

Home haemodialysis: are we improving?

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Conflict of interest declaration

Fees for lectures and advisory boards from Baxter and NxStage Medical

Clinical commissioner for NHS England (National Clinical Director and Chair, Internal Medicine NPOC, Specialised Commissioning)

The challenge (and the outline)

- Do we measure the right outcomes?
- Do we address the right therapeutic target?
- Are we addressing the need?

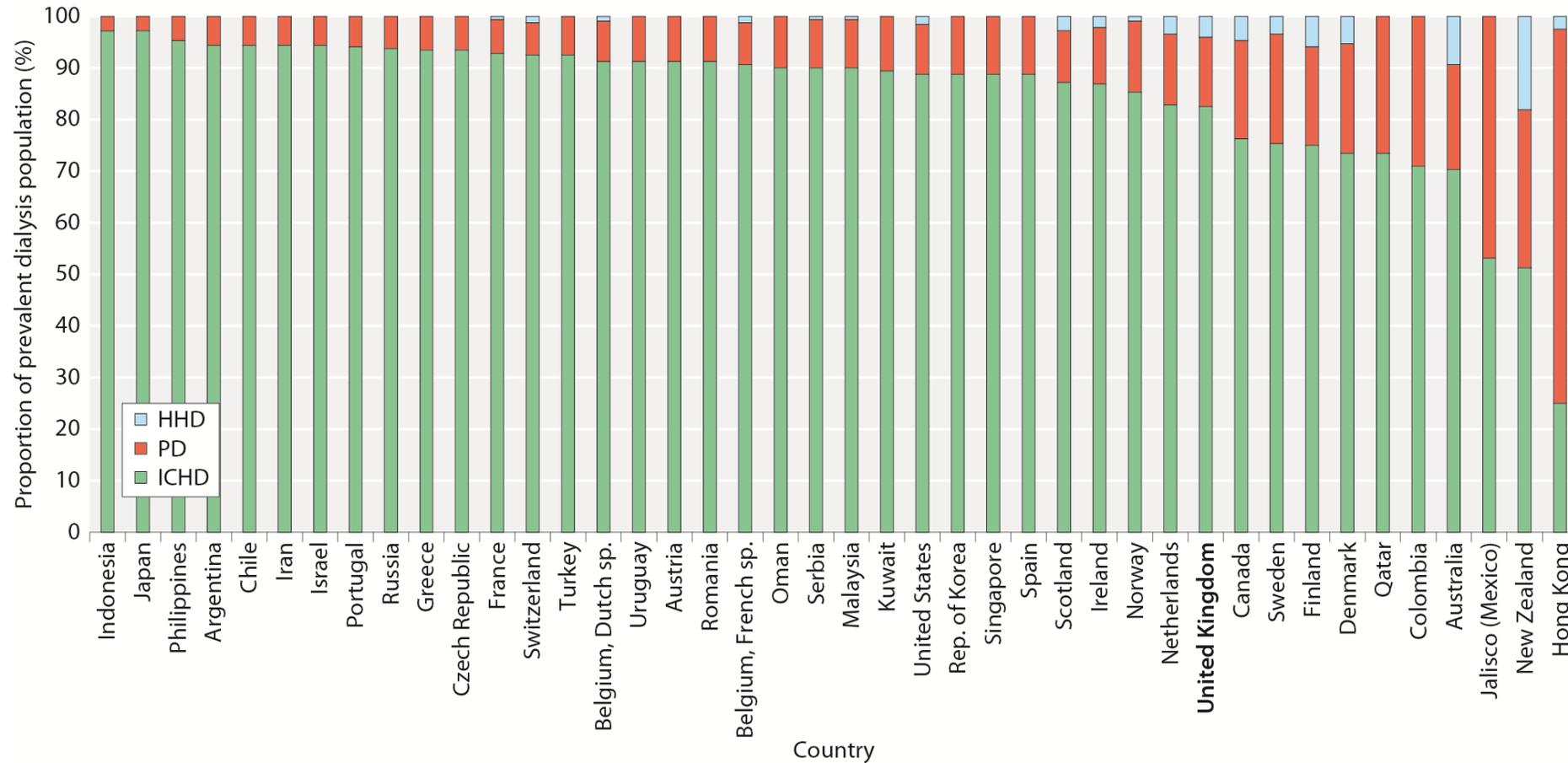
Addressing the need

Variation in provision

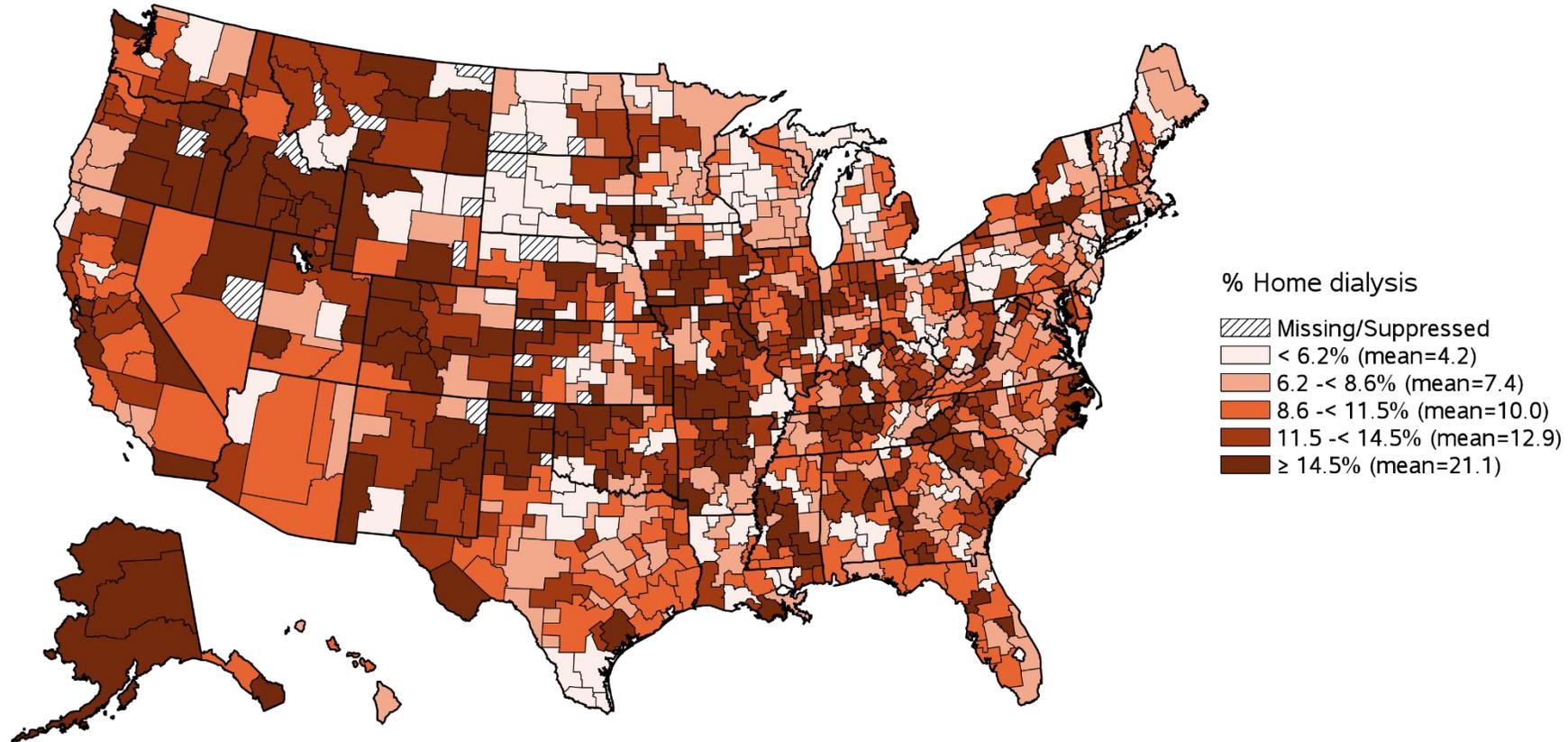


International variation

Figure 13.16. Dialysis modality use by nation, 2014

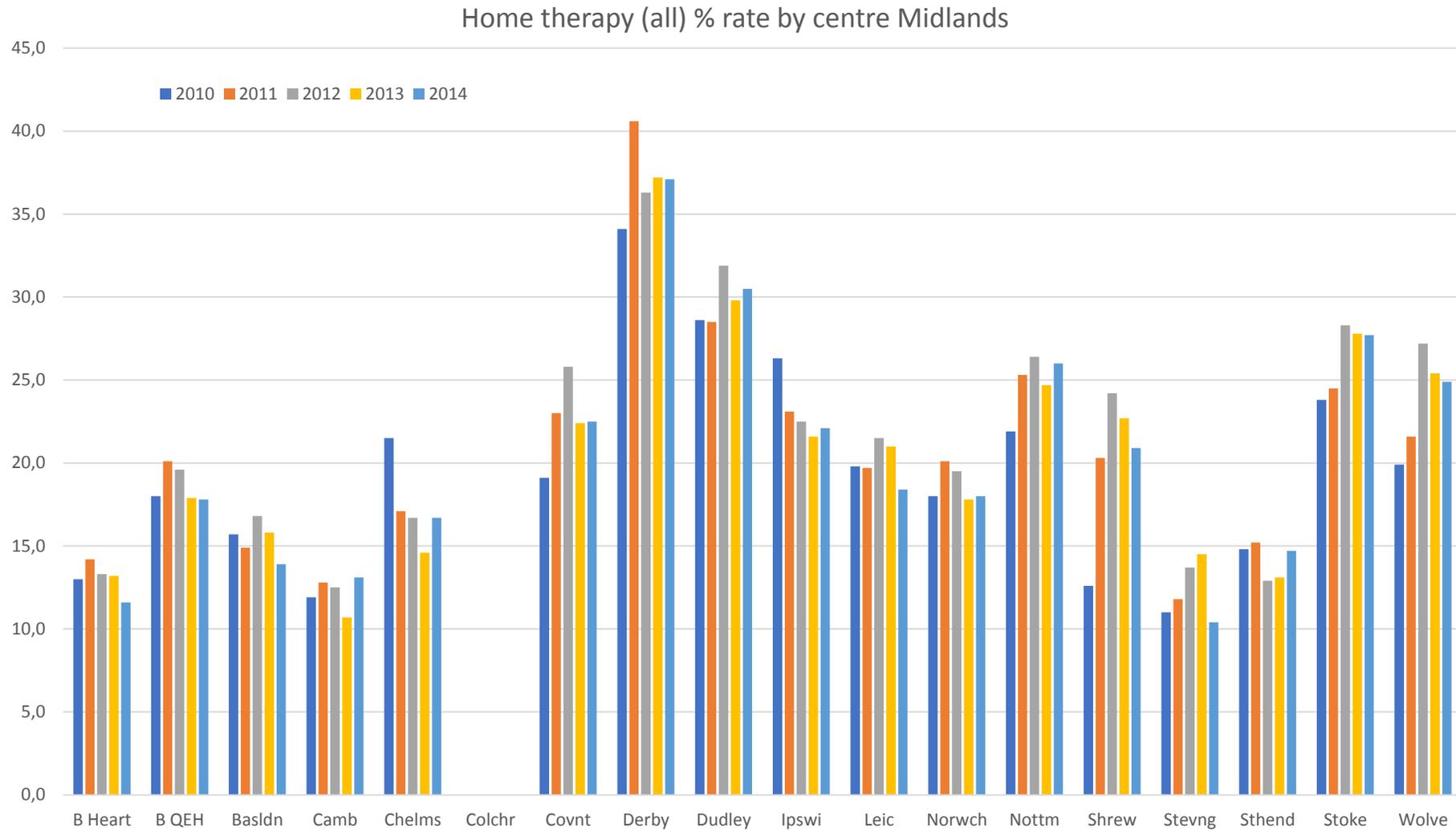


Variation by region (USA) vol 2 Figure 1.14 Map of the percentage of incident dialysis cases using home dialysis (peritoneal dialysis or home hemodialysis), by Health Service Area, 2011-2015



Data Source: Special analyses, USRDS ESRD Database. Values for cells with 10 or fewer patients are suppressed.

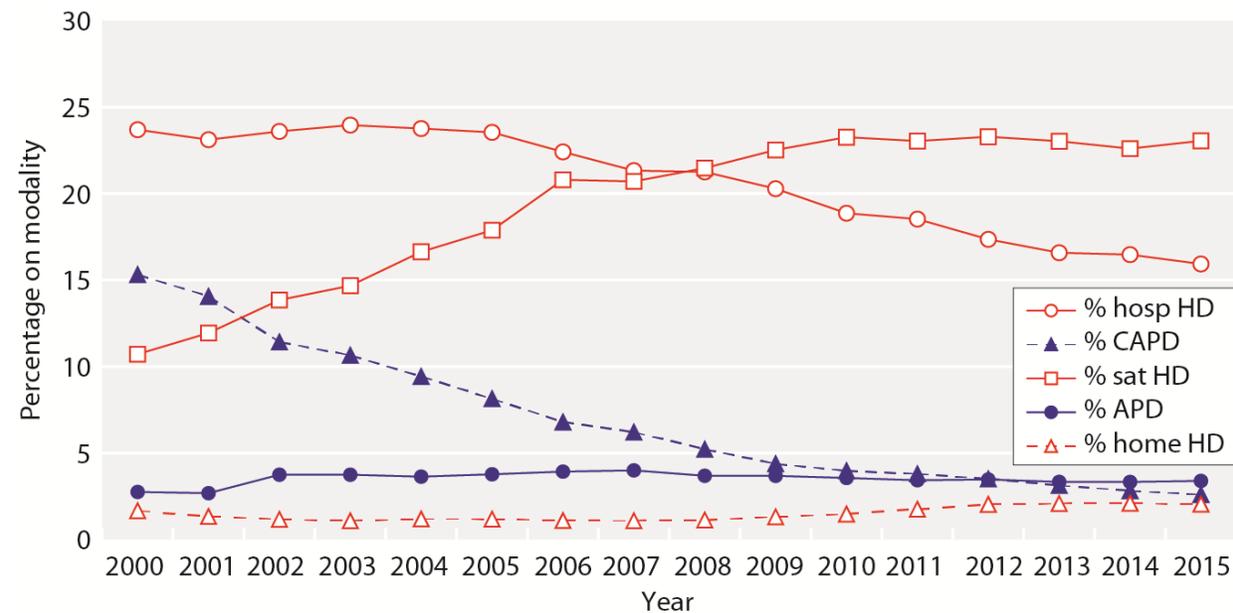
Variation by provider



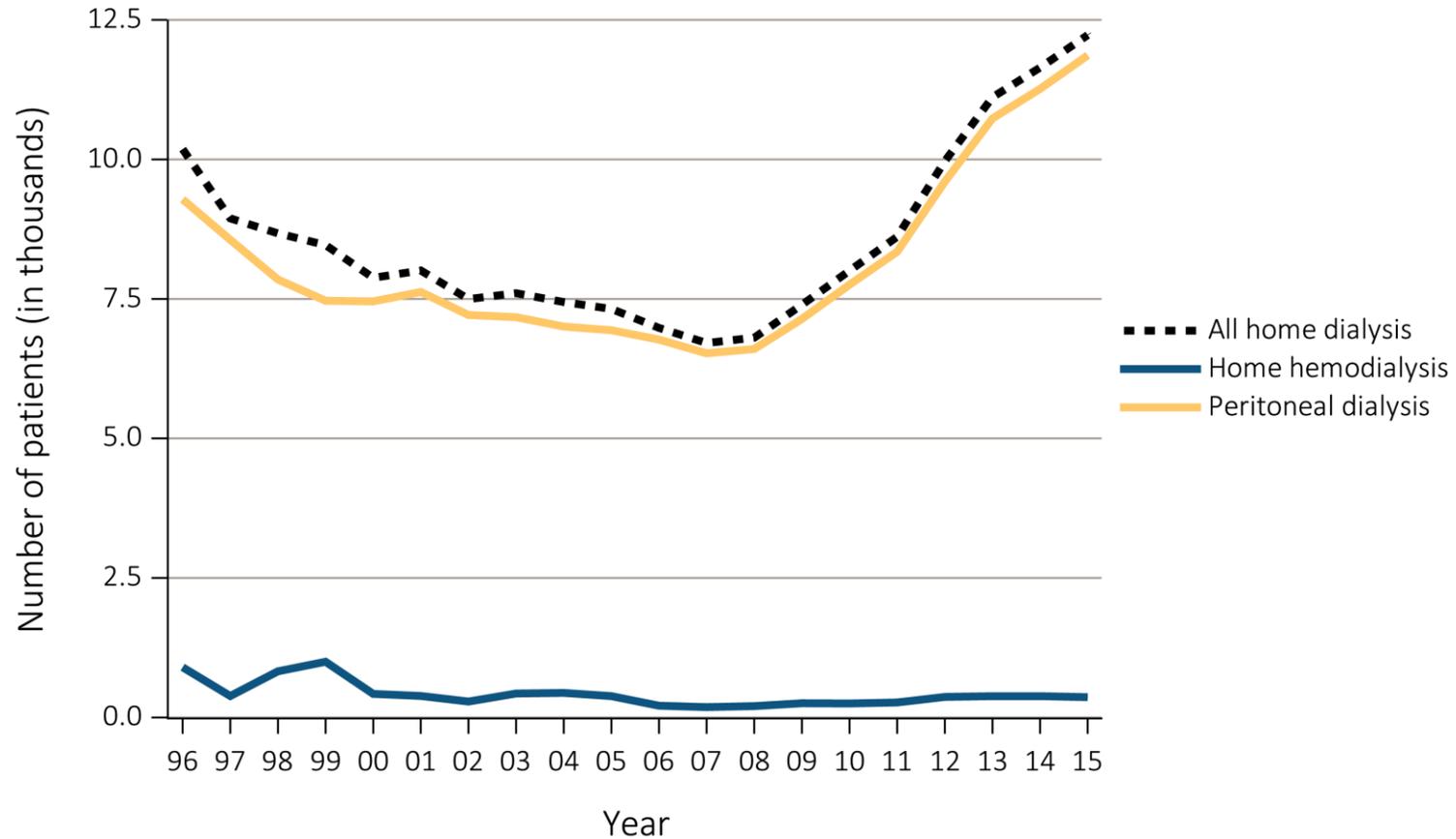
Temporal changes: UK

Figure 2.10. Detailed dialysis modality changes in prevalent RRT patients from 2000–2015

*Scottish centres excluded as information on satellite HD was not available



Temporal change (USA) vol 2 Figure 1.13 Trends in the number of incident ESRD cases using home dialysis, by type of therapy, in the U.S. population, 1996-2015



Data Source: Reference Table D.1. Abbreviations: ESRD, end-stage renal disease.

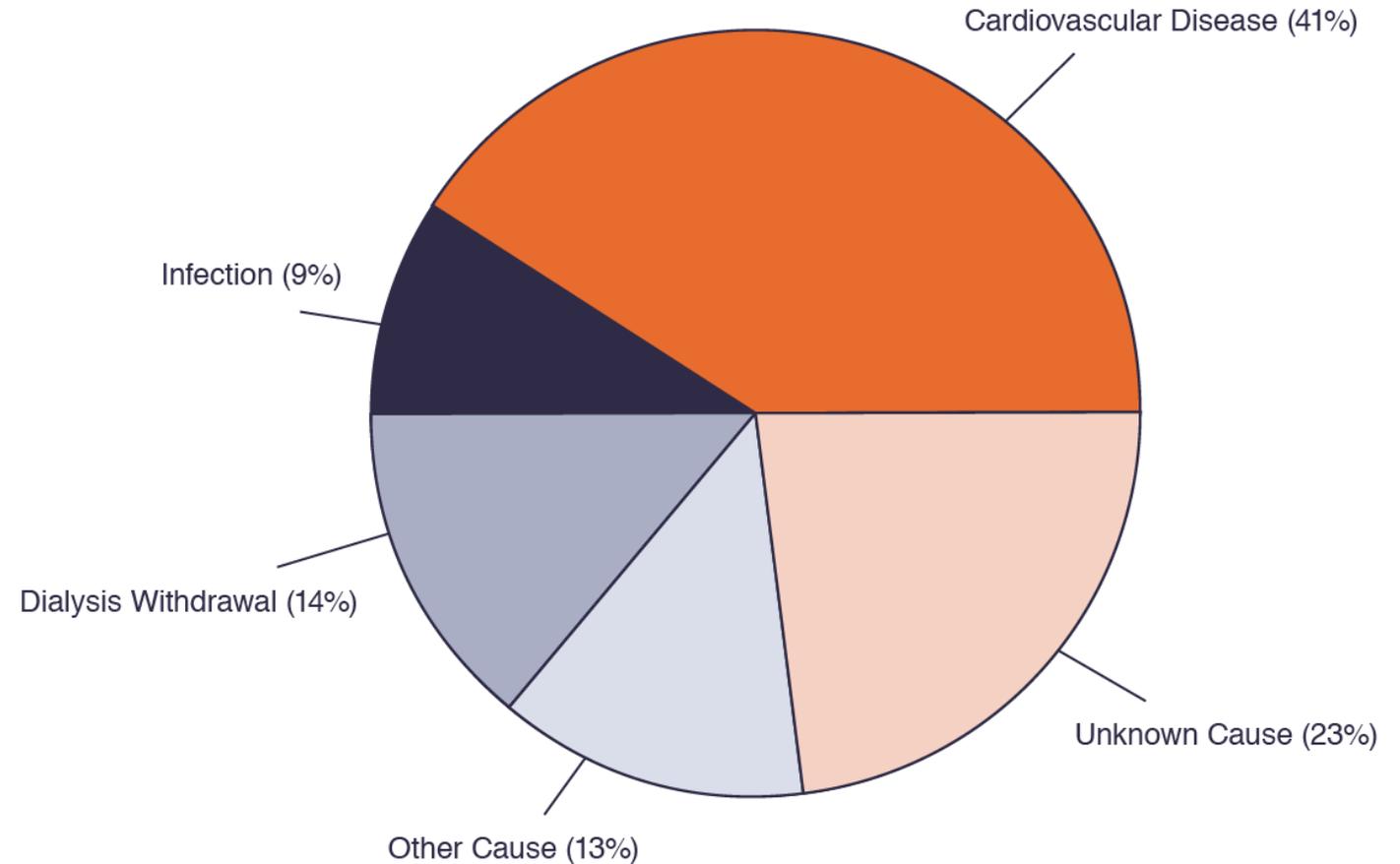
What is the therapeutic target?

Fluid not solute

Cardiovascular-related Deaths in Prevalent Dialysis Patients are Common

Over 41% of all deaths were cardiovascular-related, with nearly identical percentages in hemodialysis and peritoneal dialysis patients.¹

CHAPTER 1, FIGURE 2:
Distribution of primary cause of death in hemodialysis patients, 2011 to 2013.²



Haemodialysis creates a chronic disease state complicating CVD

- Cardiovascular complications, persistent hyperphosphatemia and tolerance of dialysis therapy are core challenges that need more effective interventions
- High Ultrafiltration Rates, with conventional three times a week HD, are interrelated with hypotension on dialysis, cardiac stunning, worsening heart failure, prolonged post dialysis recovery time, patient QOL and death
- Hyperphosphatemia is directly related to the mismatch of PO₄ intake and removal by dialysis with collateral consequences of CaPO₄ deposition in the extra skeletal areas including the blood vessels, Heart Valves, lungs and other organs
- The two chronic overload states directly impact the heart by creating LVH and limiting cardiac blood flow thereby impacting cardiac function.

AGGRESSIVE
ULTRAFILTRATION RATES

HYPOVOLEMIA

INTRADIALYTIC HYPOTENSION

REGIONAL WALL MOTION
ABNORMALITIES

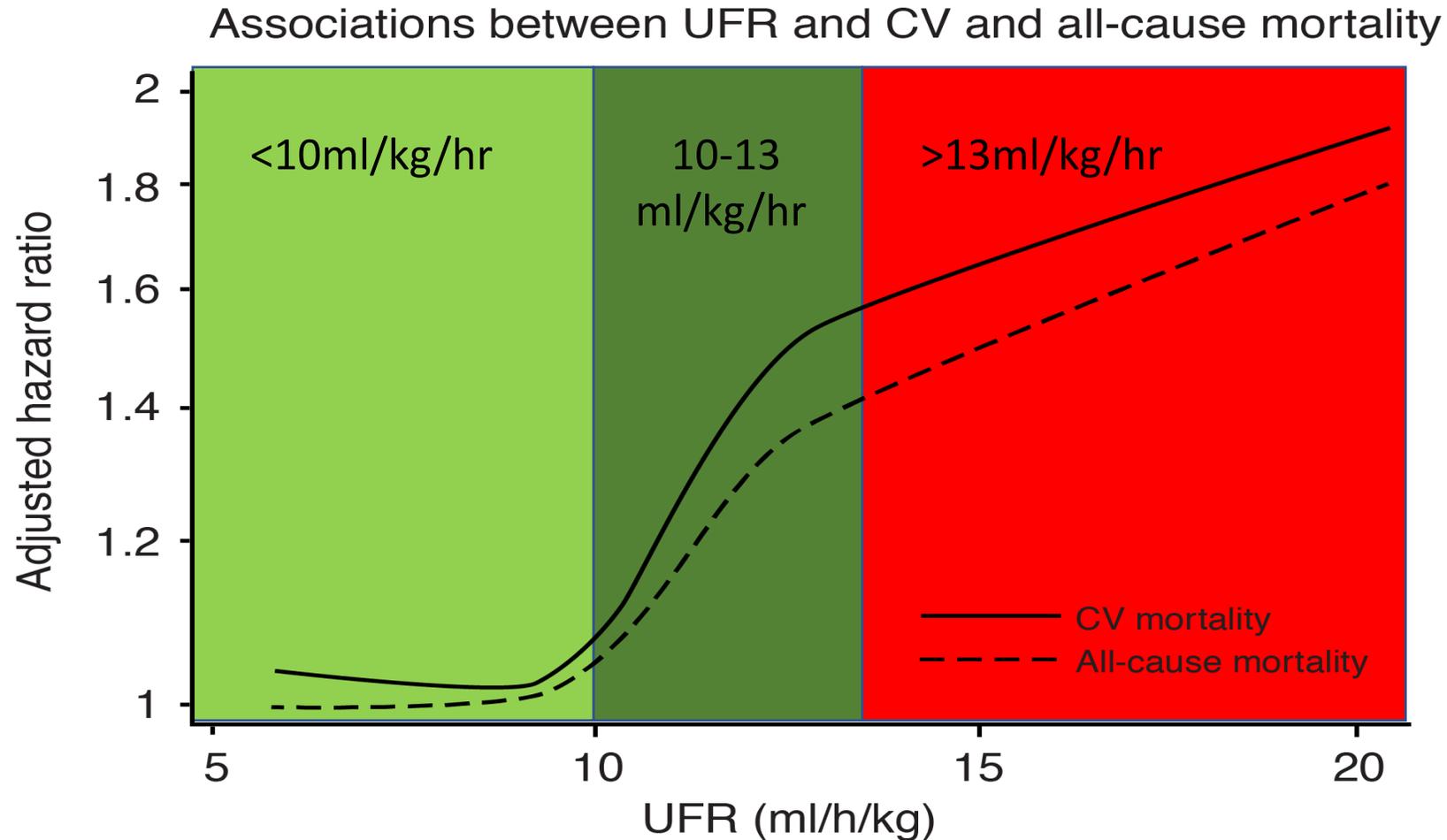
CARDIAC HYPO-PERFUSION

MYOCARDIAL STUNNING

2/3 of conventional
hemodialysis patients suffer
from recurrent HD-induced
ischemic injury¹

1. Jefferies et al. Frequent hemodialysis schedules are associated with reduced levels of dialysis-induced cardiac injury (Myocardial stunning). Clin J Am Soc Nephrol 2011 June, 6(6); 1326-1332. Graphical summary source: Flythe JE, Brunelli SM: The risks of high ultrafiltration rate in chronic hemodialysis: implications for patient care. Semin Dial 24(3):259-265, 2011

UF rate and Mortality



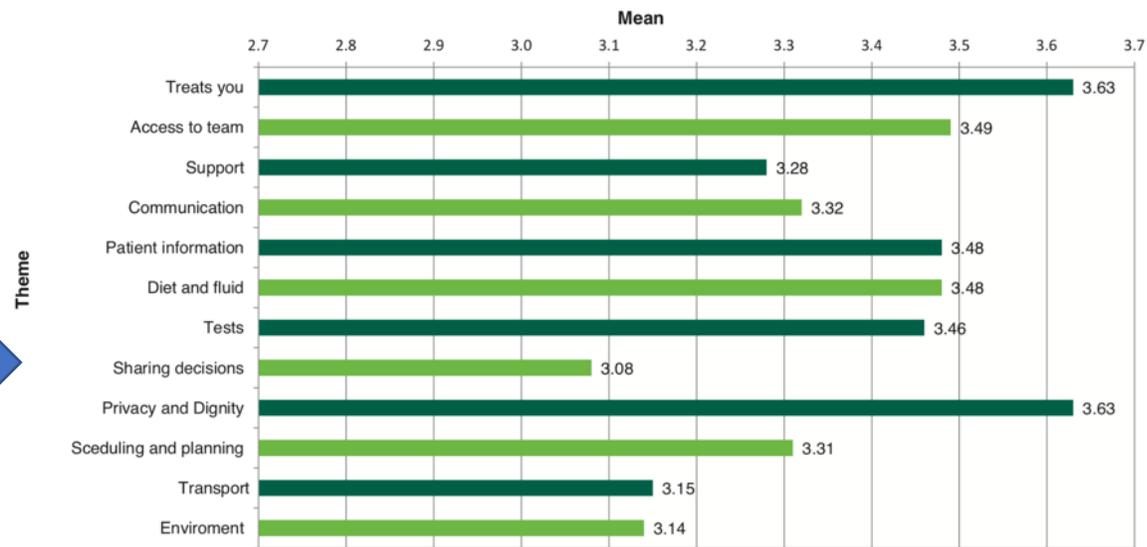
Slower UF & Longer HD Treatments are Safer

What should we measure?

Mortality probably not sensitive enough

Patient perspective: drivers for change

Figure 1: Mean scores for the 12 Themes

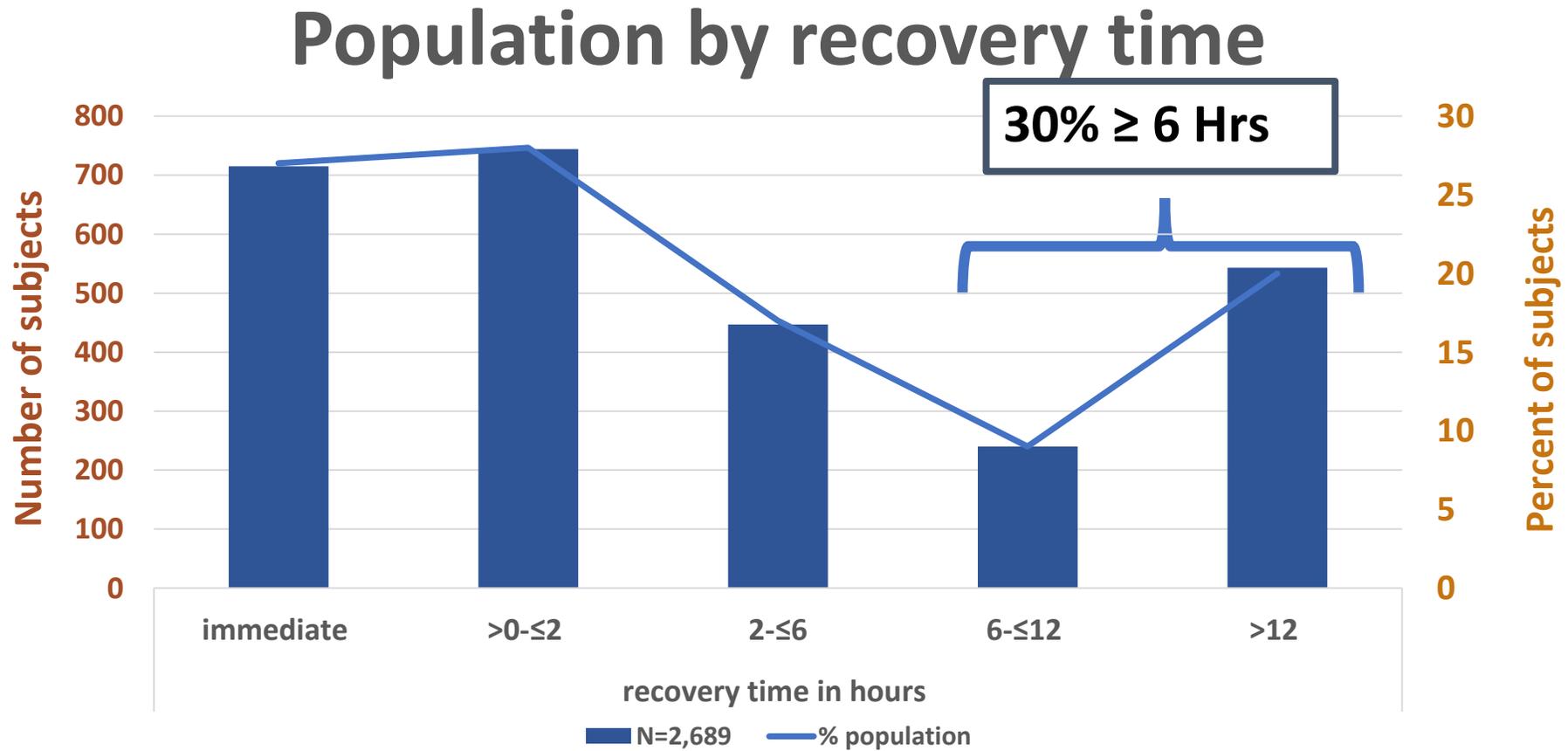


A HOME DIALYSIS MANIFESTO

INCREASING UPTAKE OF HOME DIALYSIS TO BENEFIT
PATIENTS AND THE NHS

A report of the findings of the 2013
Home Dialysis Summit

Higher Ultrafiltration rate and Dialysis Recovery Time in Conventional HD

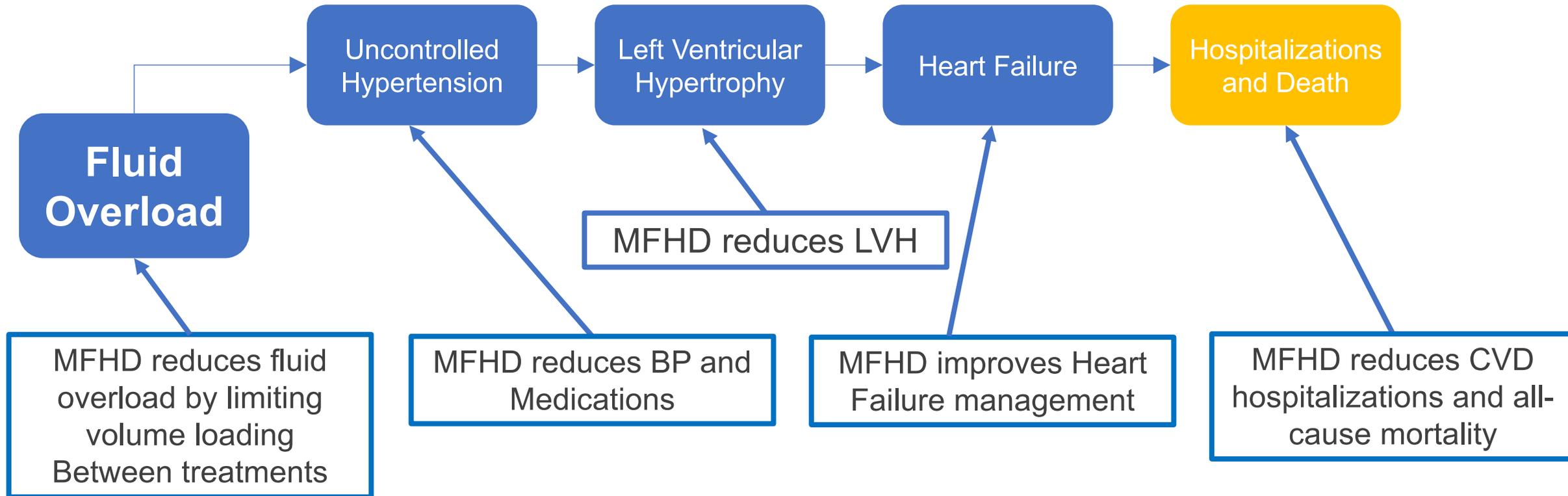


Tolerability of hemodialysis therapy

- The big issues for patients are fatigue, low BP and cramps
- More intensive home HD reduces post run recovery time (FHN & Freedom)
 - Recovery time was cut by 35 to 87%
- Recovery time is associated with mortality risk
- Can we improve haemodialysis – the role of more frequent regimes

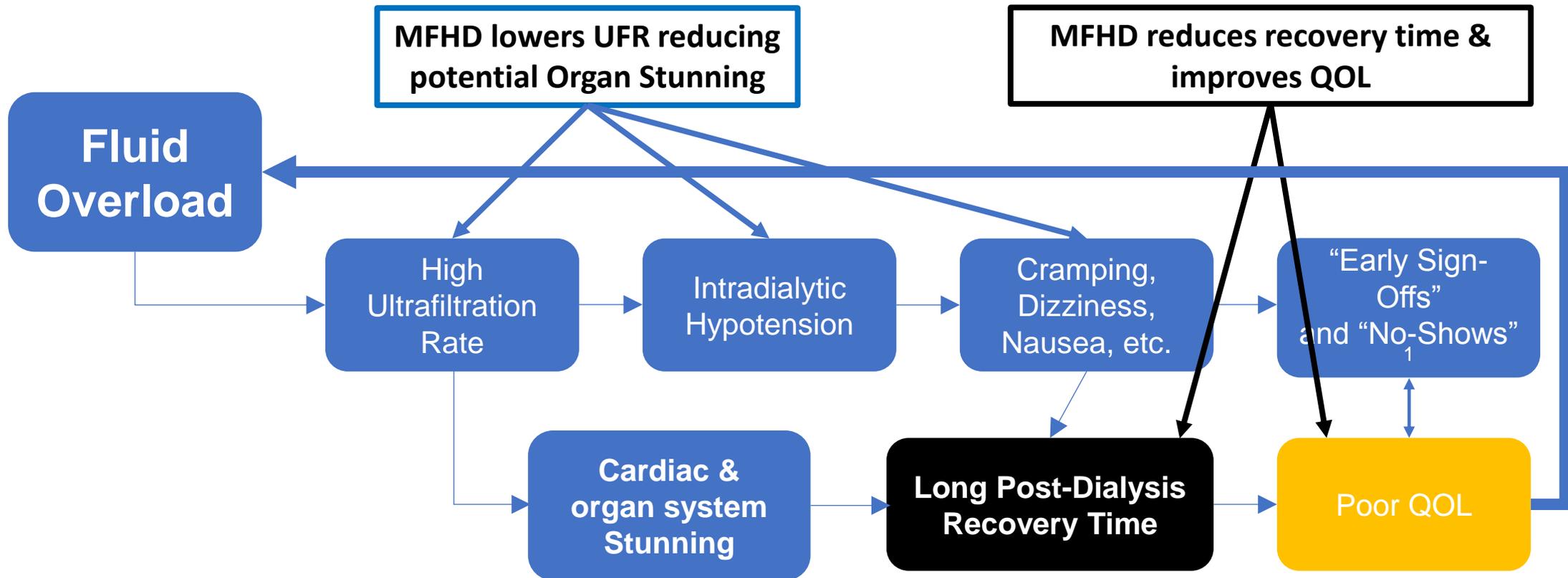
Pathophysiology and Outcomes

More Frequent HD addresses Chronic CVD risk factors



Pathophysiology and Outcomes

Improving therapy tolerability



Service delivery

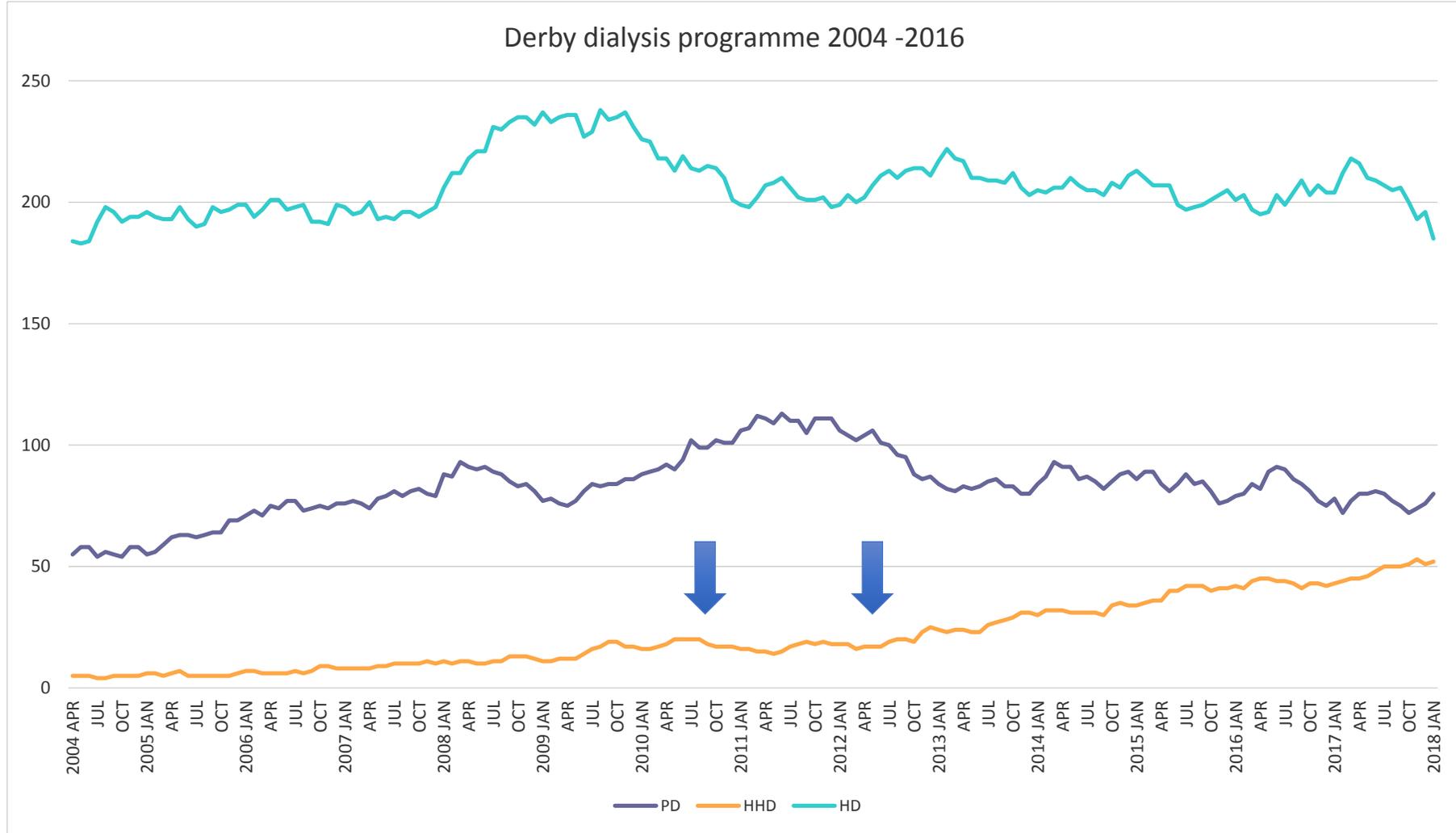
The Derby home HD programme

Can we improve?

Dialysis in Derby 1970



Derby dialysis programme 2004 -2016



Changing technology



Regime & Anticoagulation

Regime

- Default regime 5 sessions per week
- Majority range 3-3.5 hours
- 5 nocturnal patients
- Median volume of Rx 40L (range 20-60)
- Nocturnal patients use 60L
- 4 officially solo*
- 1 patient on 3 sessions per week (frailty)

Heparin

- LMWH
- Typically enoxaparin 20mg every session or alternate session
- Nocturnal 40 mg per session

*UK and EU label currently for training with partner. US FDA approval for solo use.

Training patients and carers

2 week Training Schedule

<u>Week 1</u>	Training topic
Day 1	<p>Patient is introduced to the various parts of the machine Pureflow, cyclor, pak, sak etc.</p> <p>Patient is shown how to prepare for treatment, line, prime and programme the machine. Patient is put onto dialysis and shown how to perform observations during dialysis and how to come off the machine.</p> <p>Patient is given a tablet/laptop with training videos and literature and shown how to access these.</p> <p>Patient is given the manuals for the NxStage device and made aware how this is useful for problem solving with their device.</p> <p>Patient is given the helpline number for technical problems once home and explanation given when to use this.</p>
Day 2	<p>Patient prepares their own machine with support and goes onto dialysis.</p> <p>A demonstration is given with the training device, going through the process of lining, priming, connection, highlight key part connections etc.</p> <p>Patient is given tablet/laptop and guided through training videos/literature.</p>
Day 3	<p>Patient prepares their own machine with support and goes onto dialysis.</p> <p>Assessment is made on how the patient is understanding and following instructions from the training book and following demonstration videos.</p>
Day 4	<p>Patient prepares their own machine with support and goes onto dialysis.</p> <p>Introduce some troubleshooting alarms, air 10/11 alarms and pressure pod reset.</p>
Day 5	<p>Patient prepares their own machine with support and goes onto dialysis.</p> <p>Introduce further troubleshooting, including weight loss alarms 24,25,30,37,38</p>

<u>Week 2</u>	Training topic
Day 6	<p>Patient performs all machine skills required each day for dialysis.</p> <p>Recap of everything from week 1.</p> <p>Go through alarms 10/11, weight loss minimum, and pressure pod reset.</p> <p>Power failure is simulated on training device to show what to do in a recoverable power failure (none recoverable power failure also discussed)</p>
Day 7	<p>Go through vascular access module and competencies, including fistula safety guide.</p> <p>On tablet/laptop introduce to renal patient view / how to use Skype (a login can be made for patient on this day)</p>
Day 8	<p>With community home dialysis nurse and trainer, install machine at home and demonstrate to the patient how the connections are made.</p> <p>Discuss common alarms and include temporary disconnect.</p> <p>Check bloods/demonstrate blood sampling technique.</p>
Day 9	<p>Discuss alarms 10/11 unless patient is confident with these and temporary disconnect. Perform emergency washback simulation on training device.</p> <p>Sign off all competencies/checklist.</p>
Day 10	<p>Discuss bleaching the waste line and general maintenance of the machine.</p> <p>Ensure the patient is ready to go home / arrange plan for home with community nurse.</p>
<p>Alarms discussed this week</p> <p>ALARM 10 VENOUS AIR</p> <p>ALARM 11 ARTERIAL AIR</p> <p>ALARM 40 RECOVERABLE POWER FAILURE</p> <p>ALARM 41 NONE RECOVERABLE POWER FAILURE</p>	

Training time

18 weeks down to 2 weeks

Note patients cannulation ready using BH

90% on AVF across unit and shared care programme in place

Installation

Smaller

Quicker

Cheaper

Jan 2018 52 patients median age 62 (range 20-82)

Blood pressure & volume

Blood pressure

- Mean systolic BP post dialysis
 - 122 mmHg
- Median BP meds
 - 0
 - Range 0-2
- 14/51 have BP > 130 mmHg

Ultrafiltration

- Mean UF 3.79 mL/kg/hour
- Range 0 - 9
- SD 2.2

Why has there been a step change in Derby?

- Leadership, culture
- Confidence in therapy to deliver to a wider patient group
- Training time -> generating capacity
 - Note patients cannulation ready using BH
 - 90% on AVF across unit and shared care programme in place
- Installation

A case study

- Born 1981
 - IgA nephropathy
 - Long term partner

 - Poor clinic attendance

 - Presented July 2016 Pregnant
Gestation unclear
 - Declined termination
 - GFR 25 at presentation
- AVF (Brachiocephalic) fashioned
8/8/16

 - Commenced HD 14/9/16 via AVF

 - On NxStage from October

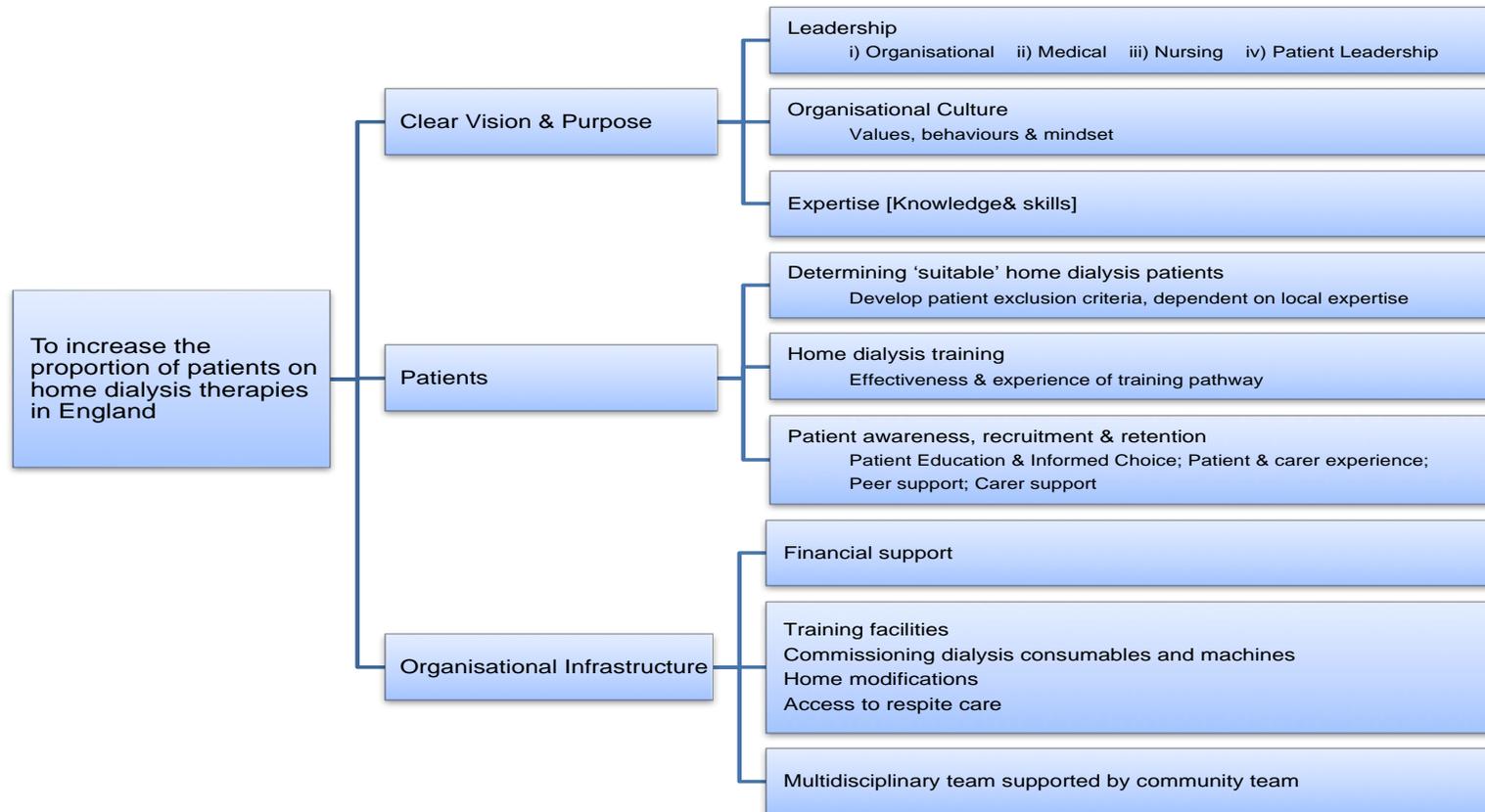
 - Home HD, nocturnal, x6 per week
24/10/16

 - Healthy baby 2185g delivered by C
section at 33+ weeks

KQuIP UK National Home Dialysis QI Project

DAYlife: Dialysis at yours: Life fulfilled

DRIVER DIAGRAM: Home Dialysis



Challenge: how do we improve?



Conclusion

- Do we measure the right outcomes?
 - Mortality is not a good measure
 - Patient outcomes – fatigue, recovery times or surrogates
 - Fluid control and UFR > phosphate > Kt/V
- Do we target the right therapeutic target?
 - Fluid is the main uraemic ‘toxin’
- Are we addressing the need?
 - No - variation by country, region and provider
 - No - not maximising benefit of home haemodialysis