Home First

KDIGO

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Disclosure of Interests

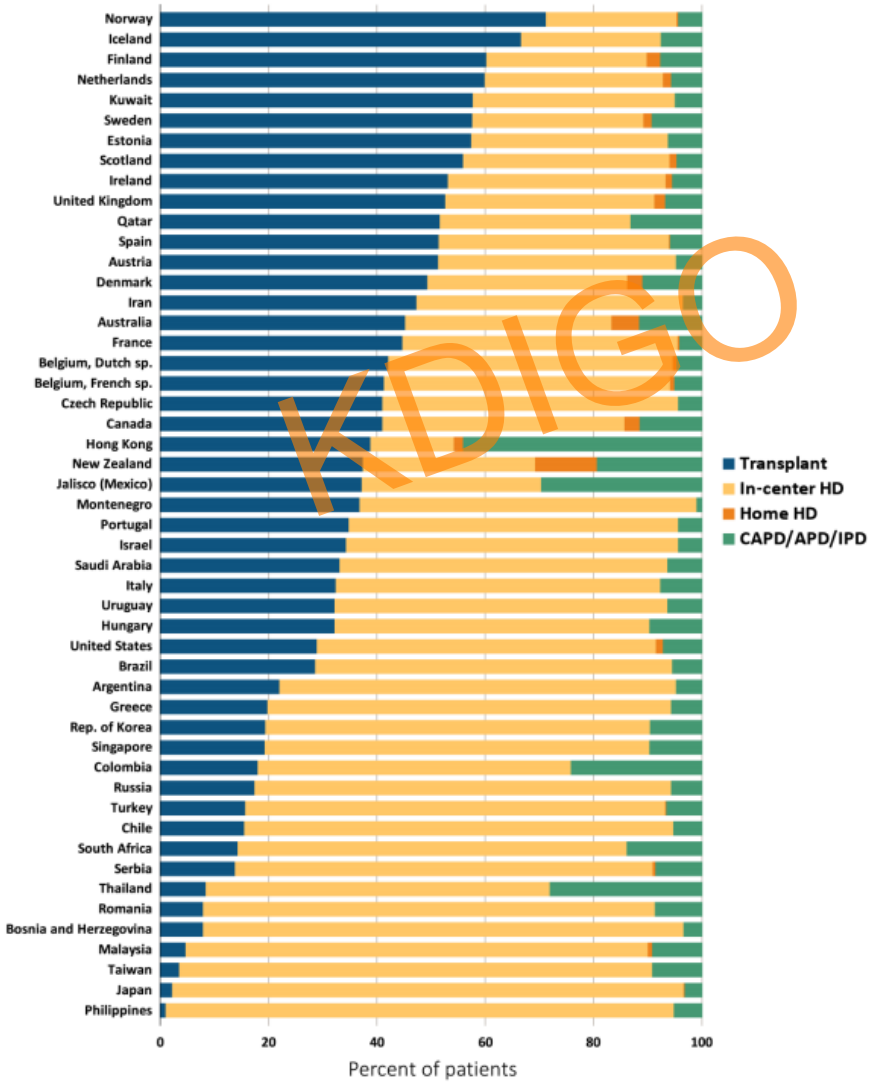
- Amgen Australia – travel support to meetings
- Quanta Fluid Solutions – advisory board.


RAZOR SHARP CORAL
CYCLONES
STINGRAYS
SHARKS
CROCODILES
STEVE IRWIN
ANGRY NATIVES
BACKPACKER MURDERERS
GIANT RATS
POISONOUS SNAKES
NOTHING
MANEATING KOALAS
SCORPIONS
MOSQUITOES
BABY KILLER DINGOS
SCORCHING DESERT
SHARKS
SHARKS
DANNI MINOGUE
FIRES
SHARKS WITH FRICKIN' LASERS
STINGING JELLYFISH
GIANT SPIDERS
CONVICTS
DERANGED GUNMEN
KDIGO

Current status

All renal replacement therapy:

vol 2 Figure 13.12 Percent distribution of type of renal replacement therapy modality used by ESRD patients, by country, in 2014

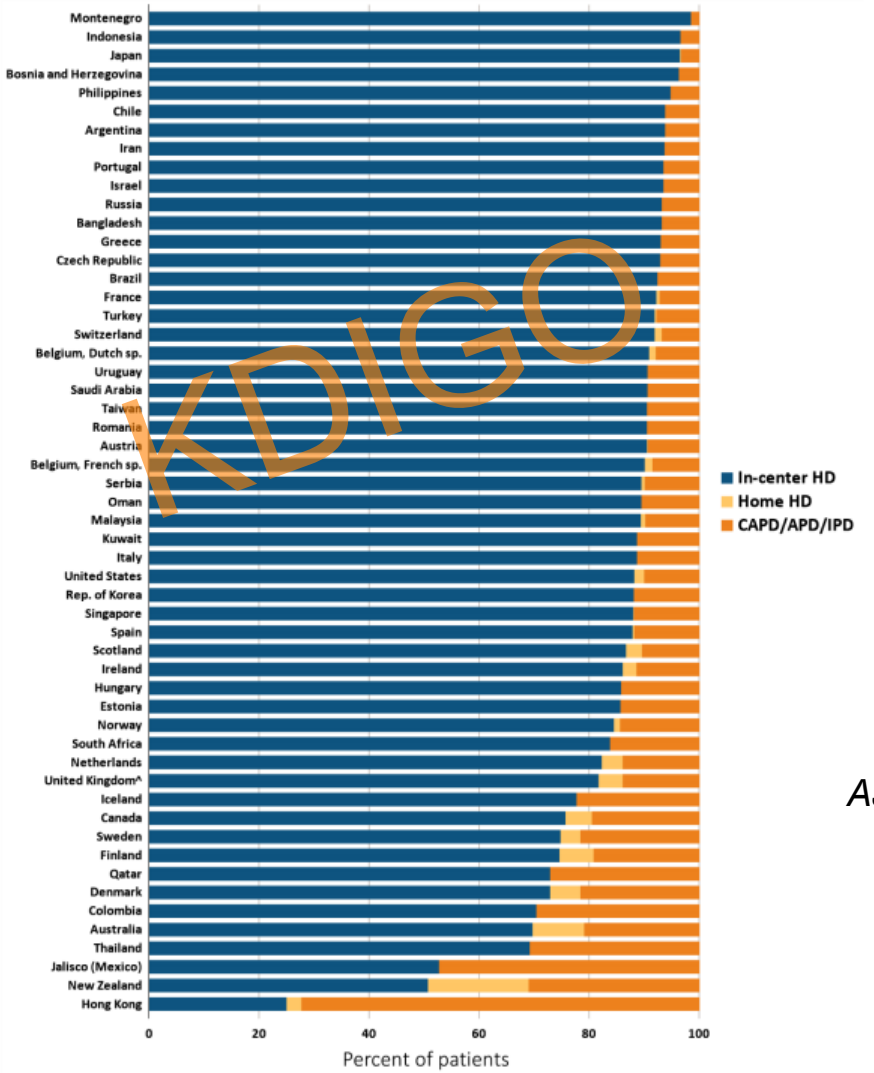


AJKD Suppl, March 2017

escription

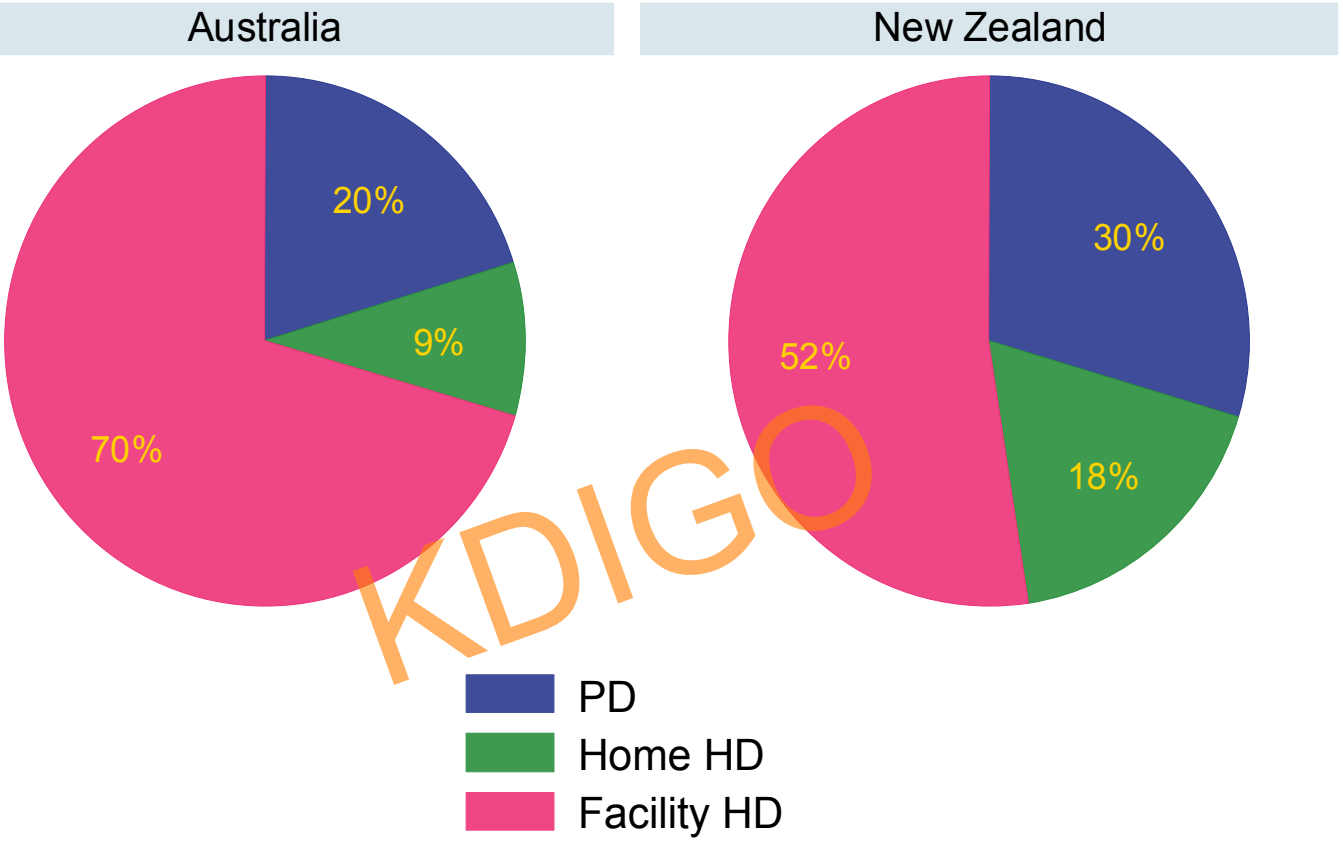
Dialysis only:

vol 2 Figure 13.15 Distribution of the percentage of prevalent dialysis patients using in-center HD, home HD, or peritoneal dialysis (CAPD/APD/IPD), 2014

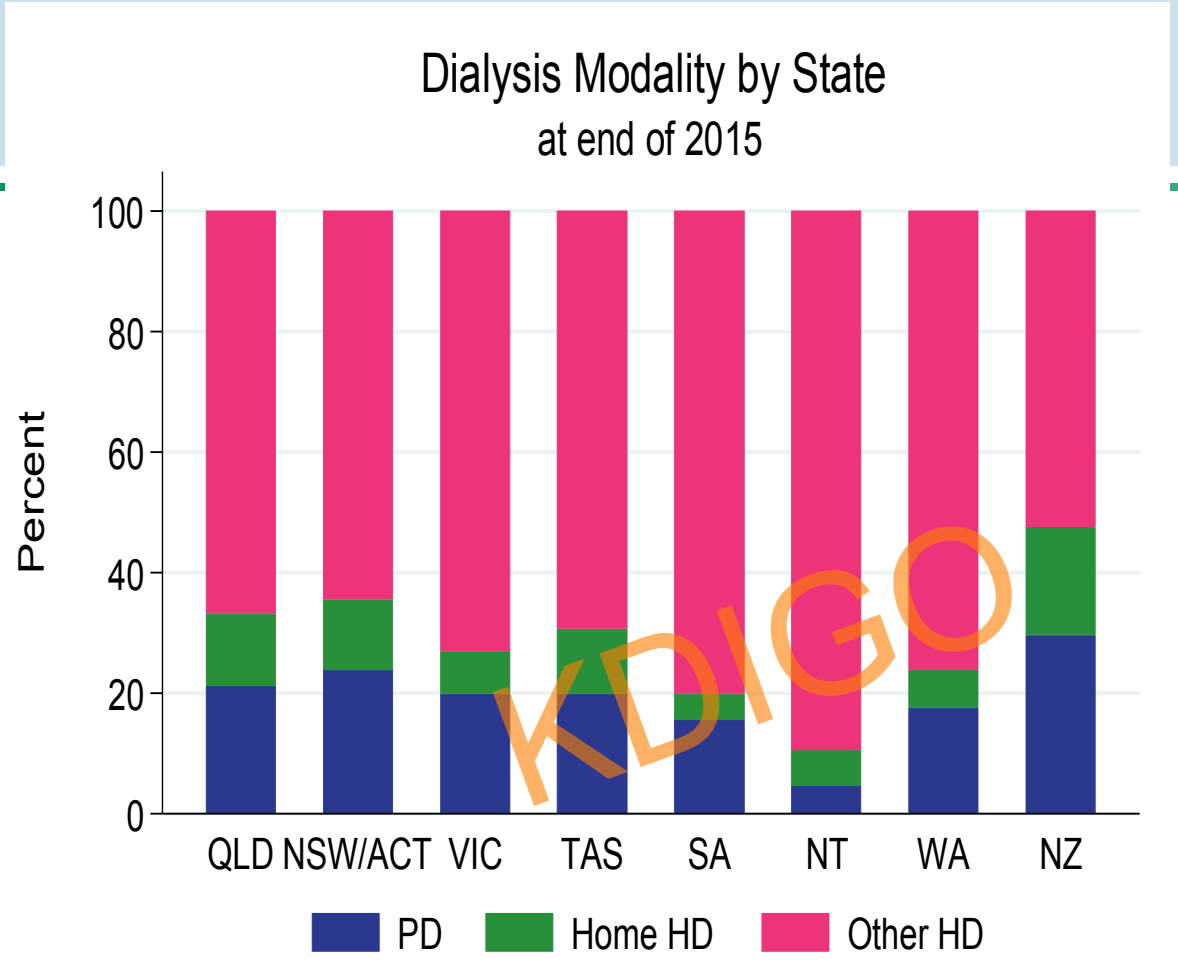


AJKD Suppl, March 2017

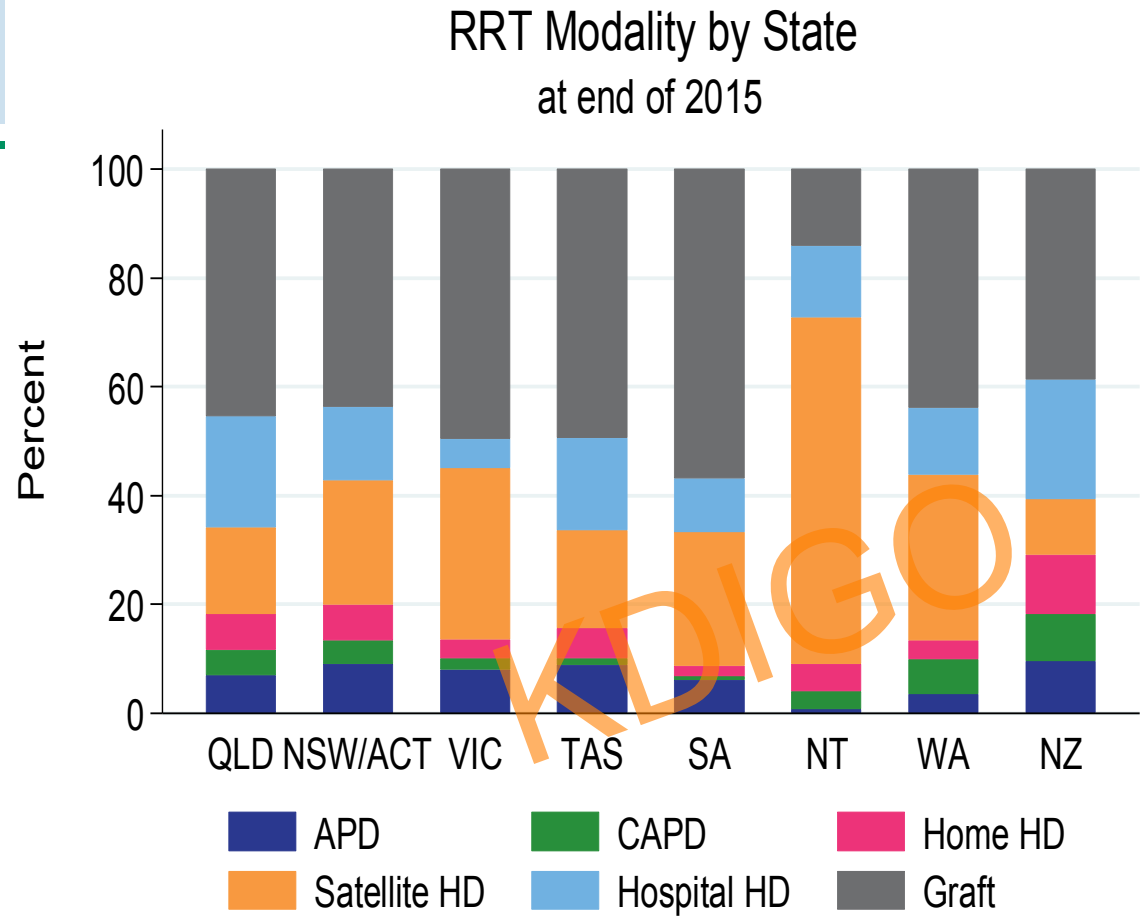
Dialysis Modality by Country 2015



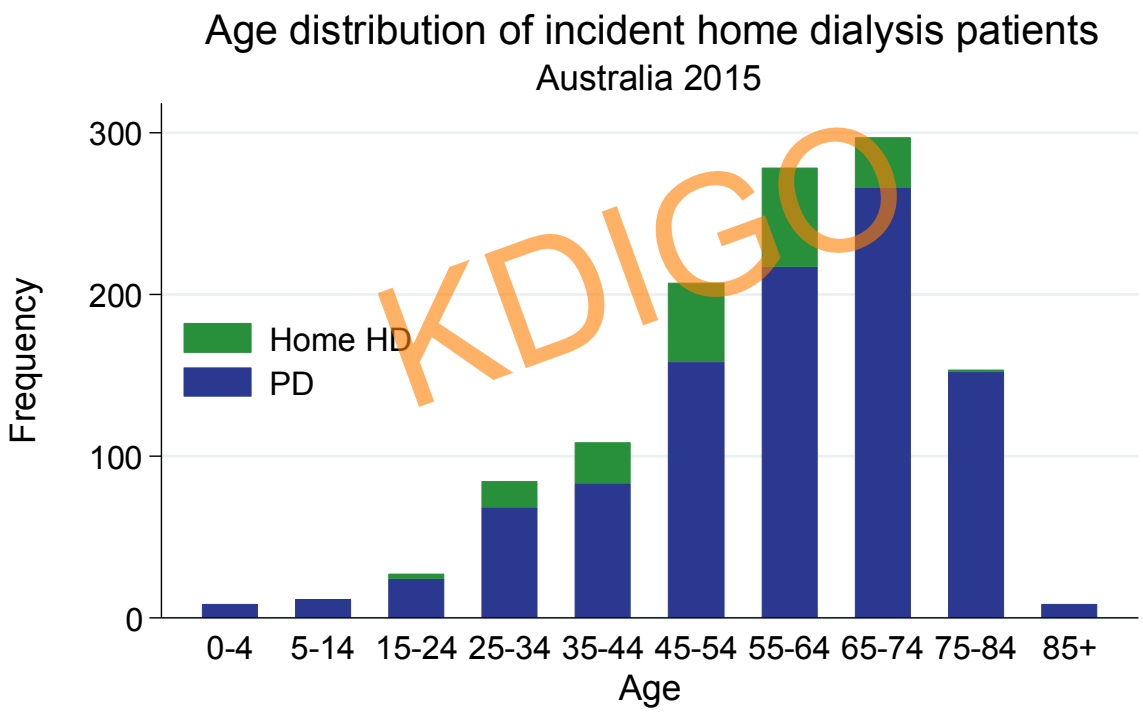
2016 ANZDATA Annual Report, Figure 2.4



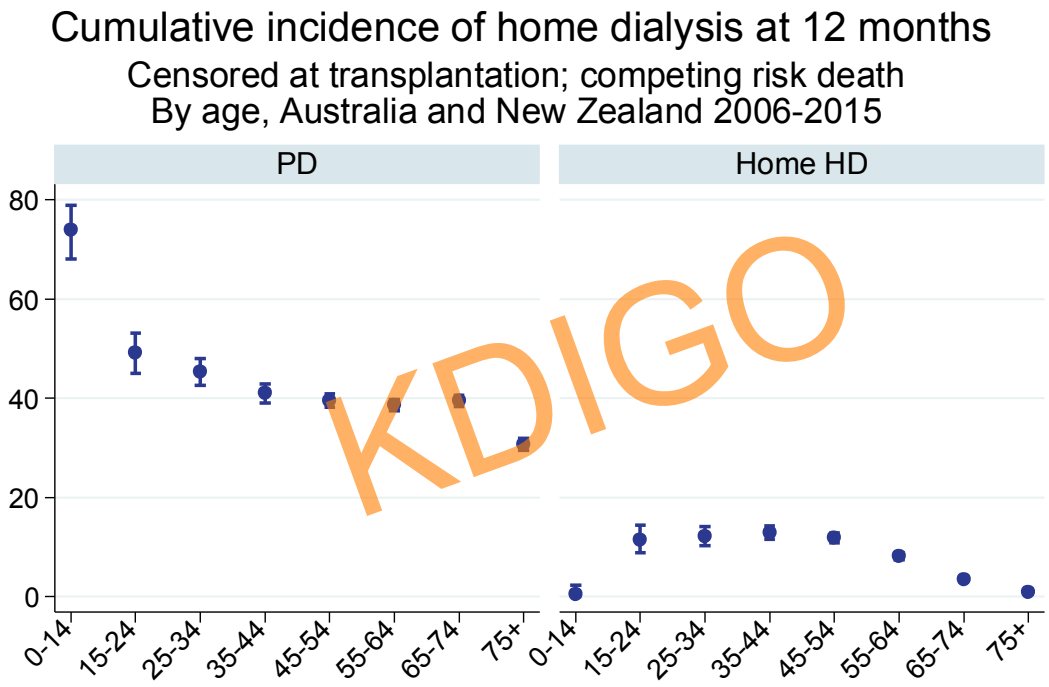
2016 ANZDATA Annual Report, Figure 2.6



2016 ANZDATA Annual Report, Figure 2.5



2016 ANZDATA Annual Report, Figure 6.1



2016 ANZDATA Annual Report, Figure 6.5

Figure 4.10

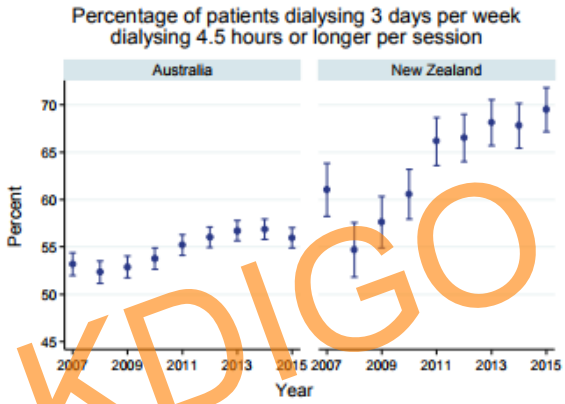
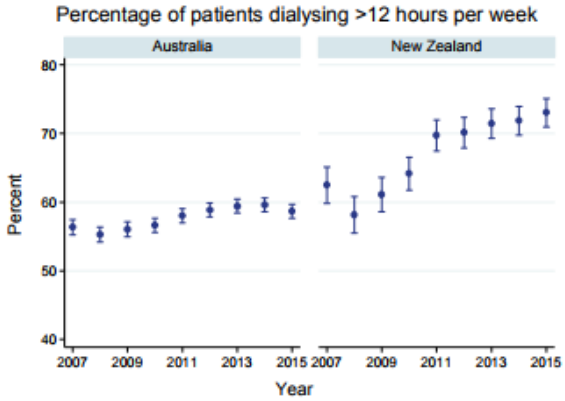


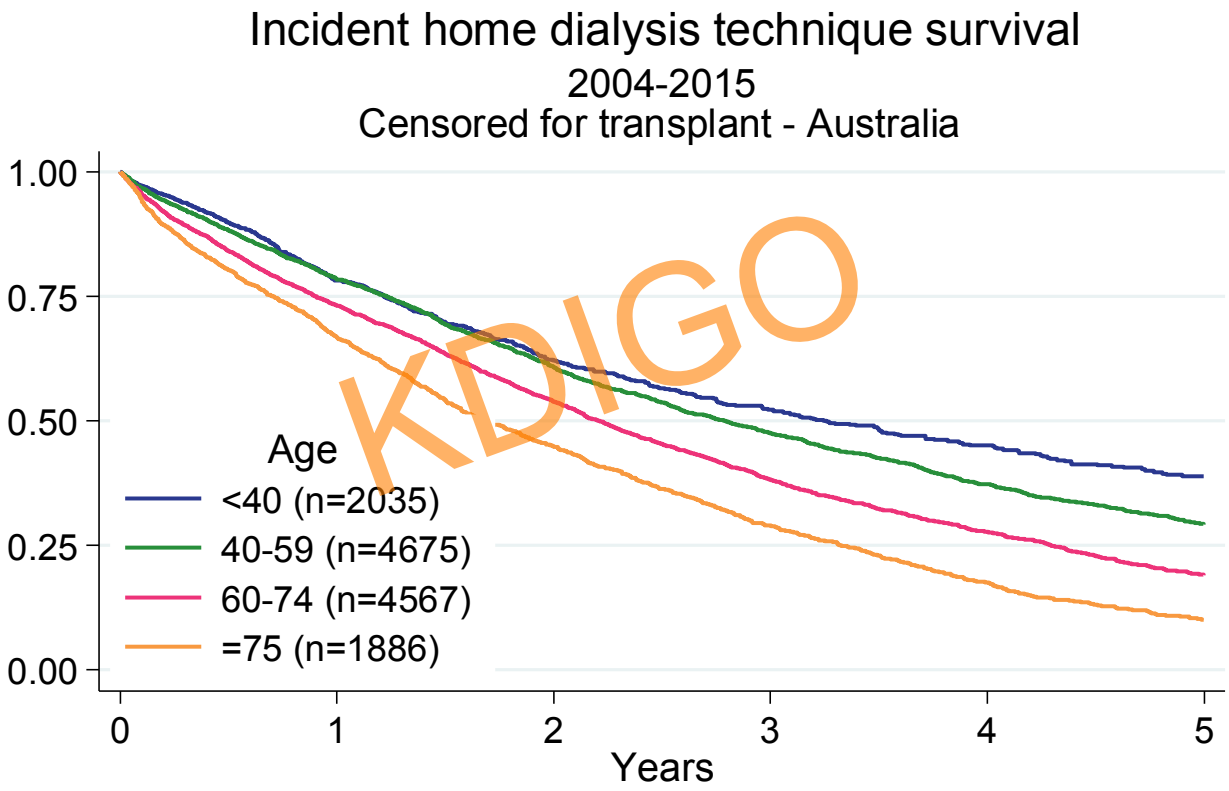
Figure 4.11



ANZDATA 2016 report

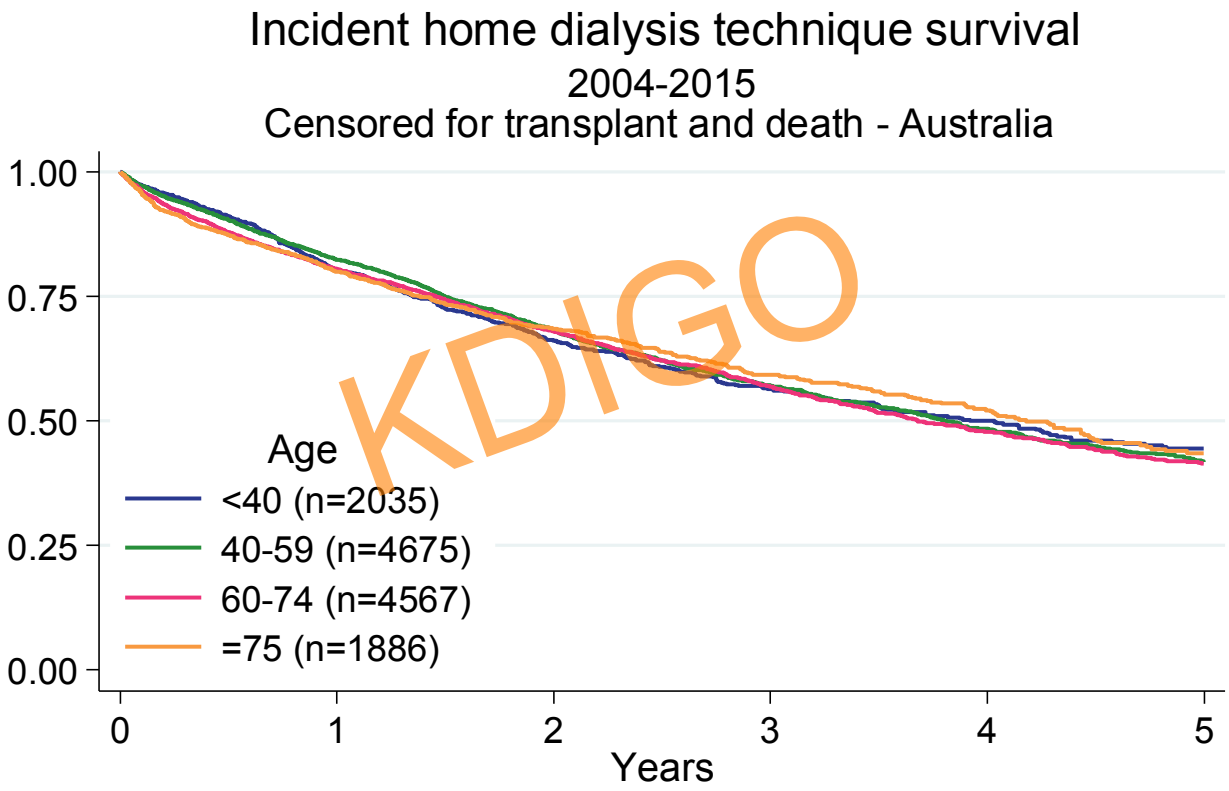
Outcomes

Technique Survival (HD & PD)



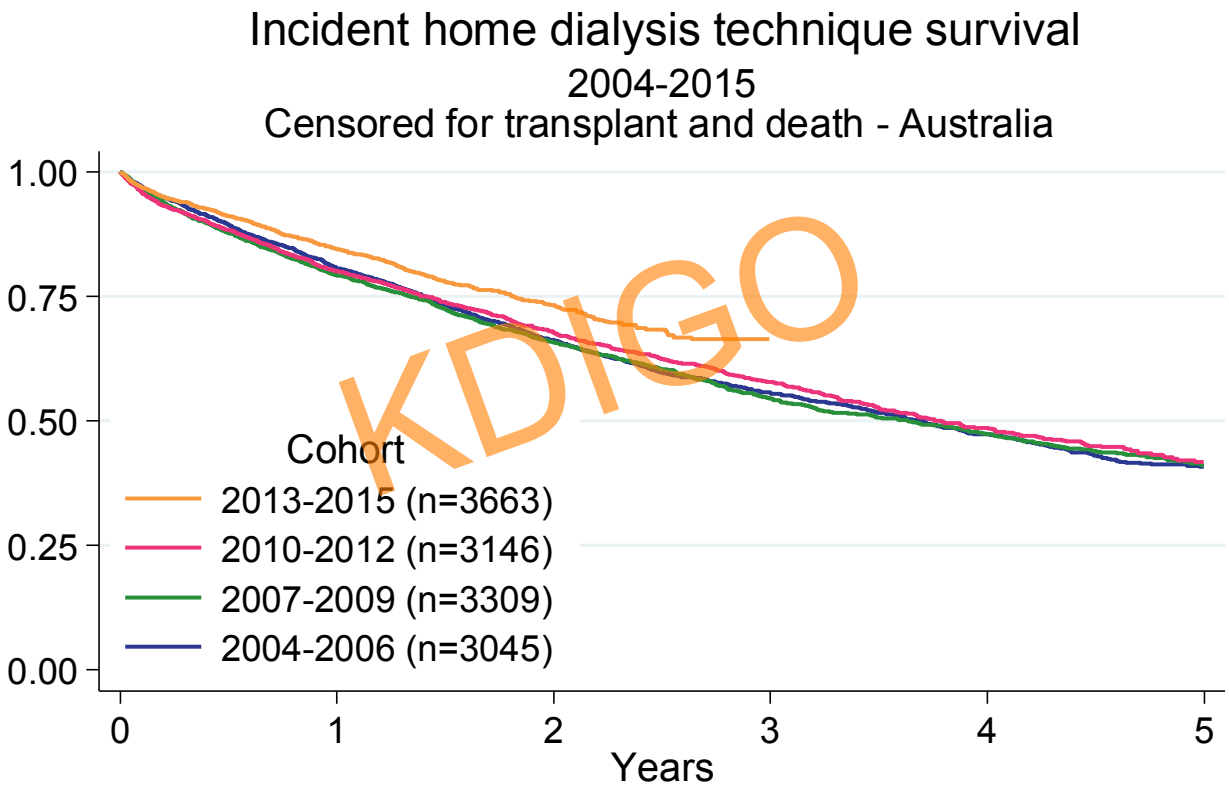
2016 ANZDATA Annual Report, Figure 6.18

Technique Survival - Censored



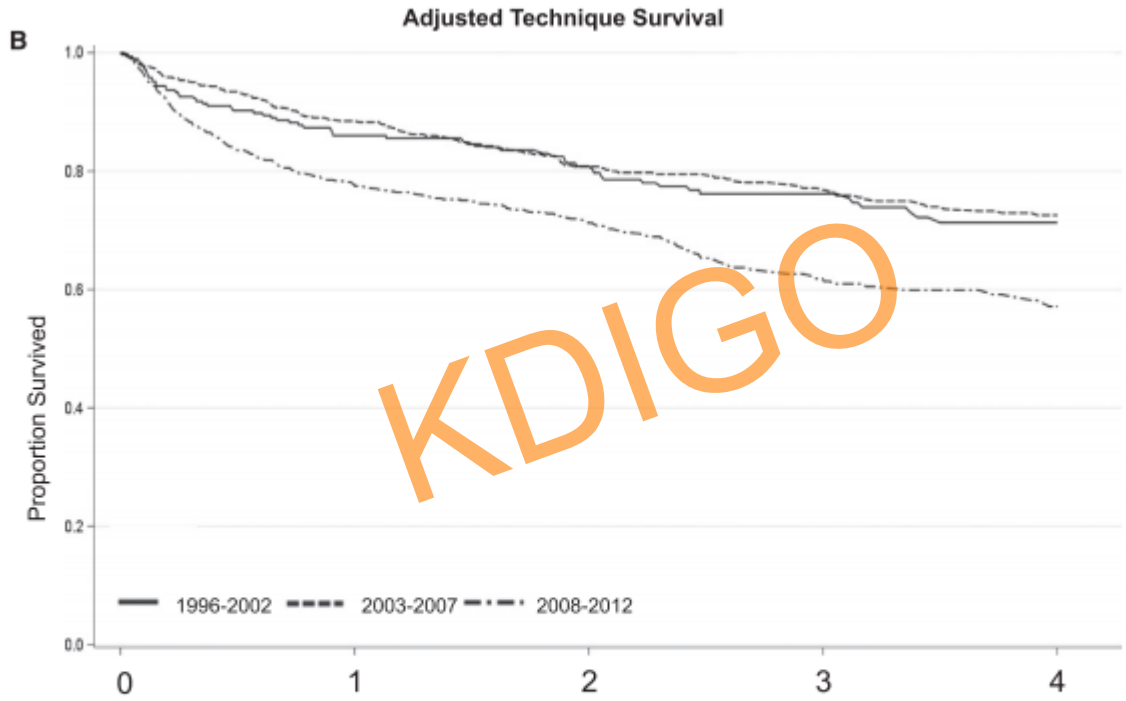
2016 ANZDATA Annual Report, Figure 6.19

It's getting better….



2016 ANZDATA Annual Report, Figure 6.16

Perl J et al, CJASN, 2017, 12:1248.



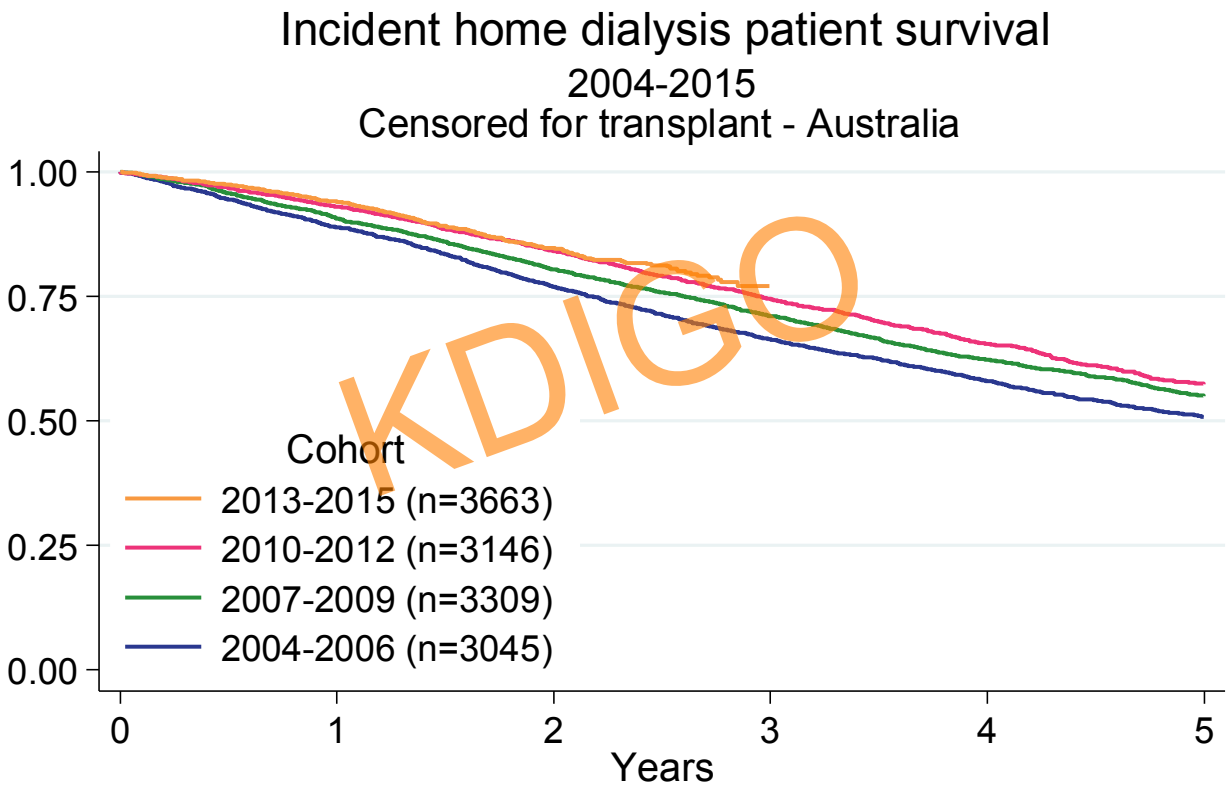
At Risk (n)					
1996-2002	233	161	126	87	67
2003-2007	568	431	324	244	185
2008-2012	1068	595	331	154	55

Figure 1. | Continued.

Integrated Dialysis

- Transition from PD to Home HD poor.
- ANZ – 5% only *(ANZDATA)*
- Canada – 2 -14% *(McCormick BB et al, CJASN)*
- Planned vs emergency

Patient Survival



2016 ANZDATA Annual Report, Figure 6.14

ANZDATA Analysis

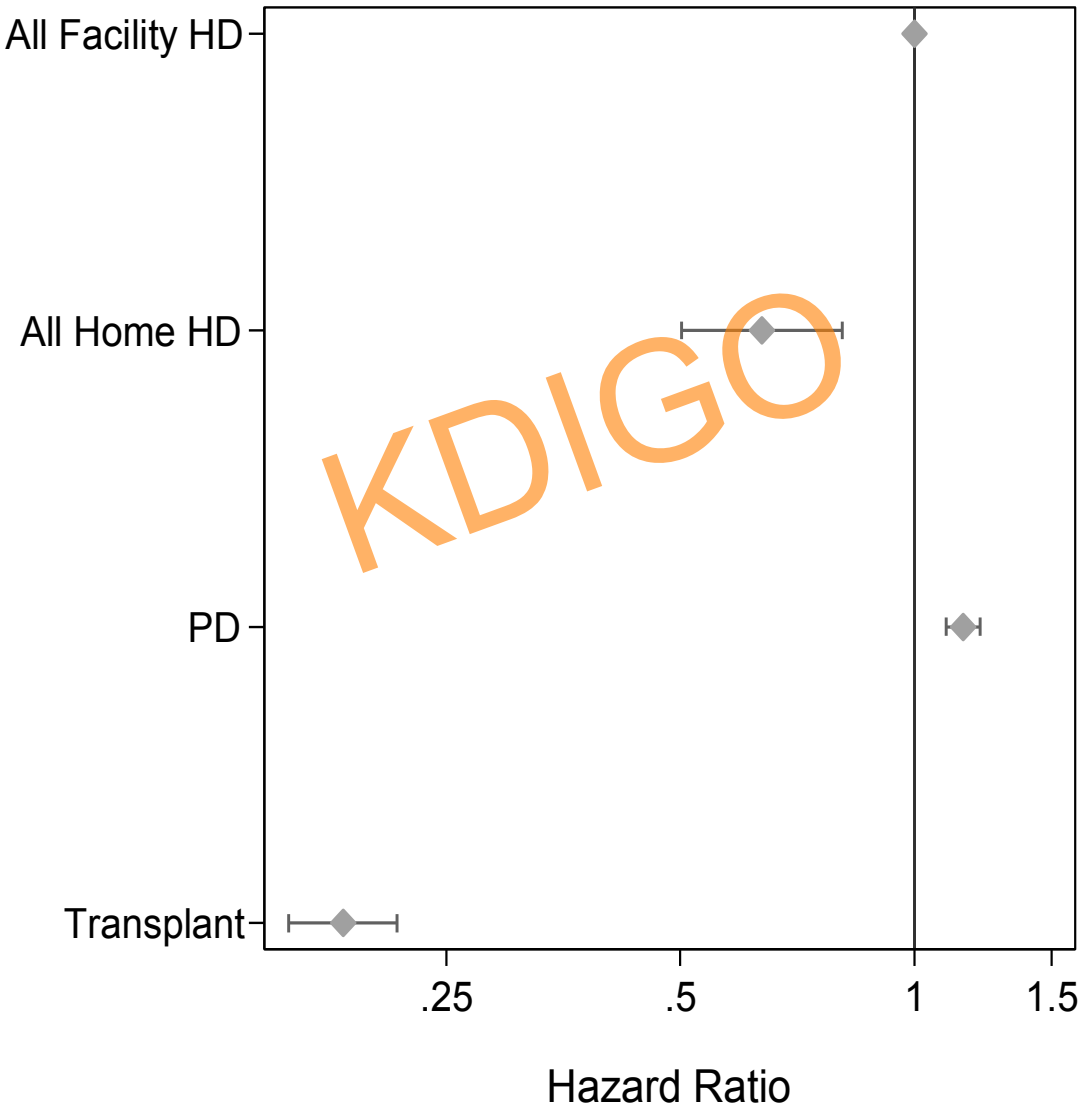
Marshall MR, Kerr PG et al, AJKD, 2016; 67(4):617

- Dataset
  - All adult patients starting renal replacement therapy in Australia and New Zealand since March 31, 1996, followed up to December 31, 2011
  - n = 38773 (2,054,990 patient-months)
- Marginal structural model
  - Able to adjust for the majority of cases who now have time-varying medical co-morbidity

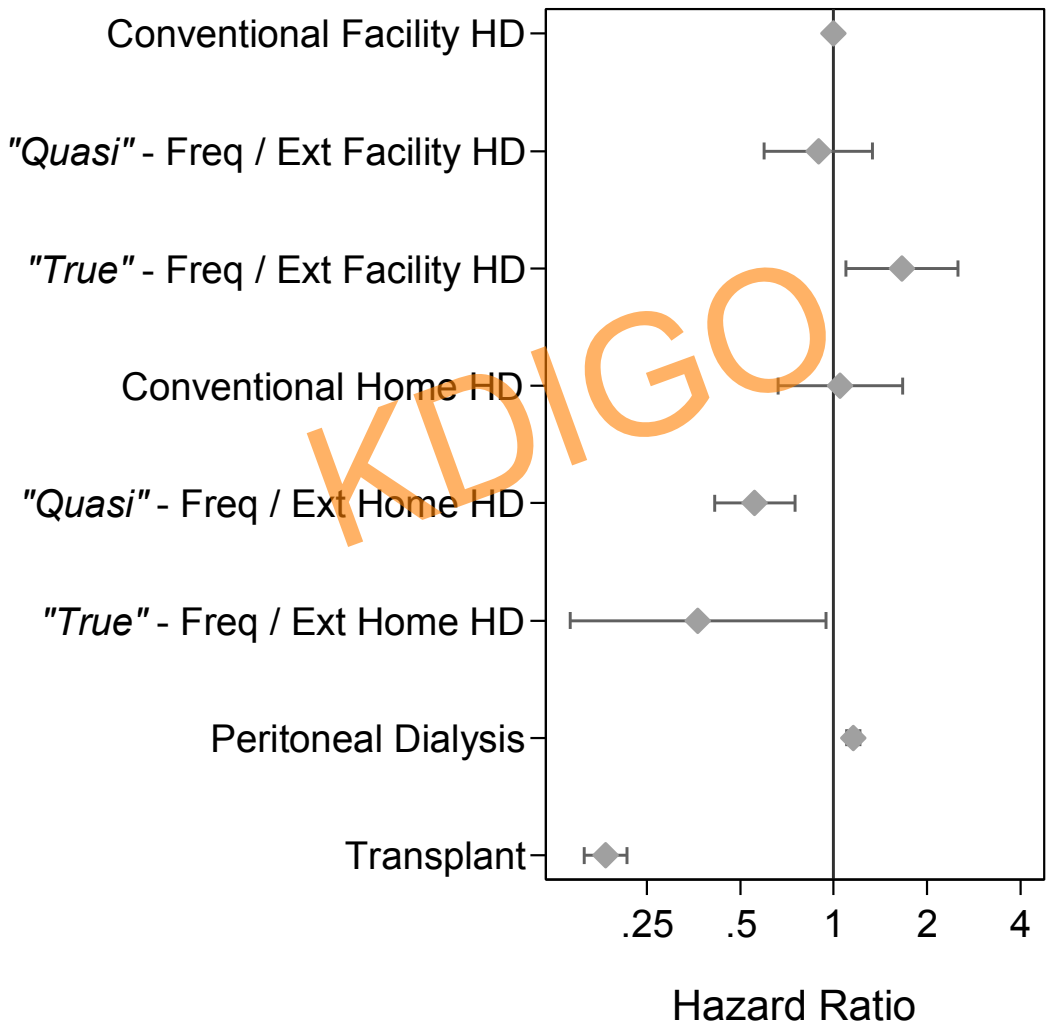
ANZDATA analysis - definitions

- Separating HD into
  - **Conventional HD**: 3 x a week, <=6 hours/session
  - **"True" Freq / Ext HD**: >=5 x a week (no short daily)
  - **"Quasi" Freq / Ext HD**: Anything more than conventional, but less than……..
- Competing risks regression
  - No informative censoring, only censoring for loss to follow up
  - Transplantation explicitly modelled as a competing risk using multinomial regression with discretised time (patient moth episodes) in a panel (longitudinal time series) data

Initial analysis – HR for death

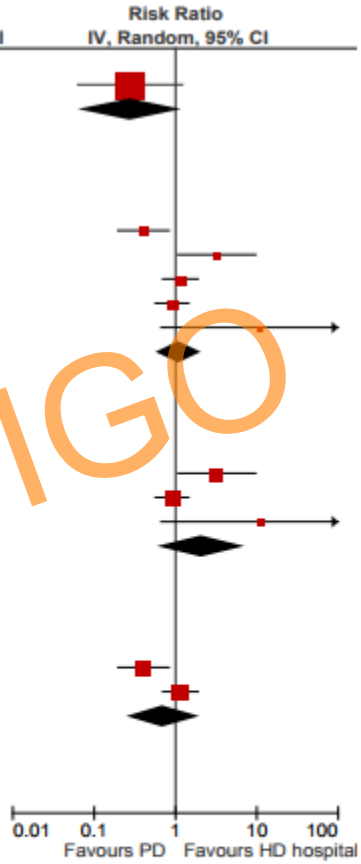


Detailed analysis – HR for death



PD v Hospital/Centre HD

Study or Subgroup	log[Risk Ratio]	SE	Weight	Risk Ratio IV, Random, 95% CI
1.1.1 RCT				
Korevaar 2003 (1)	-1.2809	0.7545	100.0%	0.28 [0.06, 1.22]
Subtotal (95% CI)			100.0%	0.28 [0.06, 1.22]
Heterogeneity: Not applicable				
Test for overall effect: Z = 1.70 (P = 0.09)				
1.1.2 Observational				
Andrikos 2008 (2)	-0.9076	0.3675	23.2%	0.40 [0.20, 0.83]
Ganeshadeva 2009 (3)	1.1725	0.5581	16.8%	3.23 [1.08, 9.64]
Jager 2001 (4)	0.1398	0.2547	27.5%	1.15 [0.70, 1.89]
Lee 2008 (5)	-0.0995	0.2388	28.0%	0.91 [0.57, 1.45]
Vigneau 2000 (6)	2.3979	1.4313	4.5%	11.00 [0.67, 181.85]
Subtotal (95% CI)			100.0%	1.11 [0.59, 2.10]
Heterogeneity: Tau² = 0.32; Chi² = 13.75, df = 4 (P = 0.008); I² = 71%				
Test for overall effect: Z = 0.32 (P = 0.75)				
1.1.3 Observational mortality-short time (12-14 months)				
Ganeshadeva 2009	1.1725	0.5581	37.2%	3.23 [1.08, 9.64]
Lee 2008	-0.0995	0.2388	48.4%	0.91 [0.57, 1.45]
Vigneau 2000	2.3979	1.4313	14.4%	11.00 [0.67, 181.85]
Subtotal (95% CI)			100.0%	2.08 [0.60, 7.28]
Heterogeneity: Tau² = 0.79; Chi² = 6.91, df = 2 (P = 0.03); I² = 71%				
Test for overall effect: Z = 1.15 (P = 0.25)				
1.1.4 Observational mortality-long time (median 28-48.5 months)				
Andrikos 2008	-0.9076	0.3675	46.8%	0.40 [0.20, 0.83]
Jager 2001	0.1398	0.2547	53.2%	1.15 [0.70, 1.89]
Subtotal (95% CI)			100.0%	0.70 [0.25, 1.96]
Heterogeneity: Tau² = 0.45; Chi² = 5.49, df = 1 (P = 0.02); I² = 82%				
Test for overall effect: Z = 0.67 (P = 0.50)				



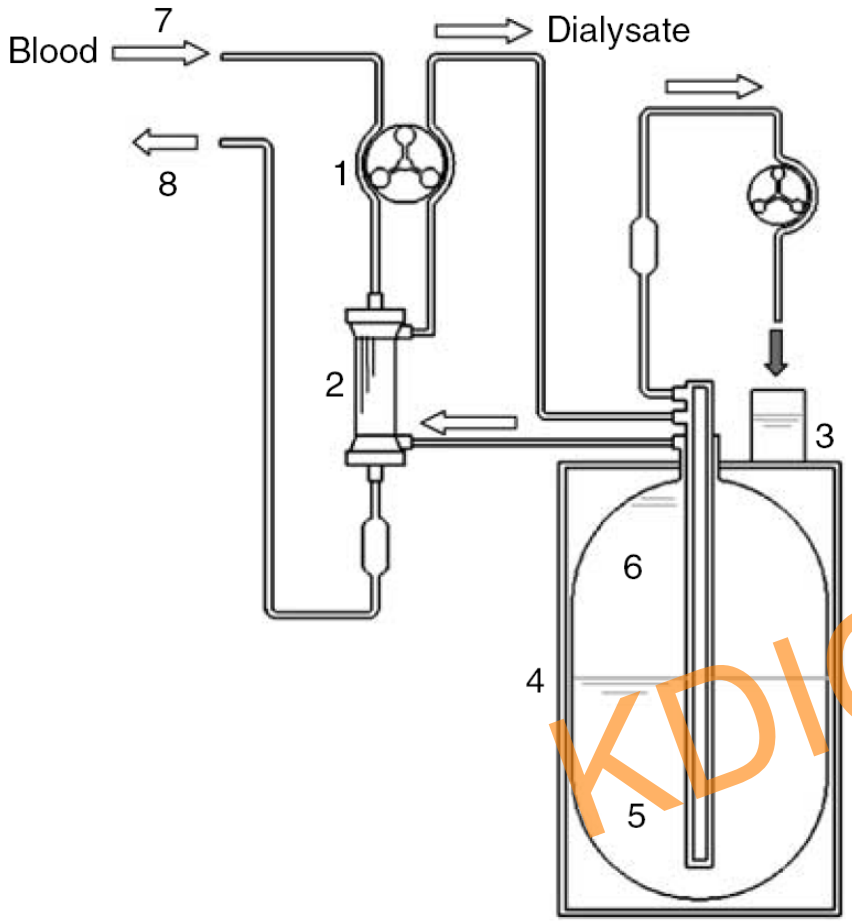
(1) Calculated log(Risk Ratio) from adjusted HR HDhospital vs PD
(2) log (Risk Ratio) calculated from reported events. ITT.Do not tell if adjusted or not
(3) log (Risk Ratio) calculated from Kaplan-Meier survival.ITT. Do not tell if adjusted or not
(4) log (Risk Ratio) calculated from reported RR. Adjusted. ITT?
(5) log (Risk Ratio) results calculated from survival data in percentage. ITT. Do not tell if adjusted or not
(6) log (Risk Ratio) calculated from reported events. ITT. Do not tell if adjusted or not

Figure 5 *Analyses of the mortality data from the RCT study and the observational studies respectively for the comparison PD home versus HD hospital.*

Pike E et al,
Norwegian Knowledge Center for Health Services,
Report No 19-2013.

Why should there be benefits?

- Increased hours and frequency
  - Solute clearances
  - Fluid management



9 patients;

90 litres dialysate

Blood flow rate = dialysate flow rate

Same system used for 4,6 or 8 hours

Therefore testing influence of time only with equivalent amount of blood processed.

Eloot S et al, KI, March 2008

Table 1 | Percentage increase of TSR, TCV, dialyzer ER, and RR during a dialysis session of 6 and 8 h compared to 4 h dialysis

	TSR		TCV		ER		RR	
	6 vs 4 h	8 vs 4 h	6 vs 4 h	8 vs 4 h	6 vs 4 h	8 vs 4 h	6 vs 4 h	8 vs 4 h
Urea	6.1	26.1†	0.7	33.3†	1.0	33.2†	4.1	1.1
CTN	21.7	35.5	16.7	32.1†	17.1	32.0†	−2.9	−0.3
P	26.7	48.9†	22.4	32.5†	22.7	32.4†	2.1	−5.8
β2M	42.5	81.2	48.5	94.4	48.9	94.3	5.2	9.3

β2M, β2-microglobulin; CTN, creatinine; ER, extraction ratio; RR, reduction ratio; P, phosphorus; TSR, total solute removal; TCV, total cleared volume.
†$P<0.05$ percentages '8 vs 4 h' vs '6 vs 4 h.'

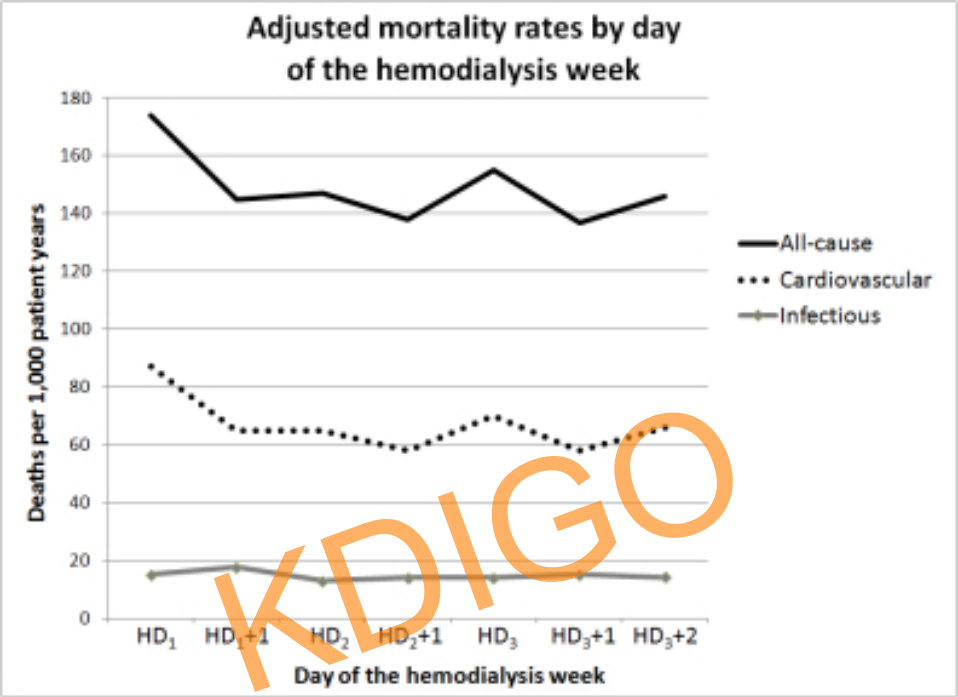
Mathematical modelling – *Clark WR et al, JASN, 1999*

Regimen	Frequency (per week)	Time (min)	Q_B/Q_D (ml/min)	K_{urea} (ml/min)	K_{inulin} (ml/min)	
A	3	240	350/600	231	75	- Conventional
B	7	100	350/600	231	75	- Short Daily
C	3	480	300/100	101	56	
D	5	480	300/100	100	54	- Nocturnal regimens
E	7	480	300/100	99	53	

Normalized Equivalent urea clearance (EKR, ml/min) during the different dialysis regimens

Regimen	**Urea**	**Creatinine**	**Vancomycin**	**Inulin**	**β_2-Microglobulin**
Conventional hemodialysis	1	1	1	1	1
Short daily hemodialysis	1.04	1.03	1.06	1.05	1.00
Long 3 times per week	0.96	1.08	1.32	1.54	1.27
Long 5 times per week	1.58	1.80	2.21	2.57	1.73
Long 7 times per week	2.22	2.55	3.12	3.62	2.19

Vancomycin – MW 1448; Inulin – MW 5200; B2m – MW 11,800



Not seen in Australian data examining nocturnal HD (3.5+ times per week)

Table 3

Associations Between Continuous and Finely Categorized Prescribed Ultrafiltration Rate and All-Cause Mortality

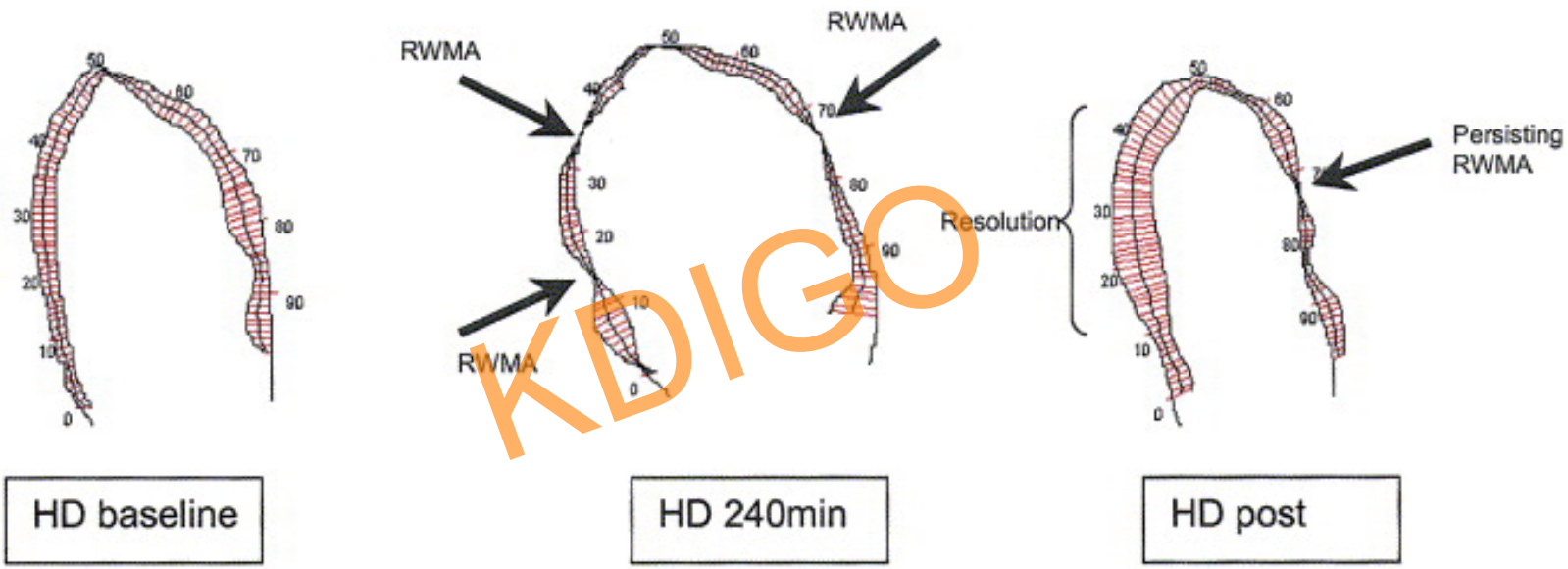
		HR (95% CI)	
	No. (%)	Unadjusted	Adjusted [a]
Mean UF rate, per 1-mL/h/kg	118,394 (100.0)	1.01 (1.01-1.02)	1.03 (1.02-1.03)
Mean UF rate			
<6 mL/h/kg	23,813 (20.1)	1.00 (reference)	1.00 (reference)
6-<8 mL/h/kg	21,729 (18.4)	0.99 (0.96-1.02)	1.03 (1.00-1.07)
8-<10 mL/h/kg	24,323 (20.5)	1.01 (0.98-1.04)	1.09 (1.06-1.12)
10-<12 mL/h/kg	19,457 (16.4)	1.04 (1.01-1.07)	1.15 (1.12-1.19)
12-<14 mL/h/kg	13,086 (11.1)	1.08 (1.05-1.12)	1.23 (1.18-1.27)
≥14 mL/h/kg	15,986 (13.5)	1.19 (1.15-1.23)	1.43 (1.39-1.48)

View Table in HTML

Assimon MM … Flythe JE, AJKD, 2016

Myocardial Stunning

Transient myocardial ischemia leading to LV dysfunction which can persist after restoration of normal perfusion

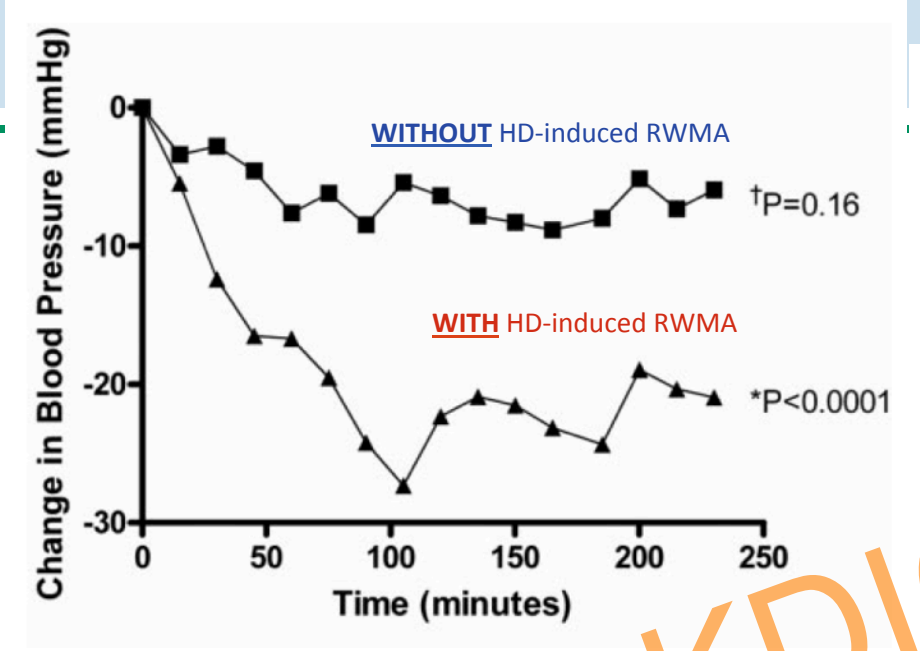


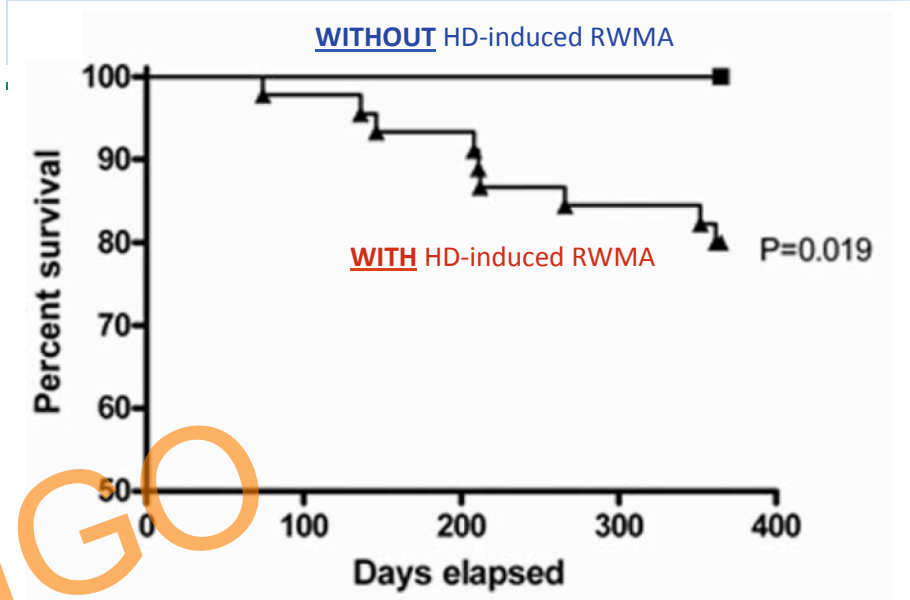
Selby *et al*. AJKD 2006; 47:830

HD is the perfect setup for STUNNING

HD ⇨ ⇣MBF ⇨ RWMA (in absence of coronary disease)

McIntyre *et al*. CJASN 2008; 3:19





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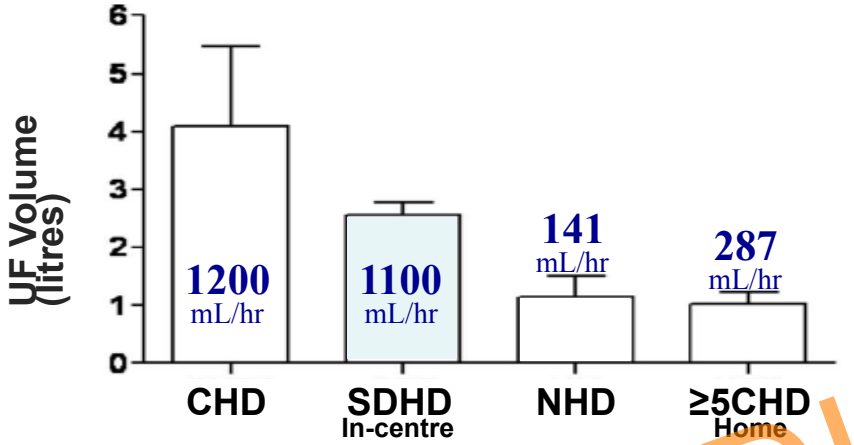
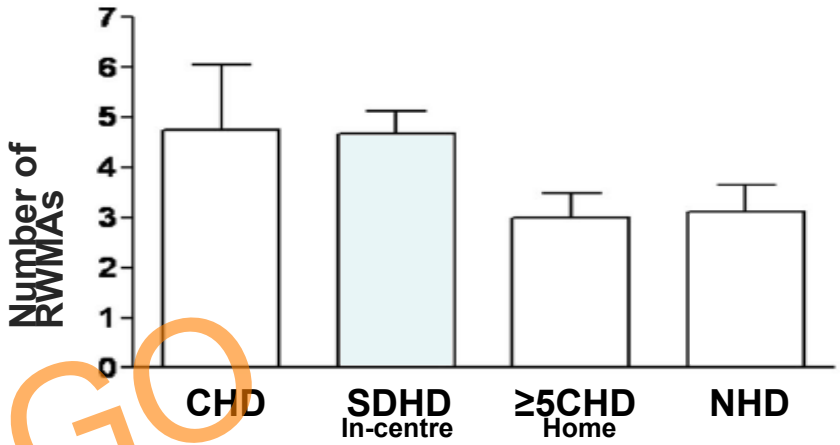
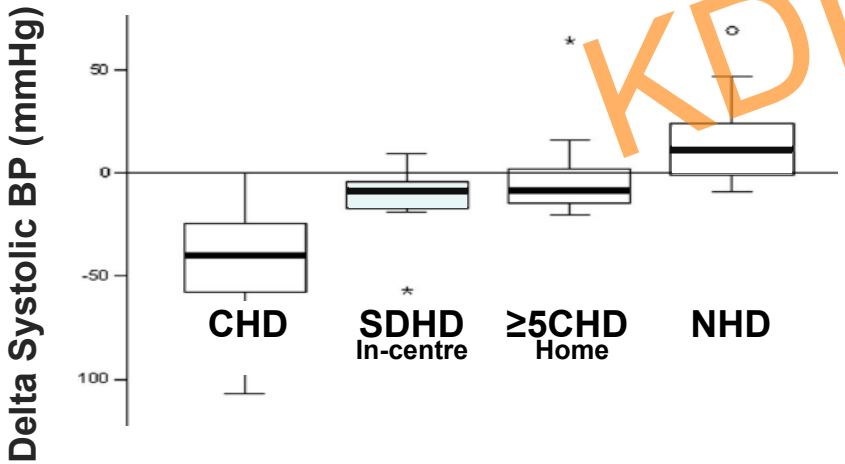
Factor associated with presence of myocardial stunning	Odds Ratio	*P* value
UF volume during HD of 1L	**5.1**	0.007
UF volume during HD of 1.5L	**11.6**	
UF volume during HD of 2L	**26.2**	
Maximum SBP reduction during HD of 10 mmHg	1.8	0.002
Maximum SBP reduction during HD of 20 mmHg	3.3	
Maximum SBP reduction during HD of 30 mmHg	6.0	

Burton *et al*. CJASN 2009; 4:914







Jefferies *et al*. CJASN 2011; 6:1326

KDIGO

FHN

SDHD

UF/session 2.12 L

UF rate **800 ml/hr**

NHD

UF/session 1.95 L

UF rate **300 ml/hr**


International Journal of Nursing Studies
Volume 74, September 2017, Pages 128-137
ELSEVIER
Effects
on chronic kidney disease:
A met
Mei-Yu
The Choice of Renal Replacement Therapy (CORETH) project: dialysis patients' psychosocial characteristics and treatment satisfaction
Maxi Robinski, Wilfried Mau, Andreas Wienke, Matthias Girndt
Nephrology Dialysis Transplantation, Volume 32, Issue 2, 1 February 2017, Pages 315–324, https://doi.org/10.1093/ndt/gfv464
KDIGO
Closing the
chronic kidney
Clint Douglas,
Effect of a behavioral self-regulation
adherence in hemodialysis.
Christensen, Alan J.,Moran, Patricia J.,Wiebe, John S.,Ehlers, Shawna L.,
Health Psychology, Vol 21(4), Jul 2002, 393-397
Nonadher
Patients: A
Saurav Ghimire, Ronald
Published: December 4, 2015
OPEN ACCESS
RESEARCH ARTICLE
aire (heiQ): An
patient education
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C5716304

AJKD

ePub 30 Nov, 2017

Hemodialysis Self-management Intervention Randomized Trial (HED-SMART): A Practical Low-Intensity Intervention to Improve Adherence and Clinical Markers in Patients Receiving Hemodialysis

Konstadina Griva, Mooppil Nandakumar, Jo-an H. Ng, Kevin F.Y. Lam, Hayley McBain, and Stanton P. Newman

Table 2. Primary Outcomes: Clinical Markers Across Assessment Points for Each Trial Arm

	HED-SMART (n = 101)			Usual Care (n = 134)			Between-Arm Comparisons		
	P[a]	Mean ± SD	%[b]	*P*[a]	Mean ± SD	%[b]	*P*[c]	*P*[d]	*d*[e]
IDWG, kg									
T1	[e]	2.49 ± 0.71	—	[e]	2.46 ± 0.69	—	0.5	—	0.04
T2	[f]	2.32 ± 0.59	—	[e,f]	2.50 ± 0.73	—	0.08	—	−0.27
T3	[f]	2.34 ± 0.55	—	[f]	2.54 ± 0.72	—	0.04	—	−0.31
T4	[f]	2.32 ± 0.60	—	[e,g]	2.45 ± 0.71	—	0.2	—	−0.19
IDWG, % of dry weight									
T1	[e]	3.91 ± 1.02	39.6%	[e,f]	3.93 ± 1.06	46.3%	0.8	0.3	−0.02
T2	[f]	3.67 ± 0.84	32.7%	[e,f]	4.00 ± 1.18	48.1%	0.03	0.02	−0.32
T3	[f]	3.71 ± 0.79	30.7%	[e]	4.03 ± 1.10	53.4%	0.02	0.001	−0.33
T4	[f]	3.66 ± 0.84	30.7%	[f]	3.90 ± 1.10	45.1%	0.1	0.03	−0.24
Phosphate, mg/dL									
T1	[e]	5.16 ± 1.45	45.5%	[e]	5.15 ± 1.27	40.3%	0.8	0.4	0.01
T2	[e,f]	5.05 ± 1.41	46.5%	[f,g]	5.33 ± 1.21	55.2%	0.2	0.2	−0.21
T3	[f]	4.87 ± 1.26	34.7%	[e,g]	5.27 ± 1.20	47.8%	0.02	0.04	−0.33
T4	[e]	5.06 ± 1.11	39.6%	[f,g]	5.36 ± 1.06	44.8%	0.05	0.4	−0.28
Potassium, mEq/L									
T1	[e]	5.00 ± 0.64	49.5%	[e]	4.89 ± 0.52	38.1%	0.09	0.08	0.21
T2	[e,g]	4.90 ± 0.63	36.6%	[e]	4.91 ± 0.59	38.1%	0.9	0.8	−0.01
T3	[f]	4.70 ± 0.62	31.7%	[f,g]	5.02 ± 0.59	47.8%	<0.001	0.01	−0.52
T4	[g]	4.82 ± 0.65	33.7%	[e,g]	4.97 ± 0.55	42.5%	0.07	0.2	−0.25

Note: Intention-to-treat values shown.

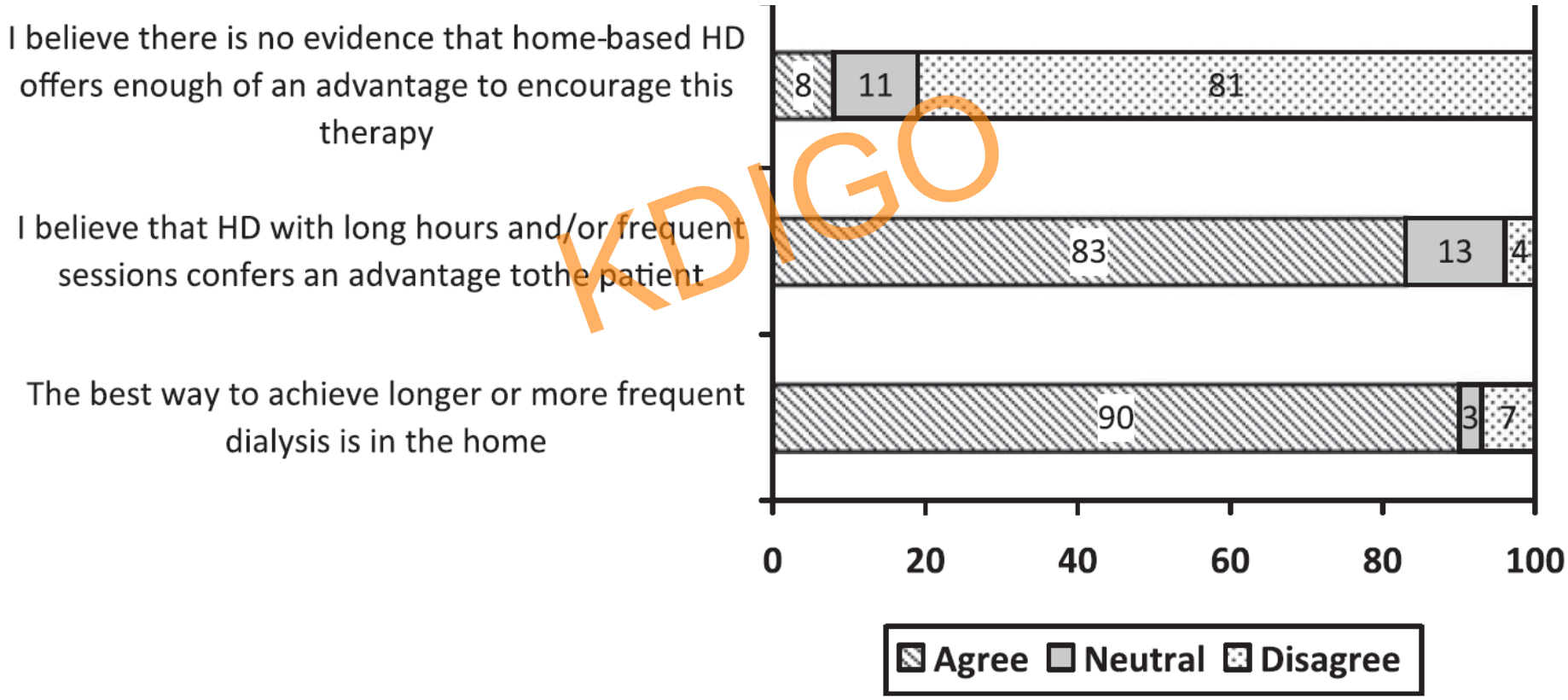
Not all sustained – need recurrent reinforcement

Barriers to home dialysis.

- Financial – patient, doctor and institution
- Physical infrastructure – home, hospital training facilities
- Lack of expertise – nephrologists, nurses
- Lack of industry support – hardware, consumables, deliveries
- Lack of belief/trust in home dialysis – doctors, nurses, patients
- Patient – demography, geography, comorbidities

Adapted from *Ludlow, Kerr et al, Nephrology, 2011.*

Australian Nephrologists Believe in Home HD



Ludlow MJ … Kerr, PG et al. Nephrology, 2011; 16:446.

What do the patients want?

AJKD
Original Investigation

Patient and Caregiver Perspectives on Home Hemodialysis: A Systematic Review

Rachael C. Walker, NP, MN (Dist),[1,2] Camilla S. Hanson, BPsych(Hons),[1,3] Suetonia C. Palmer, MBChB, PhD,[4] Kirsten Howard, PhD,[1] Rachael L. Morton, PhD,[1,5] Mark R. Marshall, MBChB, FRACP, MPH,[6] and Allison Tong, PhD[1,3]

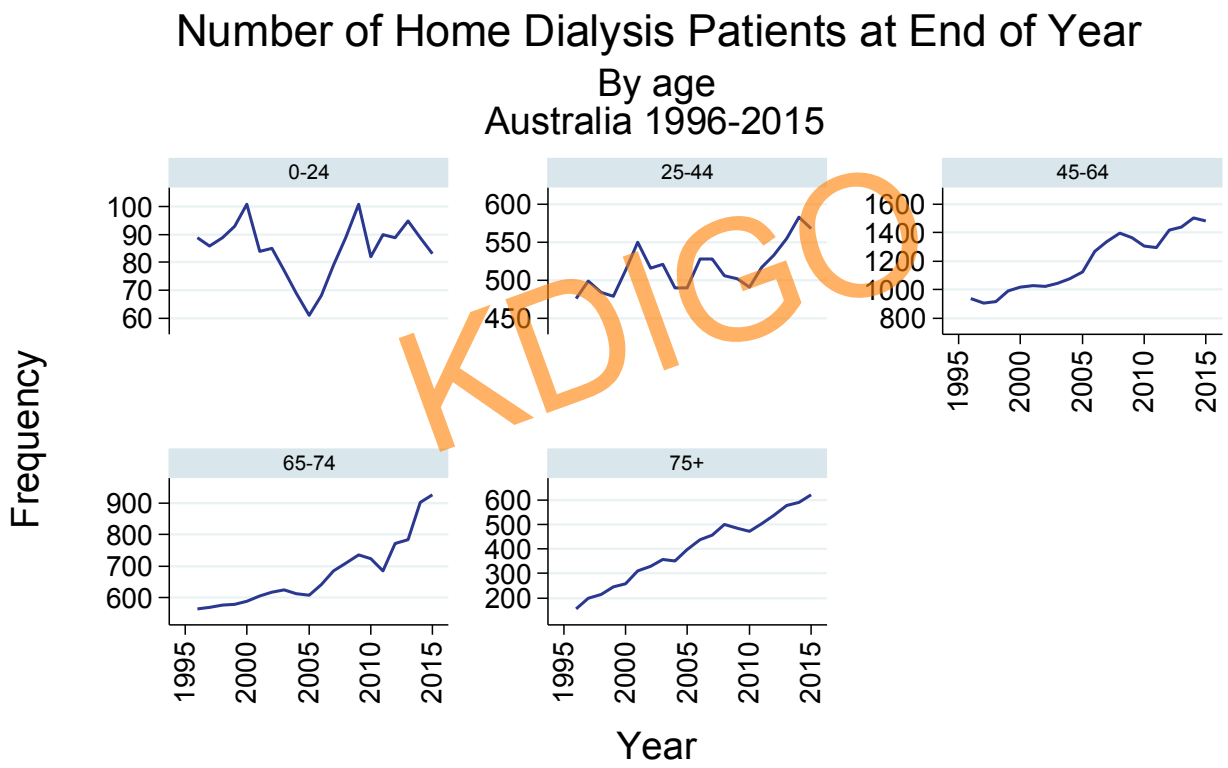
Patients and caregivers perceive that home HD offers the opportunity to thrive; improves freedom, flexibility, and well-being; and strengthens relationships.

AJKD 2015; 65:451

NZ study of patient preferences

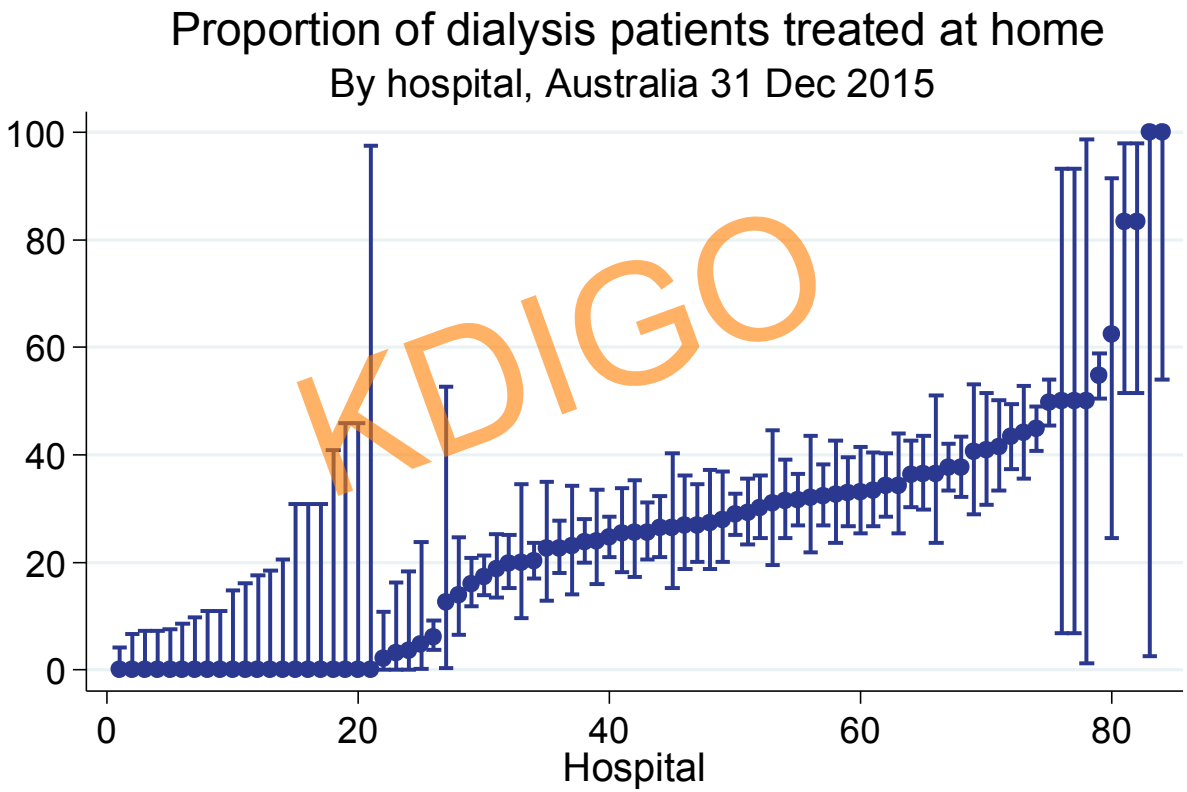
- Discrete choice study of 143 participants – preferences and trade-offs
- Preferred home dialysis if unlimited nursing support available
- Willing to pay US$271/month for that support
- Preferred home Dialysis if out of pocket costs minimised
- Preferred home Dialysis if nocturnal Dialysis available
- Willing to pay US$151/month to gain treatment flexibility

Walker RC, Morton RL, ..Tong A et al, CJASN, 2018



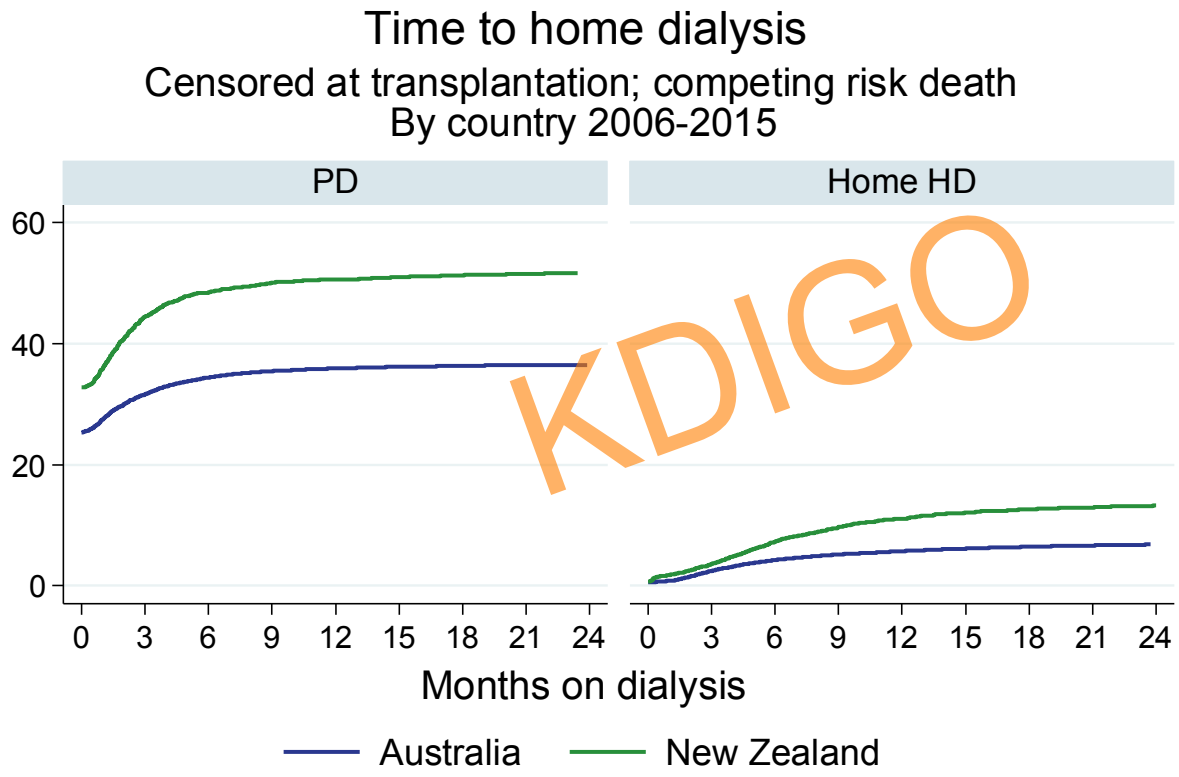
2016 ANZDATA Annual Report, Figure 6.12

Unquestionable Centre Bias



2016 ANZDATA Annual Report, Figure 6.13

Need to avoid delays to start



2016 ANZDATA Annual Report, Figure 6.3

- Patients too comfortable in a facility
- AND
- A long lag will influence your interpretation of outcomes

Economic evaluation, including QoL

Table 37: *Results of the base-case cost-effectiveness analyses from a societal perspective (discounted); HD home compared with Hospital, Satellite, Self-care Hemodialysis and Peritoneal Dialysis*

	Total costs (NOK)	Effects (QALYs)	Incremental cost (NOK)	Incremental (QALYs)	ICER (NOK/QALY)	INHB
HD home	1,705,865	1.8613				
HD satellite	2,629,801	1.7181	923,936	-0.1443	Dominated	-1.71
HD self-care	1,951,610	1.7169	388,161	-0.1444	Dominated	-0.80
HD hospital	2,371,729	1.7169	665,864	-0.1432	Dominated	-1.28
PD	1,230613	1.6825	-475,252	-0.1789	2,657,211	0,63

QALY: quality-adjusted life year; ICER: incremental cost-effectiveness ratio; INHB: incremental net health benefit; HD: hemodialysis; PD: peritoneal dialysis

Pike E et al,
Norwegian Knowledge Center for Health Services,
Report No 19-2013.

Economic evaluation

- In our model analyses all dialysis modalities were almost equally effective.
- Hemodialysis at home was the most effective and cost-effective alternative compared to all other hemodialysis modalities from both healthcare and societal perspectives.
- Peritoneal dialysis was the least costly, and hence the most cost-effective alternative compared to all hemodialysis modalities.

Economic evaluation of dialysis therapies

Scott W. Klarenbach, Marcello Tonelli, Betty Chui and Braden J. Manns

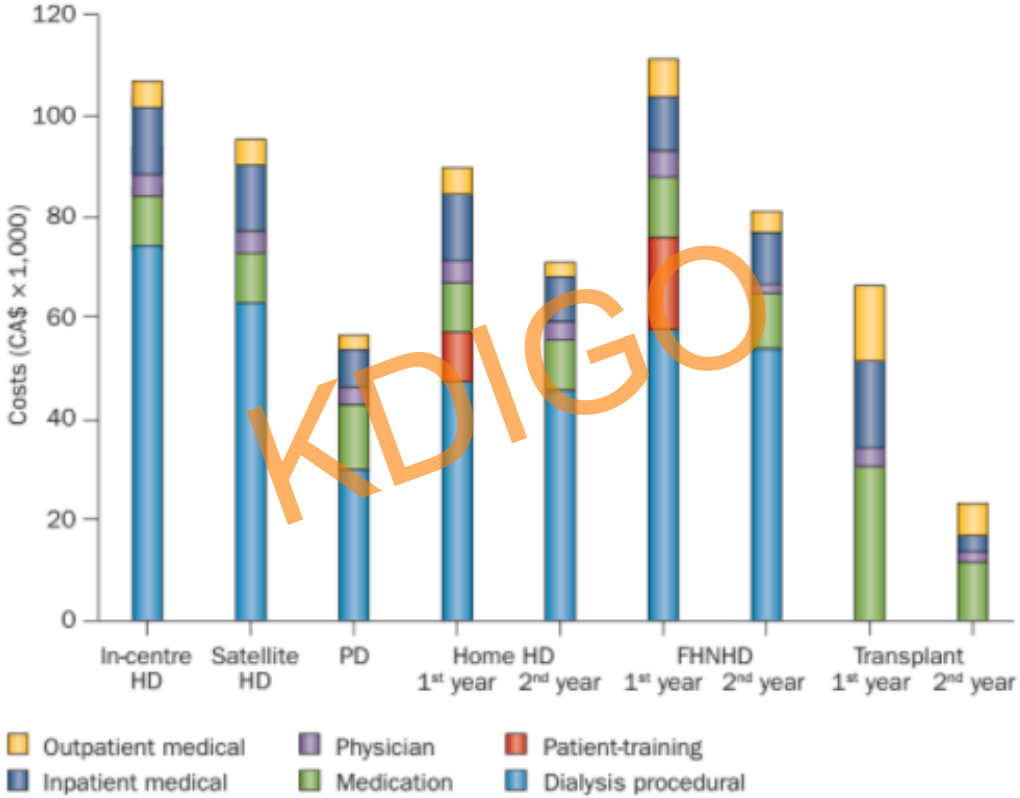


Figure 1 | Annual health-care costs of dialysis stratified by modality in Canada.

Nature Rev Nephrol, 2014; 10:644.

Home Dialysis: summary

- Patients prefer it
- Outcomes are excellent
- Administrators love it – it‘s cheaper
- Practicalities will demand it

- Let‘s do it.

  - (but it means you have to support it)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