Wessex Kidney Centre
Delivering Excellence in Kidney Care

Portsmouth Hospitals NHS
NHS Trust

Home HD using low flow dialysate?

Dr Natalie Borman

Nephrologist and Clinical director

Wessex Kidney centre

Content

- Portsmouth programme
- Why more frequent HD and meeting growing demand
- Application of more frequent HD – case based approach.
- European data

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Location

- 2.4 million population
- 800 dialysis patients

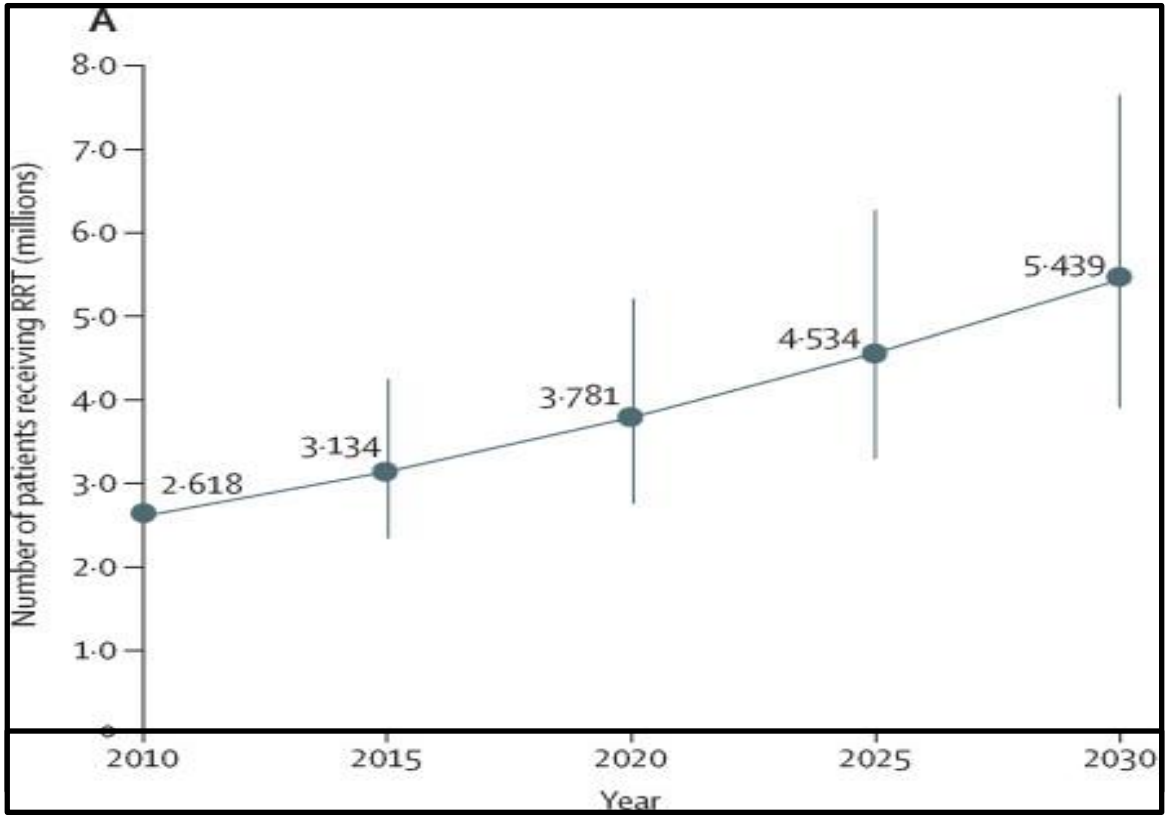
Portsmouth Programme

- No Home HD from 1999 to 2009
- Attempts to restart a programme failed
- WKC HHD programme started in 2009
- Nocturnal programme started 2011
- Over 250 patients trained in 8 years
- Has up to 90 prevalent HHD patients
- All patients on NxStage
- Now 7 Nurses and 2 Nephrologists

Meeting the growing demand

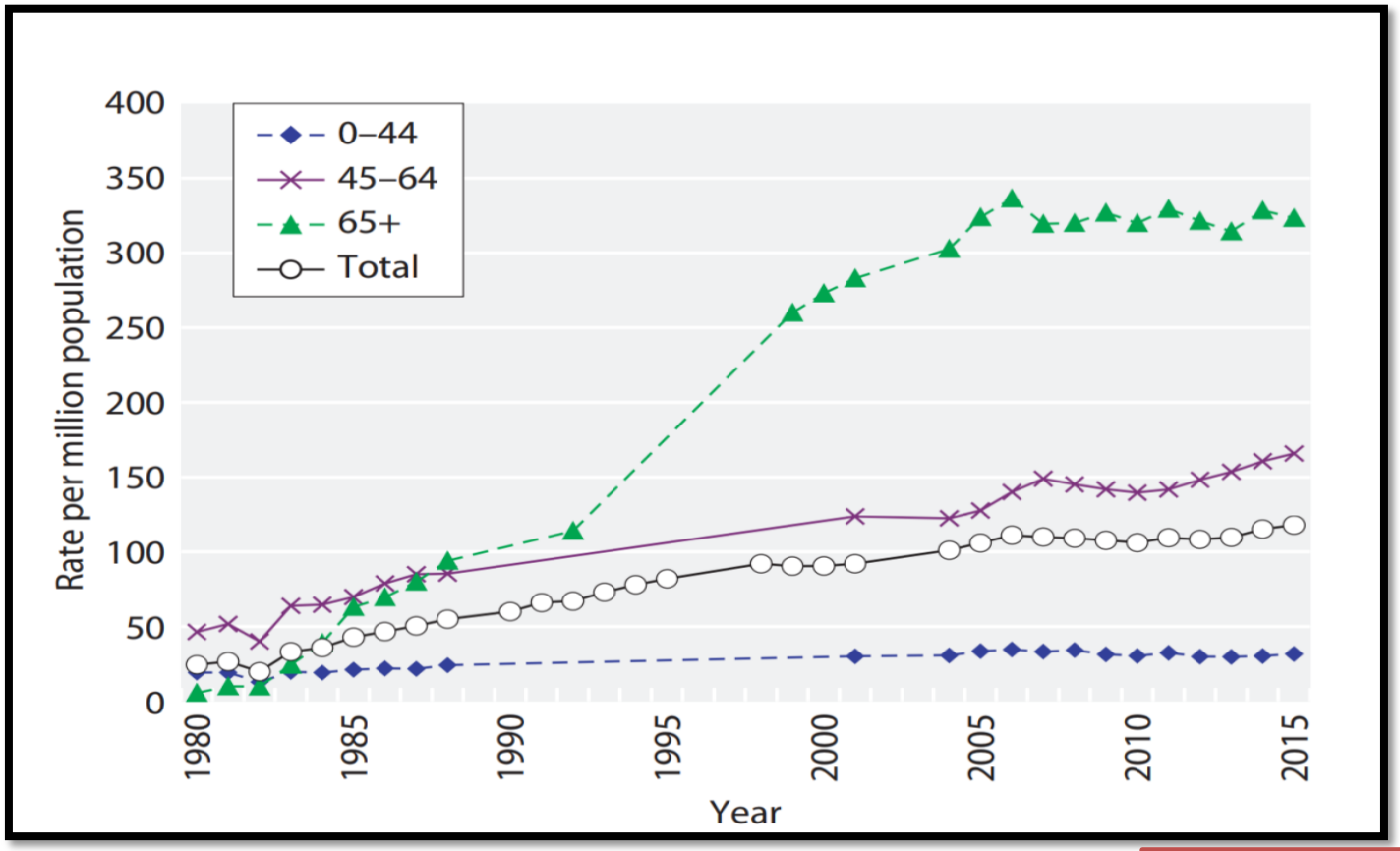
How can more frequent HD help?

Increasing dialysis population



↗ **Demand** of dialysis services
↘ **Shortage** in renal professionals
✚ **Choice** for patients

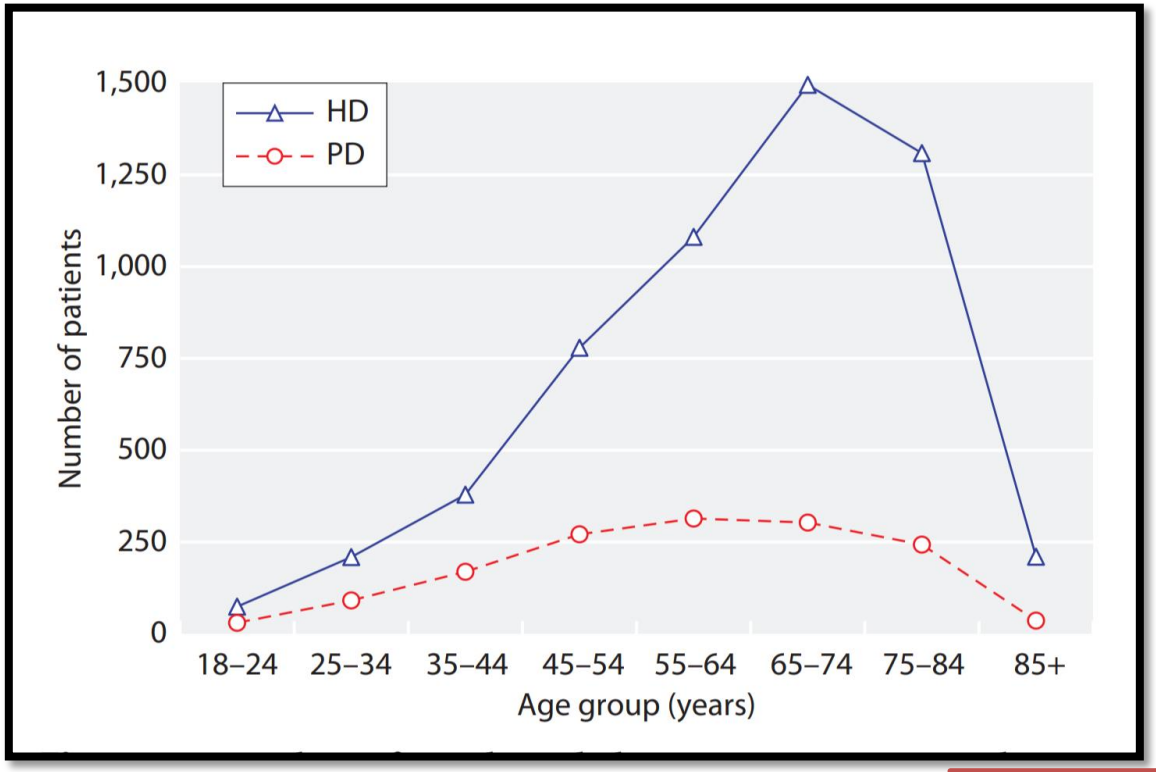
Increasing age



Data from 19th UK Renal registry

↗ **Comorbidity**
↗ **Frailty**
↗ **Demand to treat**

Much more likely to receive HD



Data from 19th UK Renal registry

- ↗ **Complications**
- ↗ **Hemodynamic instability**
- ↗ **Hospitalisation**

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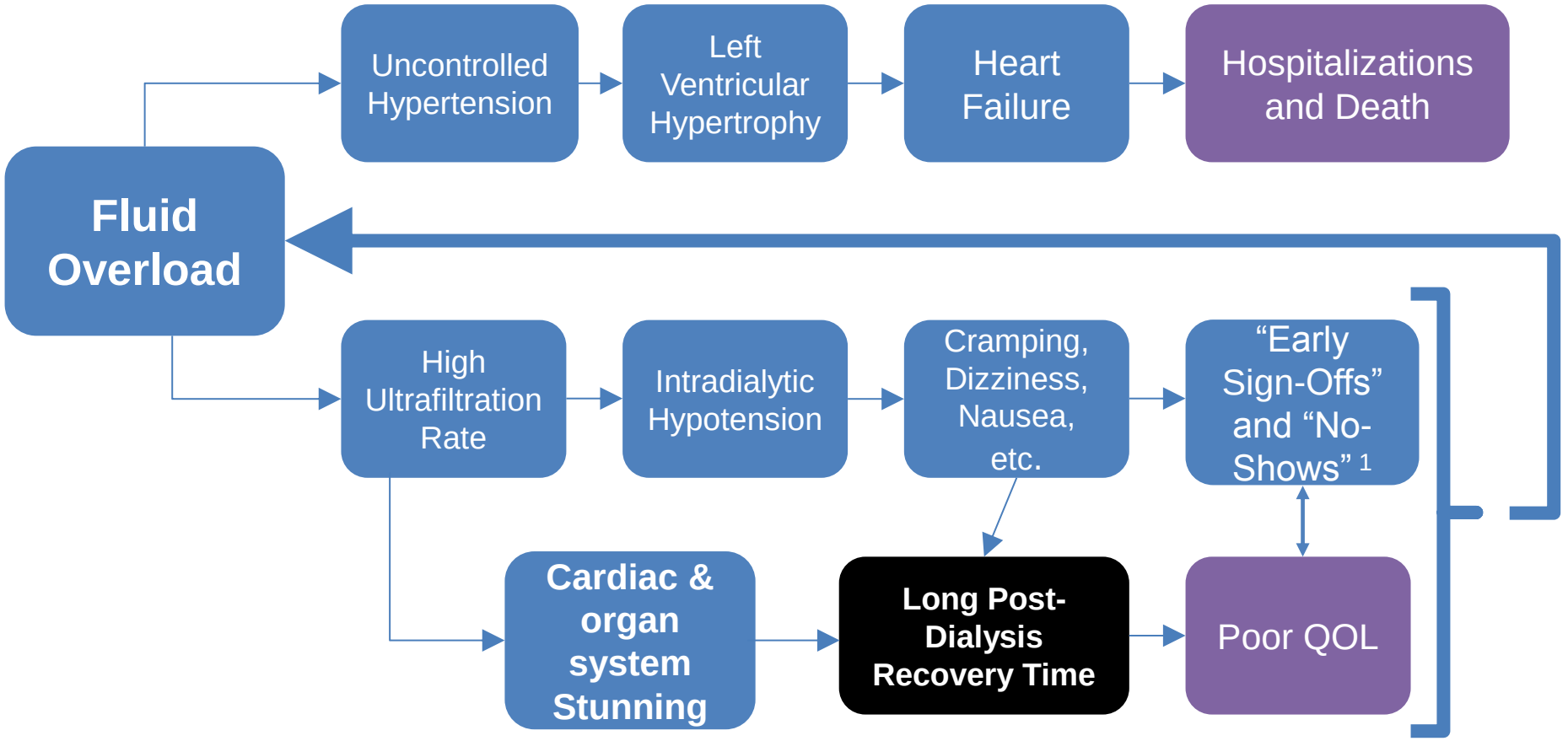
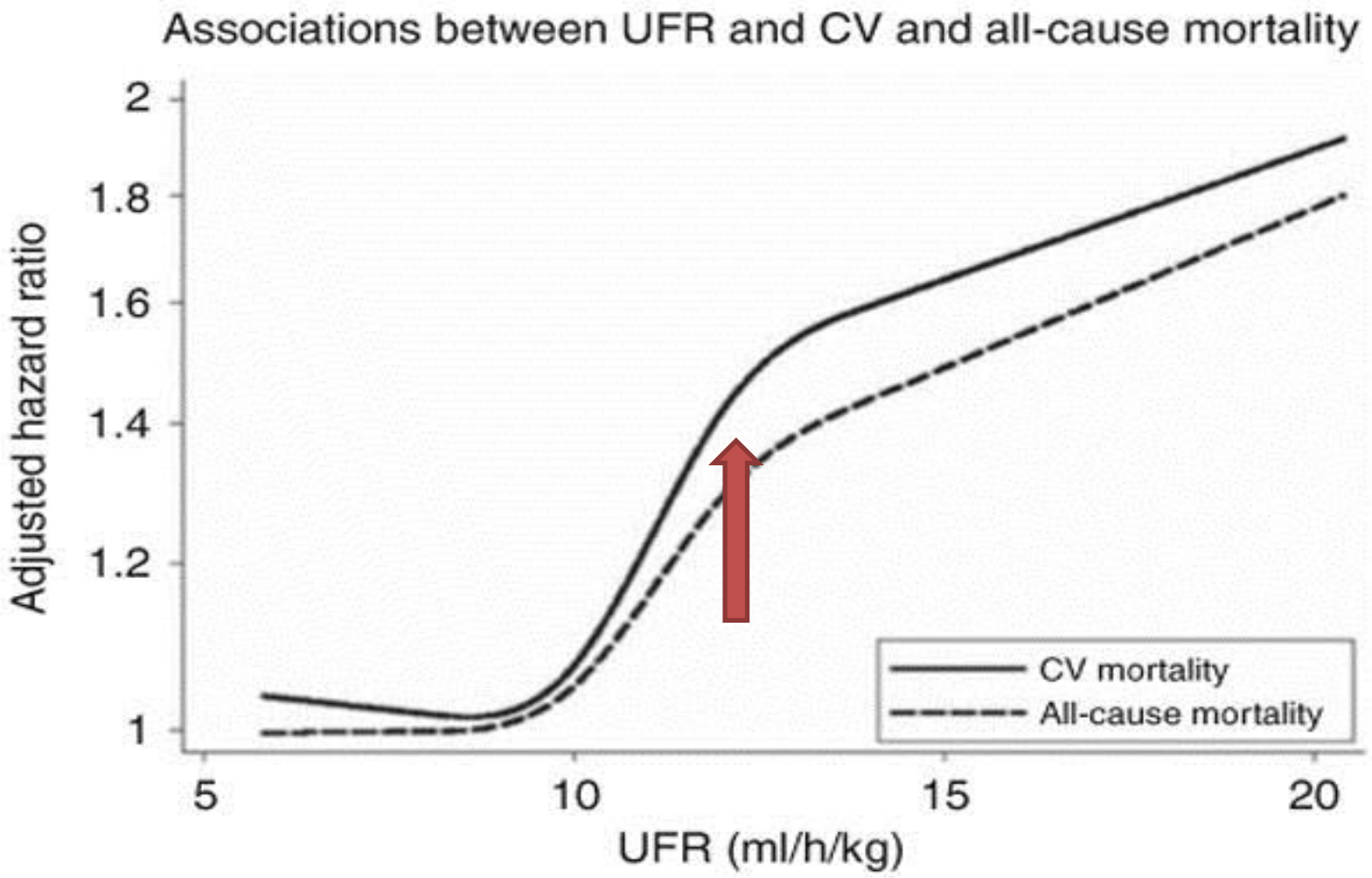
Pathophysiology and Outcomes

Challenges with Thrice-Weekly Hemodialysis

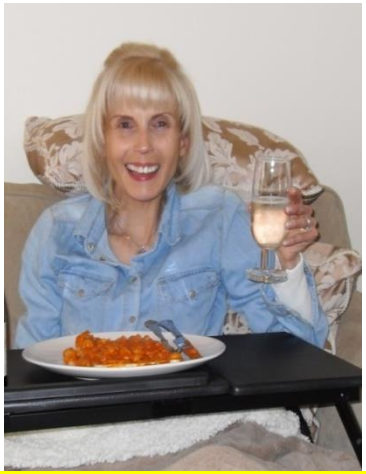


1.Rocco MV, Burkart JM. Prevalence of missed treatments and early sign-offs in hemodialysis patients. J Am Soc Nephrol. 1993 Nov;4(5):1178-83.

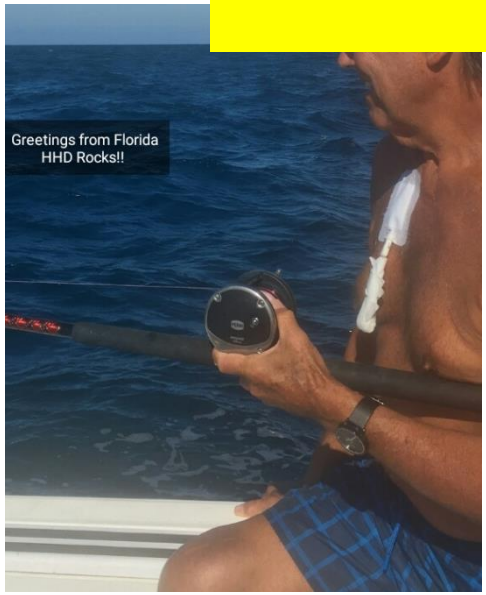


Flythe. Kidney int 2011

N = 1846 patients



One size does not fit all



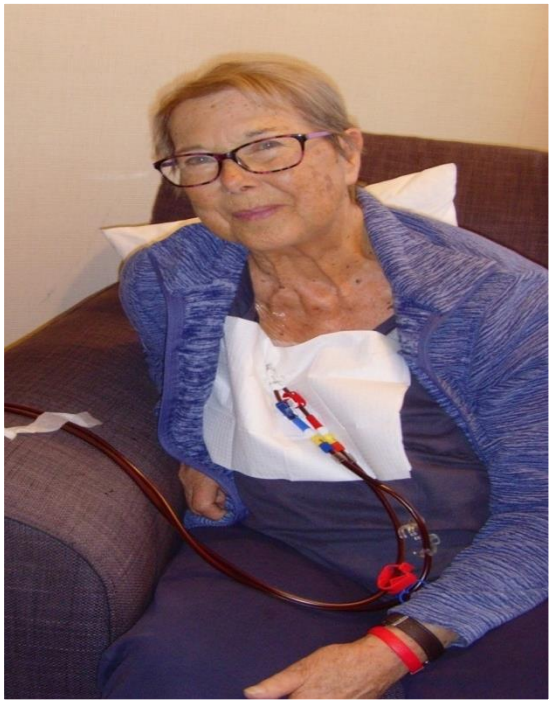
Based on experience of Wessex Kidney centre, Portsmouth, UK

C Nocturnal w

- 35 Years old
- Full Time chief
- New wife, expecting first child

- His challenges
  - Time and work
  - Money
  - Quality time with family
- Medical challenges
  - Phosphate
  - Highly sensitised and recurrent FSGS
  - Cardiovascular risk
  - 20 years on HD already

Six Sessions per week



- 77 years old
- Failed transplant
- Sever CCF, EF 20%, Bi-vent pace
- Low BP, severely overloaded

- Her challenges
  - Travel to centre
  - Feels terrible
  - Cant walk properly
- Medical Challenges
  - LVF
  - Fluid removal with low BP
  - Continuing cardiac
  - Stability on dialysis

A tailored therapy that he will actually do

- 46 years old
- Frequently missing sessions
- Off Tx list due to compliance

- His Challenges
  - Fear of loosing job
  - No flexibility
  - Feels terrible after HD
- Medical Challenges
  - Compliance
  - Excessive UF
  - Potassium
  - Risk of Sudden death
  - Trust

A tailored regimen with graduated withdrawal when malignancy reaches terminal stage

- 81 Years Old
- On dialysis for 1 year
- Cant do anything post dialysis
- Diagnosis of cancer with limited treatment options

- His challenges
  - Find dialysis exhausting
  - Wants to enjoy time at home
- Medical Challenges
  - How will he cope
  - Carer Burden
  - End of life care
  - When to stop

Frequent HD to improve BP, facilitate UF and medication reduction

- 55 years old
- Failed transplant
- Recent restart on dialysis
- Full time employment
- Severe hypertension on 8 medications

- His Challenges
  - Severe headache on dialysis
  - Off sick from work
  - Tablets don't seem to be helping
- Medical Challenges
  - Controlling BP
  - Not tolerating UF
  - Risk of Stroke and LVF
  - Risk of non compliance

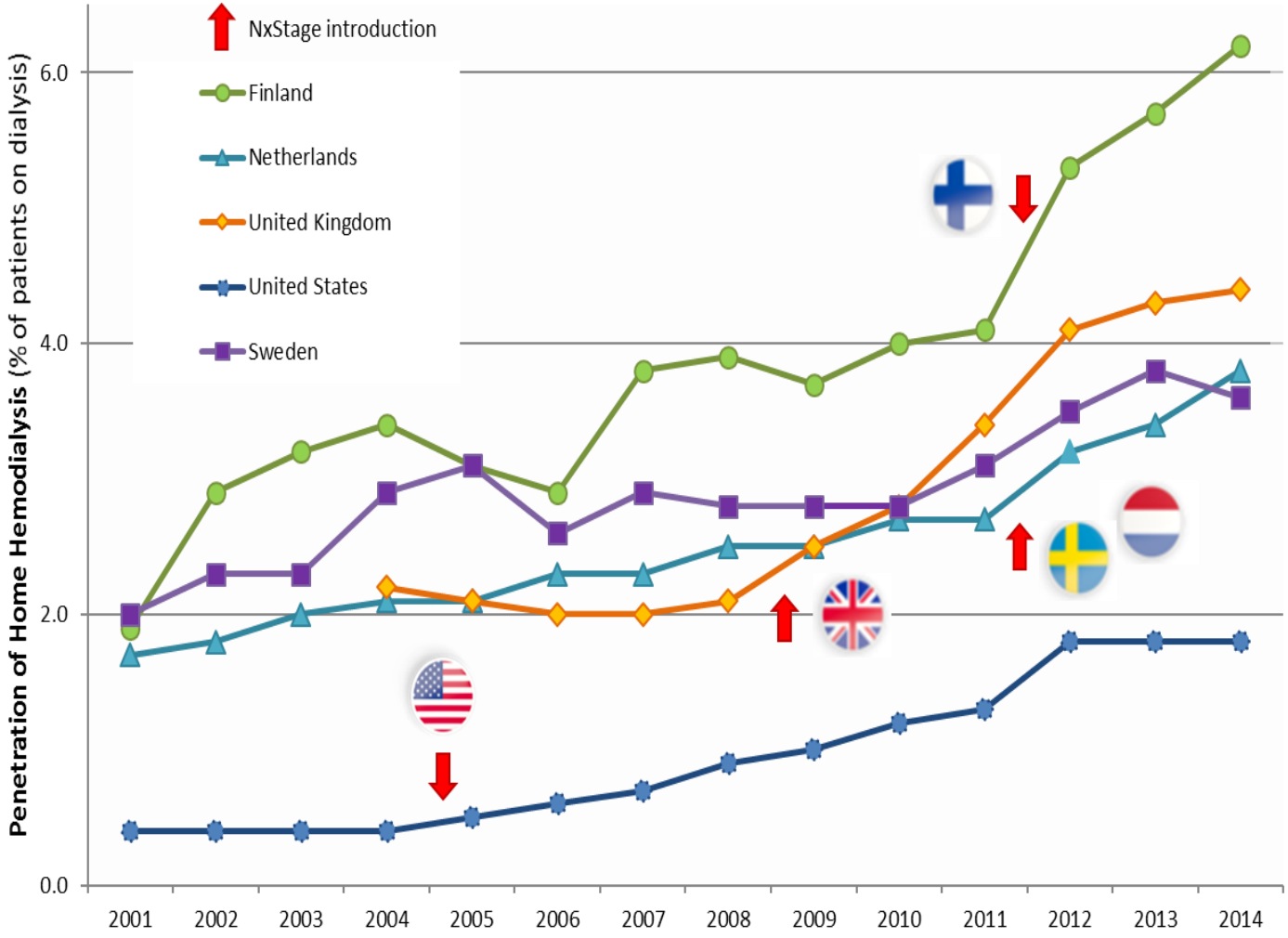
So what is the point……

NxStage can help more patients

- Simple and portable
- Quick and Easy training and setup
- Drop-in cartridge
- Minimal home modification
- No disinfection
- Low utilities usage
- High flux membrane
- Low dialysate volume
- L-Lactate buffer

Treatment fits to patient's life

With More Options Home HD Can Grow



In these countries, Home HD growth restarts as soon as NxStage is introduced

European data

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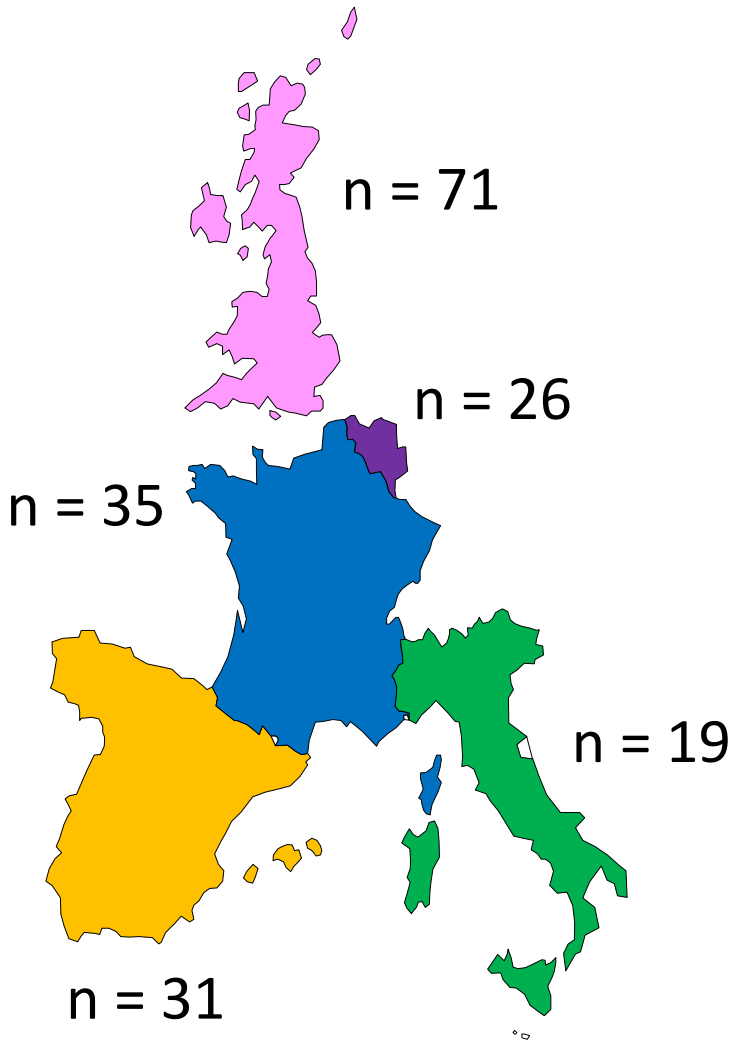
Knowledge to Improve Home Hemodialysis Network in Europe

KIHDNEy

Retrospective study of frequent home hemodialysis (fHHD) patients using NxStage® System One™

182 patients
9 home hemodialysis programs
5 European countries
1 year follow-up



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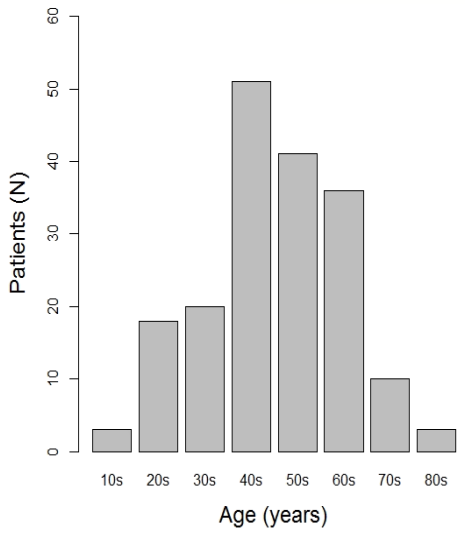
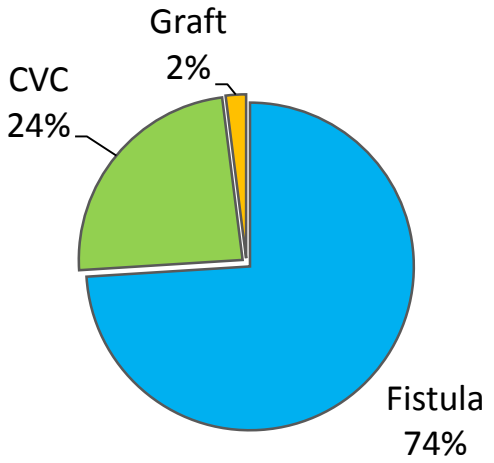
Demographics

	Mean	Range
Age (years)	49.5	15-84
Male sex	63%	
Body mass index (kg/m^2)	26.1	13.3-50.8
Charlson score (points)	3.9	2-11

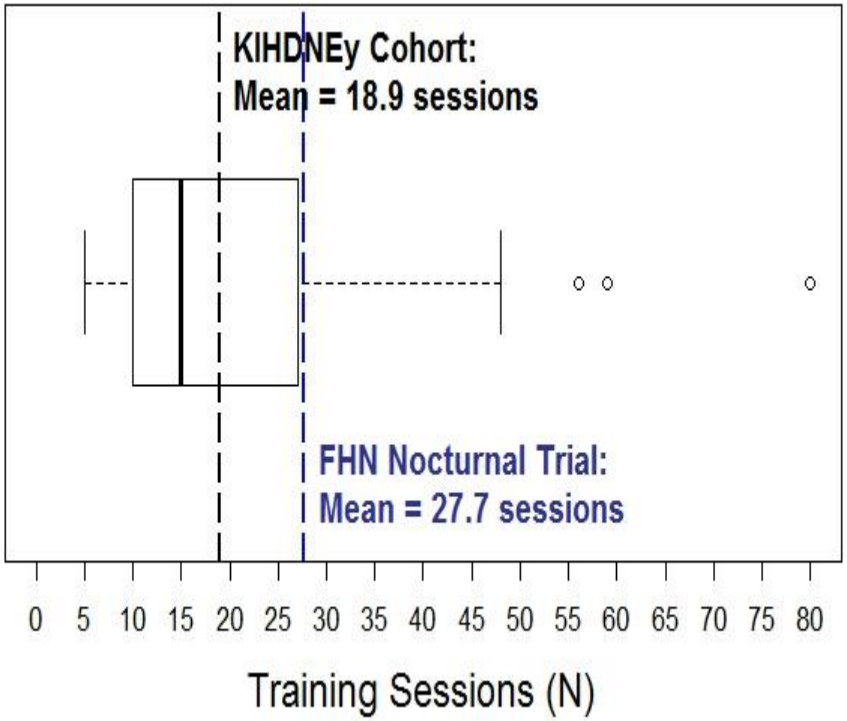




- Diverse Patient Population
- 2 in 3 Patients **≥1 Comorbid Condition**

76% using button hole technique

Short Training Times



- **Less** than with traditional Home HD equipment
- **3 fewer training sessions** if able to cannulate independently at initiation

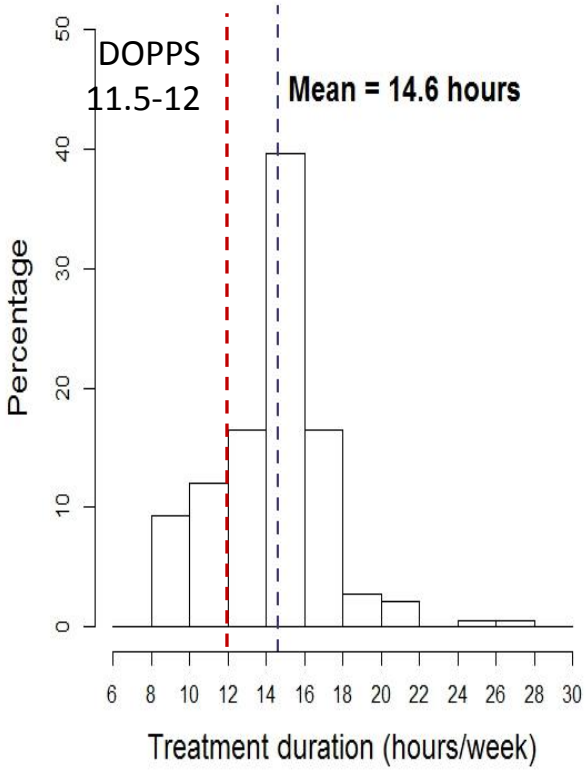
Individualized Prescriptions

Number of Patients, by Treatment Frequency and Duration

		Treatment Duration (Hours/session)				
		2.0-2.4	2.5-2.9	3.0-3.4	3.5-3.9	≥4.0
Treatment Frequency (Sessions/week)	3				1	
	3.5 or 4		2		1	2
	5	28	13	12		2
	6	25	60	28	2	
	7		3	2		1

Cumulative Treatment Duration

Generally Exceeding Conventional Hemodialysis



- Compared to 11.5-12.0 hours/week with conventional hemodialysis in same European countries[1]
- 16% of patients with <12 hours/week, but most had residual renal function

[1]Tentori F, Zhang J, Li Y, Karaboyas A, Kerr P, Saran R, Bommer J, Port F, Akiba T, Pisoni R, Robinson B. Longer dialysis session length is associated with better intermediate outcomes and survival among patients on in center three times per week hemodialysis: results from the Dialysis Outcomes and Practice Patterns Study (DOPPS). Nephrol Dial Transplant. 2012 Nov;27(11):4180-8.

Dialysate Volume

L/session	% of Patients
15 ±	8%
20 ±	38%
25 ±	26%
30 ±	25%
≥ 35	2%

L/week	% of Patients
75 ±	7%
100 ±	20%
125 ±	26%
150 ±	23%
175 ±	23%
≥ 200	2%

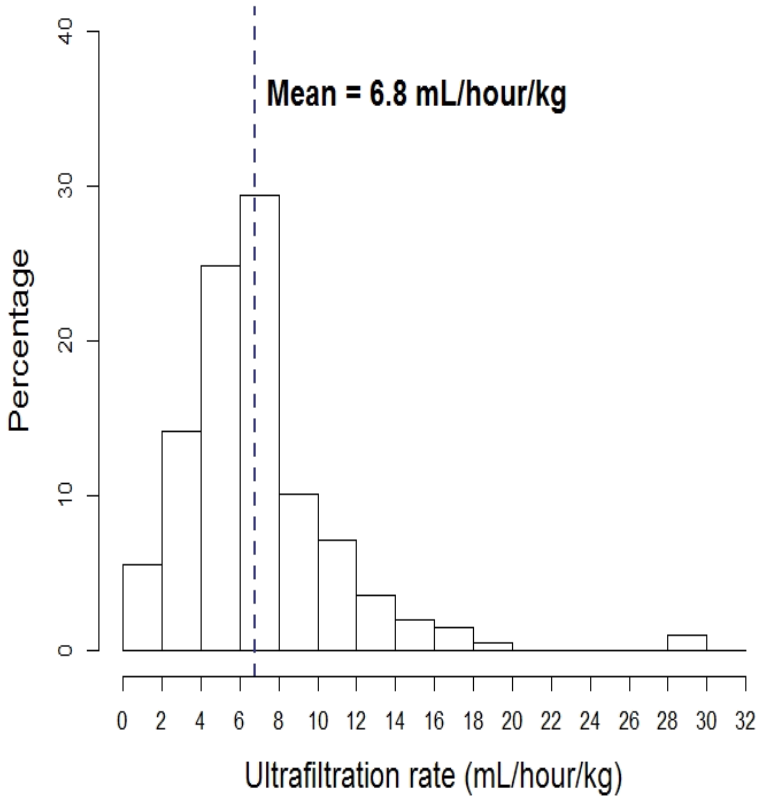
Prescription Adapted to Body Size

BMI	Mean Sessions /week	Mean Hours/ session	Mean L/session	Kt/V
<25	5.5	2.55	22.0	2.63
25-29	5.7	2.62	25.1	2.59
≥30	5.9	2.70	26.7	2.53

- Increasing BMI, increase in dialysis intensity

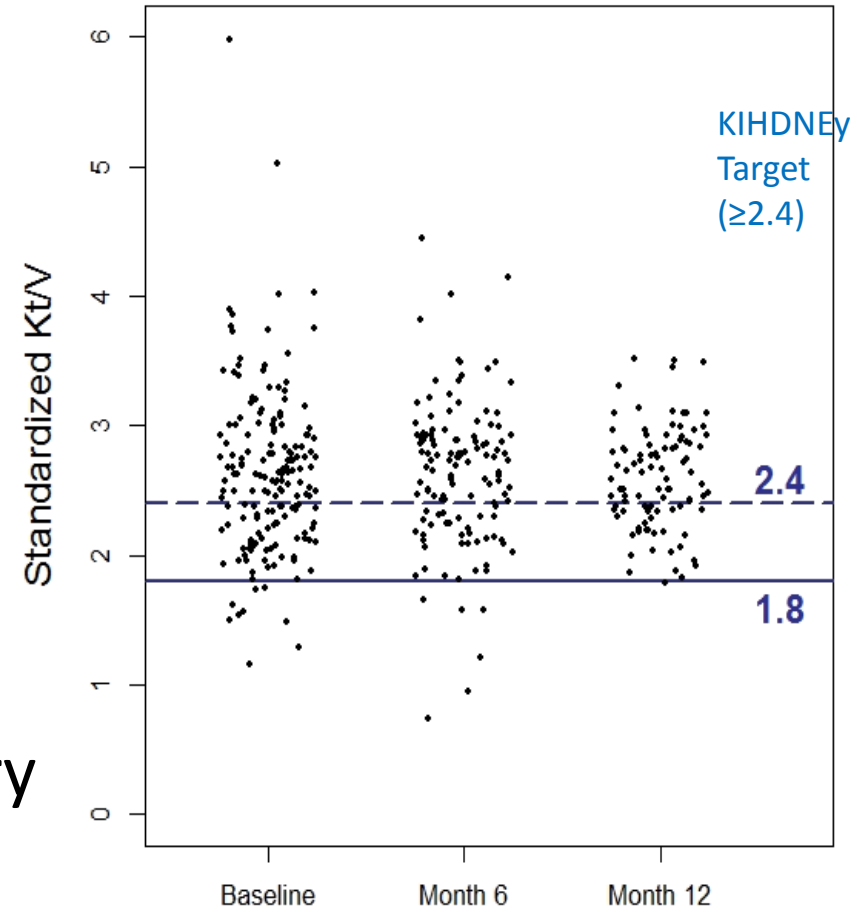
Ultrafiltration Rate

- Mean UFR at months 6 and 12 (pooled), **6.8 mL/hour/kg**
- **84%** of patients with UFR <10 mL/hr/kg (73% at baseline) (low cardiovascular risk)
- Frequent HD reduces UFR



Weekly standard Kt/V

	Mean std Kt/V
Baseline	2.61
Month 6	2.60
Month 12	2.60



- Adequate dialysis delivery

Antihypertensive Use

	Agents per day	% using 0 Rx	% using ≥2 Rx
Baseline	1.51	27%	42%
Month 6	1.12	36%	34%
Month 12	0.91	42%	25%
p in trend	<0.001	<0.001	<0.001

- Statistically significant decline in antihypertensive use

Heamoglobin, ESA and Anticoagulation

	Mean Hb (g/dL)	Mean ESA dose (EPO IU/week)	Heparin Use (%)
Baseline	11.2	8400	73%
Month 6	11.1	7800	61%
Month 12	11.4	8200	60%
p for trend	0.12	0.85	0.002

- Stable heamoglobin
- Concurrent **decline in use of anticoagulation**

Residual Renal Function

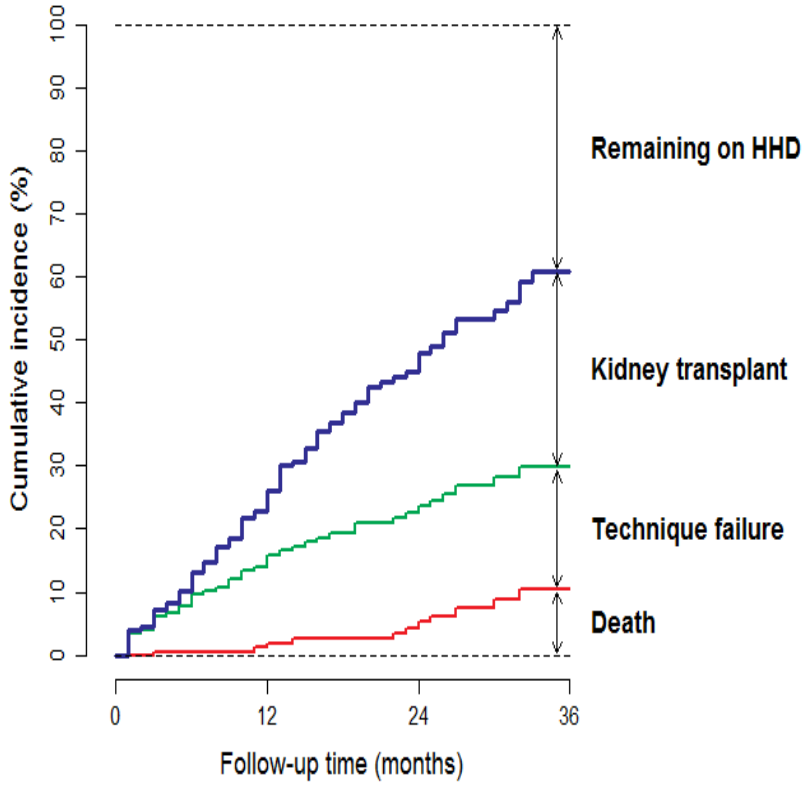
Patients (n=54) with RRF at Baseline

	Mean Urine Volume (mL/day)	% Anuric
Baseline	1100	0%
Month 6	960	5%
Month 12	800	18%

- Slower decline than in FHN[1] (~50% and 67% were anuric after 12 months of intensive HD in Daily and Nocturnal trials)
- Slower decline than in NECOSAD[2] (~50% were anuric after 12 months of either CAPD or APD)

[1]Daugirdas JT et al. FHN Trial Group: Effect of frequent hemodialysis on residual kidney function. Kidney Int. 2013 May;83(5):949-58. [2]Michels Wm et al. Decline in residual renal function in automated compared with continuous ambulatory peritoneal dialysis. Clin J Am Soc Nephrol. 2011;6(3):537-42.

Good Therapy Retention



	Cumulative Incidence		
	12 m	24 m	36 m
Remaining on HHD	74%	53%	40%
Transplant	10%	24%	31%
Home HD Cessation	14%	18%	19%
Death	2%	5%	10%

- Transplant is predominant
- 40% of patients retained therapy at 36 months
- Good survival at 36 months

Nocturnal

- 21 Patients with 12 months data for nocturnal (3 European centres)
- Additional safety features (moisture sensor)
- Mean age 44.5 (range 26-66)
- 75% male
- 2 solo nocturnal patients

	Percentage
Haemodialysis sessions per week (%)	
3.5	80
4 or 5	20
Haemodialysis hours per week (%)	
24-26 hours	25
26.1-28 hours	60
>28 hours	15
Dialysate liters per session (%)	
30-40 Liters	10
40.1-50 Liters	35
50.1-60 Liters	55
Vascular access modality (%)	
Catheter	20
Graft	10
Fistula	70

Biochemical parameter	Baseline	6 months	12 months
	Mean (SD)	Mean (SD)	Mean (SD)
Pre Phosphate mmol/L	1.74 (0.48)	1.56 (0.39)	1.55 (0.56)
Pre Potassium mmol/L	4.99 (0.70)	4.63 (0.69)	5.04 (0.69)
Pre Bicarbonate mmol/L	24.61 (2.83)	25.91 (3.41)	25.81 (3.05)
Pre Hemoglobin g/dL	11.47 (1.61)	12.04 (2.06)	12.24 (1.51)
Standardized Kt/V	2.12 (0.63)	2.37 (0.28)	2.52 (0.39)
No. phosphate binders	4.30 (4.95)	1.90 (2.81)	1.47 (2.35)
No. BP medications	1.20 (1.28)	0.95 (1.10)	1.06 (1.20)

Conclusions

- Diverse patient population on Home HD, including elderly and those with comorbidities, all access types are viable option
- Individualized prescriptions, flexibility to most situations
- Addressed combined medical and patient challenges
- More frequent dialysis can be provided in a variety of settings(home, hospice, nursing home)

Conclusions

- Short training times facilitating Programme growth
- Less intense ultrafiltration
- Less use of antihypertensive medications
- Maintain stable biochemistry and reduced dose of anticoagulation
- Able to preserve residual renal function
- Excellent clinical outcomes, including Home HD retention
- Targets should be individualized as most complex patients often have the most to gain

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Thank You

Any Questions?