*, Volume 34, Issue 5, May 2019, Pages 731–741, https://doi.org/10.1093/ndt/gfy223

A BRIEF HISTORY OF THE EFFECTS OF THE US PAYMENT SYSTEM



2004 : Move to a tiered fee-for-service with capitation for seeing HD patients weekly



2011: Move to activity-based funding (bundled payments that included EPO) plus home training add-on

Erickson KF, Winkelmayer WC, Chertow GM, Bhattacharya J. Effects of physician payment reform on provision of home dialysis. Am J Manag Care. 2016 Jun 1;22(6):e215-23. PMID: 27355909; PMCID: PMC5055389

Trends in Peritoneal Dialysis Use in the United States after Medicare Payment Reform. Caroline E. Sloan, Cynthia J. Coffman, Linda L. Sanders, Matthew L. Maciejewski, Shoou-Yih D. Lee, Richard A. Hirth, Virginia Wang. CJASN Dec 2019, 14 (12) 1763-1772; DOI: 10.2215/CJN.05910519

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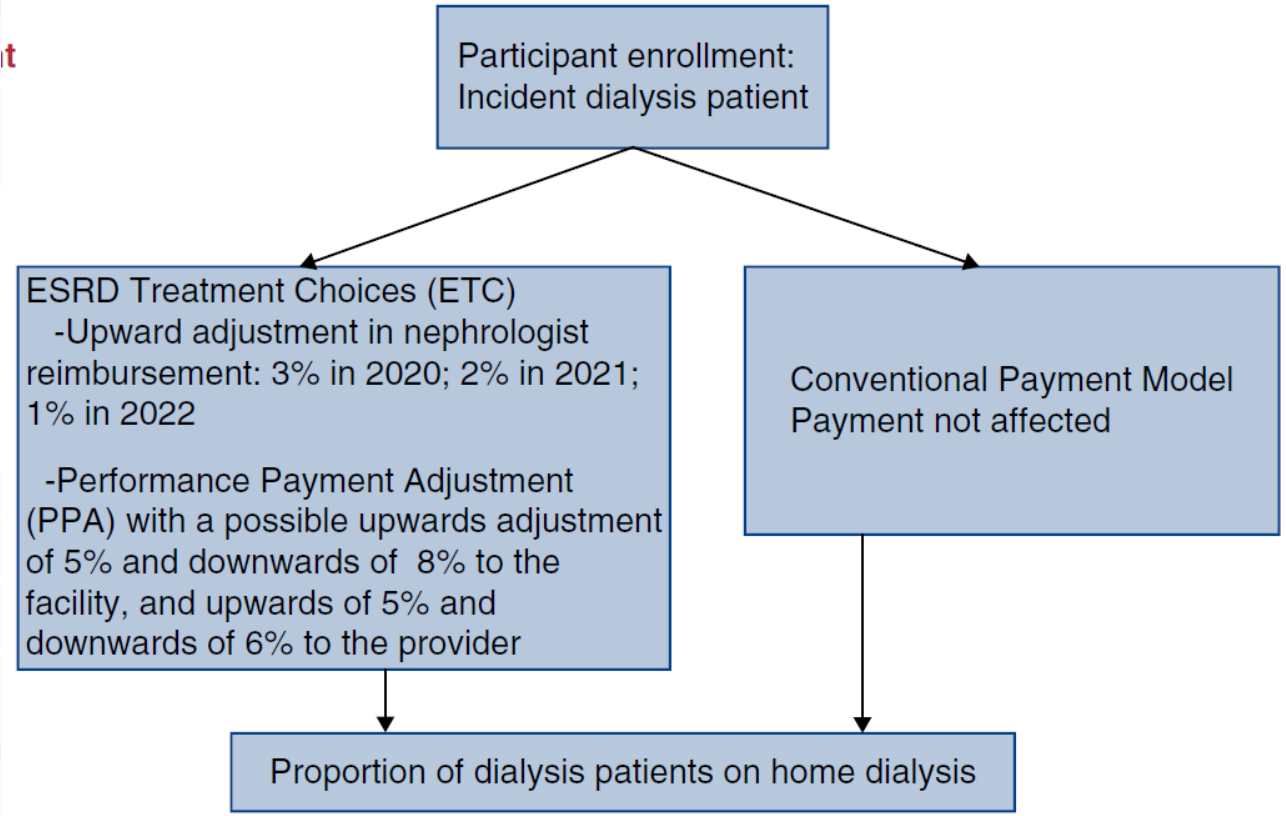


2020: Combination of changes in payment (fee for service & activity)

ESKD Treatment Choices Model: Responsible Home Dialysis Growth Requires Systems Changes Eric L. Wallace, Michael Allon Kidney360 May 2020, 1 (5) 424-427; DOI: 10.34067/KID.0000672019

What do Patients think about the economics of home therapies?

DCE in 143 adult patients with CKD expected to require RRT within 12 months (predialysis).

A Discrete Choice Study of Patient Preferences for Dialysis Modalities

Rachael C. Walker,[1,2] Rachael L. Morton,[3] Suetonia C. Palmer,[4,5] Mark R. Marshall,[6,7,8] Allison Tong,[1,9] and Kirsten Howard[1]

Table 5. Tradeoff between out of pocket cost and dialysis characteristics

Attribute Tradeoff	Mean (New Zealand Dollars)	Upper 95% CI	Lower 95% CI
Unlimited nurse support	399.21	333.39	465.02
Increased flexibility	223.03	195.20	250.85

Table 3. Patient preferences for home dialysis (HD and PD) compared with in-center dialysis

Attributes for Home Dialysis (HD and PD)	β	OR (95% CI)	
Treatment attributes (random parameters)			
Out of pocket cost (per extra $)	−0.02	0.98 (0.97 to 0.99)	
Life expectancy (per extra year)	0.49	1.63 (1.25 to 2.12)	
Flexibility of treatments (per unit increase in flexibility: hard to change, sometimes possible to change, or easy to change)	2.22	9.22 (2.71 to 31.3)	
How well you feel on dialysis (per unit improvement)[a]	5.35	210 (15.0 to 2489)	
Availability of transport (versus all transport provided)			
Respondents living <100 km from nearest dialysis center			
Transport sometimes provided	−0.86	0.42 (0.05 to 3.24)	0.40
Transport never provided	−1.61	0.20 (0.02 to 1.59)	0.10
Respondents living >100 km from nearest dialysis center			
Transport sometimes provided	3.20	24.5 (0.85 to 706)	0.06
Transport never provided	−3.82	0.02 (0.001 to 0.48)	0.02

Figure 1. | Choice set example presented to patients. Example of choice set presented to each patient before dialysis in the discrete choice survey. HD, hemodialysis; PD, peritoneal dialysis.

A Discrete Choice Study of Patient Preferences for Dialysis Modalities. Rachael C. Walker, Rachael L. Morton, Suetonia C. Palmer, Mark R. Marshall, Allison Tong, Kirsten Howard CJASN Jan 2018, 13 (1) 100-108; DOI: 10.2215/CJN.06830617

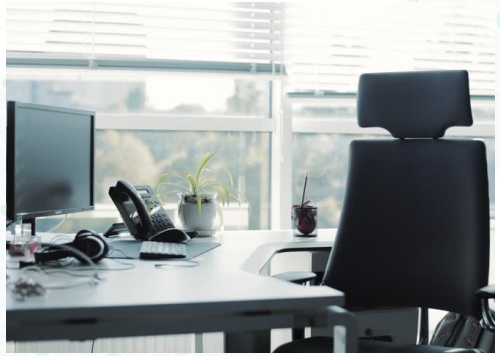
WHAT ARE THE COSTS FOR THE PATIENT?

- Patient out of pocket expenses are a barrier to recommending home dialysis

Consumables & Equipment

+

Extended training duration (time away from work)



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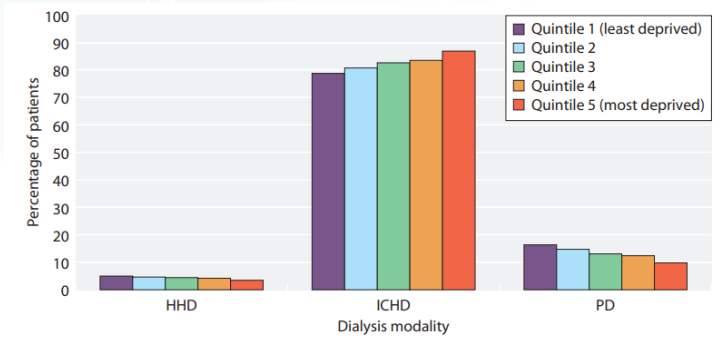
Housing problems (storage and water quality, suitability of environment)

=

Socioeconomic disadvantage



Walker, R.C., Howard, K., Tong, A., Palmer, S.C., Marshall, M.R. and Morton, R.L. (2016), The economic considerations of patients and caregivers in choice of dialysis modality. Hemodialysis International, 20: 634-642. https://doi.org/10.1111/hdi.12424

SUMMARY

- There are health economic advantages to home dialysis
  - Unlikely to be consistently the case across geographies
  - Will be influenced by changes in:
    - Cost
    - Utilities (Quality of life)
    - Competing events with time

} **Influenced by Patient, System and Geographical Factors**

- Qualitative and quantitative evidence from the literature suggests that the economics of home dialysis therapies influence their use
- Some evidence of policy and practice interventions (reimbursement models)
- More formal evaluation of policy change and more innovative assessment of “health”, “costs” and “value” could drive further changes.