



Oxford University Hospitals **NHS**
NHS Foundation Trust



Renal replacement therapy and the future of renal medicine

Dr Tom Connor
Oxford Kidney Unit, UK

thomas.connor@ouh.nhs.uk

1

The origins of chronic renal replacement therapy (RRT)

The 'Lucky 13' in 1965



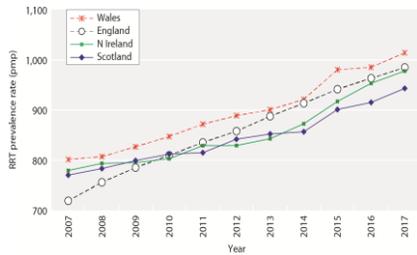
Patient selection:

1. 'Mature and stable'; preferably married with children
2. Age 20-50
3. 'Able to perform a full week's work'
4. No comorbid disease (eg diabetes until 1987)
5. Those who would 'be thankful for the opportunity afterwards'

2

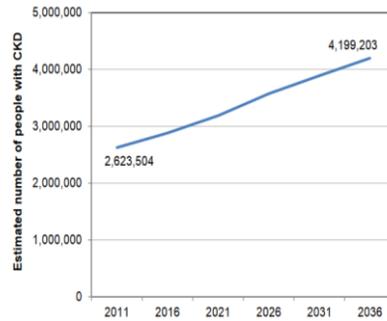
Growth in Renal Replacement

Figure 2.1. Adult RRT prevalence rates between 2007 and 2017 – per million population



UK Renal Registry 21st Annual Report
Data to 31/12/2017

Figure 2.2. Projections of growth in expected number of people in England with CKD stages 3-5, 2011 -2036



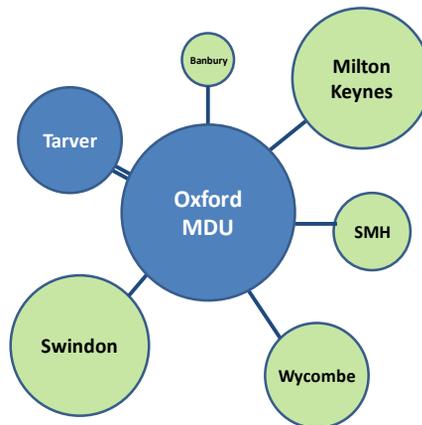
Source: Public Health England 2012-based
Subnational Population Projections for England

3

Current status

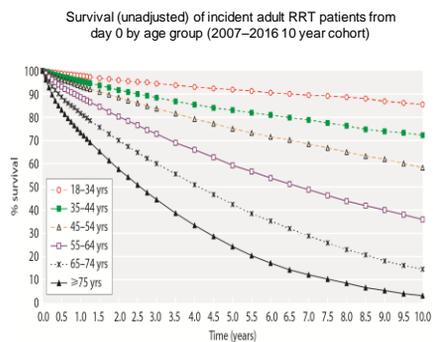


- Sidney Benjamin, from Finchley, celebrating his 104 th birthday.
- He was on dialysis for eight years after his kidneys deteriorated at the age of 96.

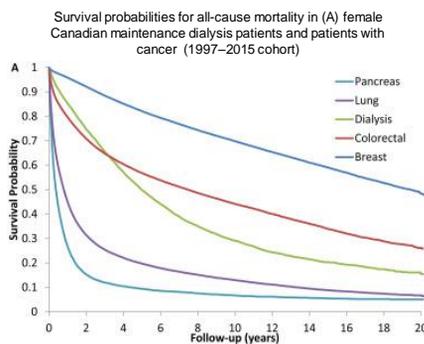


4

Outcome



UK Renal Registry 21st Annual Report
Data to 31/12/2017



Naylor et al AJKD 2019

5

Mr JF

‘Many thanks for previously helping with my 88 year old gentleman, who has recently moved to a local nursing home...

In summary, this gentleman’s kidney function is continuing to deteriorate made worse by episodes of acute kidney injury. I would like to try and forward plan with him. I am not sure if there has ever been a discussion about dialysis with him. I am not sure if you could advise further with regard to this. As mentioned he is now living in a nursing home due to increased care needs. He does spend a lot of the day in bed, and needs assistance with activities of daily living. I would be grateful for your advice as to whether he is/not a suitable candidate, so I can discuss future care with this patient and his niece.

Many thanks for your advice.’

LS

6

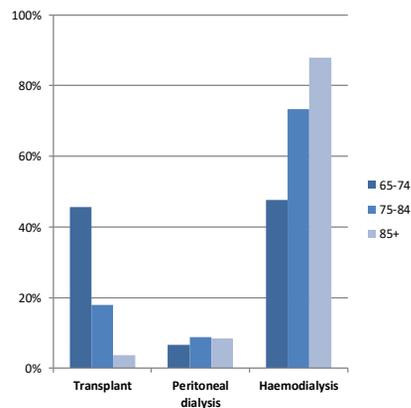
Pre-dialysis education

- Benefits of education programmes to:
- Lacson 2011
 - Adjusted HR 0.61 for attendance at treatment options program (3165 of 30,217 incident patients in 2008)
- Devins 2003
 - Time to dialysis significantly longer in the intervention group (17.0 vs 14.2 months)
- **NICE guideline 107** published October 2018 on renal replacement therapy and conservative management with 47 recommendations
- Quality Statement 1
- *'Adults preparing for renal replacement therapy, and their family members or carers, undertake individualised education programs at specialist renal centers.'*
- Start assessment at least 1 year before therapy is likely to be needed
- Remember that some decisions must be made months before RRT is needed.
- Ensure that decisions about RRT modalities or conservative management are **made jointly**, taking into account:
 - predicted quality of life
 - predicted life expectancy
 - the person's preferences
 - other factors such as co-existing conditions.
- Involve the person and their family members or carers in **shared decision-making** over the course of assessment to include:
 - clinical preparation
 - psychosocial evaluation, preparation and support
 - the person's individual preferences for type of RRT and when to start
 - how decisions are likely to affect daily life.

7

Modality choice

- Preference for hospital-based dialysis in the elderly
- MDT view of suitability for home therapy 1.5-2x the rate judged by patients (Winterbottom 2016)
- Uptake of home therapies falls after declaration of modality choice and again after start of dialysis (Keating 2014, De Maar 2016)
- It is possible to increase the uptake of home therapies with targeted education & advocacy
- Adult learning principles
 - Decision aids
 - Values-based education
 - Information congruent with patients own beliefs/culture
- No evidence of how best to deliver pre-dialysis education

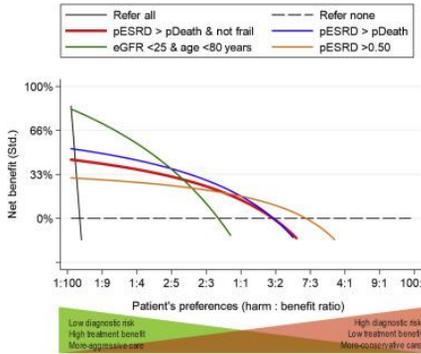


UK Renal Registry 21st Annual Report
Data to 31/12/2017

8

Predicted start

- Competing risk of ESRD and death
- Kidney failure risk equation (Tangri 2011)
 - Age, sex, eGFR, urine ACR
- Mortality risk equation (Bansal 2015)
 - Age, sex, race, eGFR, urine ACR, smoking, DM, CCF, CVA

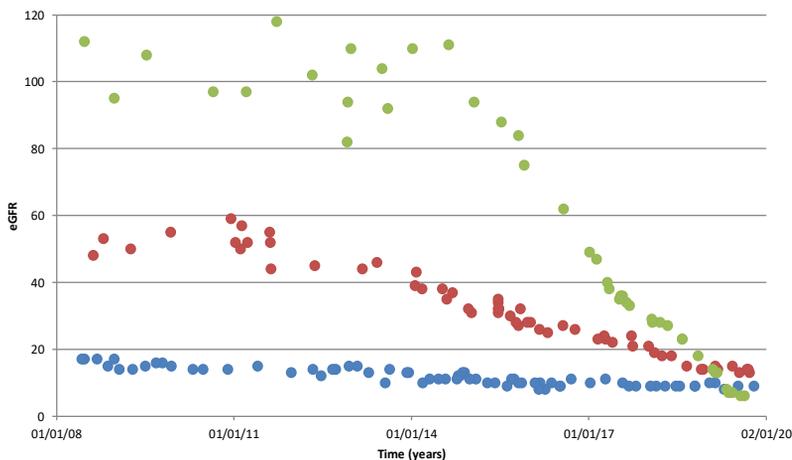


“Past performance is no guarantee of future results...”

Clinical utility of nephrology referral algorithms relative to patients’ valuation of harm versus benefit
Hallan et al. Kidney Int. 2019 Sep;96(3):728-737

9

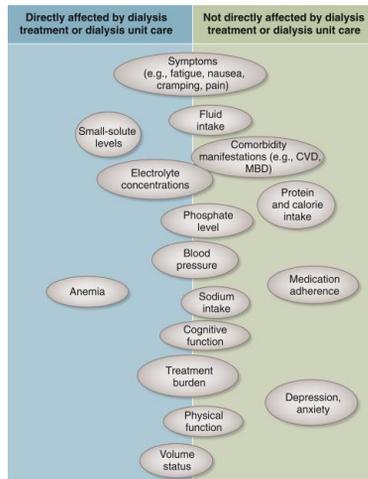
Trajectories to ESRD



10

Initiation

- Patient-reported
 - Symptoms, nutritional status, functional capacity
- Clinical reported
 - Muscle strength, gait speed, BMI
- Biomarkers
 - eGFR, albumin, phosphate, haemoglobin

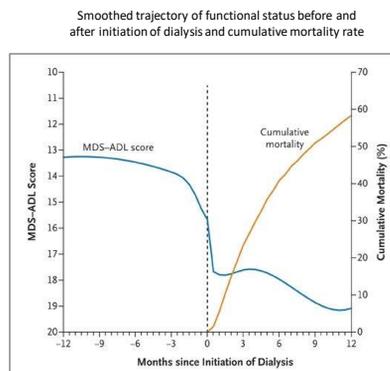


CT Chan et al.: Dialysis initiation: a KDIGO conference report
Kidney Int. 2019 Jul;96(1):37-47.

11

Residual renal function

- Dialysis schedule is historic marriage of convenience – yet majority of patients started on this 3x/wk
- 40% patients starting dialysis in US in 2013 had eGFR >10 ml/min
- Haemodialysis itself promotes loss of residual renal function
- Residual renal function
 - Fluid balance (Rottembourg 1993)
 - LVH (Fagugli 2003)
 - Nutritional status (Rhee 2013)
 - Quality of life (Shafi 2010)
 - Survival (Obi 2016)

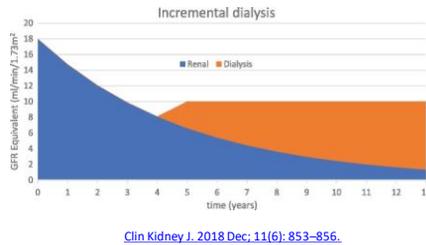


Tamura et al. Functional Status of Elderly Adults before and after Initiation of Dialysis; *NEJM* 2009

12

Incremental dialysis

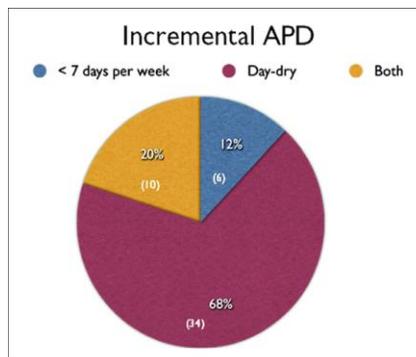
- Incremental haemodialysis
 - Slower decline in residual renal function (Lin 2009, Zhang 2014)
 - Lower mortality in prevalent patients (Hanson 1999)
 - Little take-up (<2% eligible pts Obi 2016)
 - Higher mortality if comorbid (Mathew 2016)
- Practicalities
 - Limited to most stable patients (fluid, potassium, anaemia, hospitalisations)
 - Detailed and recurrent reassessment of residual function



13

Assisted PD

- 6% of all patients are on peritoneal dialysis
 - Cf. 30% 1981
- Advantages
 - Home therapy
 - Preserved residual function
- Assisted automated PD
 - Equivalent cost to in-centre HD
 - Daily visit to set up machine, check weight & exit site
 - Patient/family does own connection & disconnection
- Assisted CAPD
 - 2 exchanges/day
 - Simple prescription
 - 5 days/week



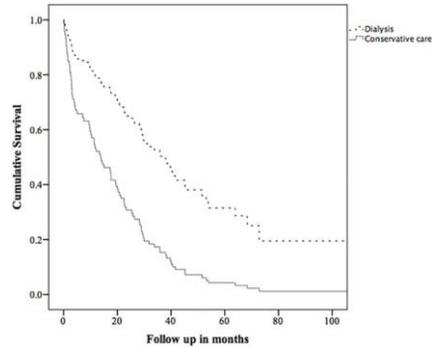
Ankawi et al CJKHD 2016

14

Assisted PD

- What to do with the well elderly?
- Community based
 - Better integration with social care
- Review at 3 months:
 - Is life better now?
- Person-centred care
 - Quality of life
 - Move away from Kt/V
- Transition to palliative care rather than to hospital-based haemodialysis

Survival curve comparing dialysis with conservative care from the date of first outpatient eGFR ≤ 10 mL/min/1.73m².

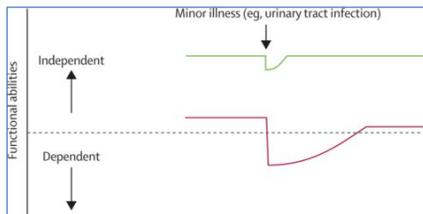


Outcomes in dialysis versus conservative care for older patients: A prospective cohort analysis of stage 5 Chronic Kidney Disease.

Raman et al.: PLoS One. 2018 Oct 26;13(10)

15

Frailty



- Multidimensional loss of homeostatic reserve
- Many definitions
 - Accumulated deficits
 - Phenotypic criteria
- Prevention
 - Screening in UK primary care (eFI since 2017)
- Complex intervention
 - Comprehensive geriatric assessment
 - Sarcopenia (physical frailty)
 - Systems level programs

16

Frailty in advanced CKD

- The dialysis population is older
- 50% frailty (Goto 2019) in patients >65 starting dialysis
 - 77% had ≥2 geriatric impairments
 - 80% help with ADLs
 - 67% cognitive deficit
- Falls in 33% (Iyasere 2016)
- Associated with worse quality of life
- Comprehensive Geriatric Assessment
 - Medical
 - Psychosocial
 - Functional
 - Environmental
- Evidence from acute hospital care (acute admissions, perioperative medicine)
- Time-consuming
- Risk of using frailty to deny patients appropriate treatment

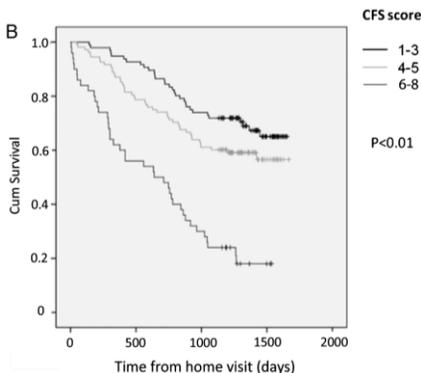
Clinical Frailty Scale*

- 1 Very Fit** – People who are robust, active, energetic and motivated. These people commonly exercise regularly. They are among the fittest for their age.
- 2 Well** – People who have **no active disease symptoms** but are less fit than category 1. Often, they exercise or are very **active occasionally**, e.g. seasonally.
- 3 Managing Well** – People whose **medical problems are well controlled**, but are **not regularly active** beyond routine walking.
- 4 Vulnerable** – While **not dependent** on others for daily help, often **symptoms limit activities**. A common complaint is being "slowed up", and/or being tired during the day.
- 5 Mildly Frail** – These people often have **more evident slowing**, and need help in **high order IADLs** (finances, transportation, heavy housework, medications). Typically, mild frailty progressively impairs shopping and walking outside alone, meal preparation and housework.
- 6 Moderately Frail** – People need help with **all outside activities** and with **keeping house**. Inside, they often have problems with stairs and need **help with bathing** and might need minimal assistance (cuing, standby) with dressing.

17

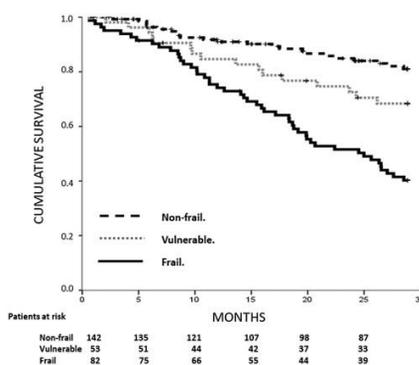
Frailty outcomes

Kaplan–Meier survival curves for (B) frailty subgroup in 283 patients referred for pre-dialysis education 2010–2012 to single center



Pugh CKJ 2016 2016 Apr;9(2):324-9

Kaplan–Meier survival curves by frailty status (EFS) in 277 prevalent hemodialysis patients recruited in 2016 from a single center



Garcia-Canton, [Ren Fail](#), 2019 Nov;41(11):567-575

18

Location

- 50% of all non-emergency patient transport paid for by the NHS is for dialysis patients
- 25,000 people have haemodialysis treatment in hospitals or satellite units
- Patients average over 300 journeys every year to and from their dialysis
- Costs up to £250m per year
- Impact on carers, physio, rehab etc



Dialysis Transport Working Group (UK) 2019
Comprehensive kidney patient transport guidance

19

Location



1966



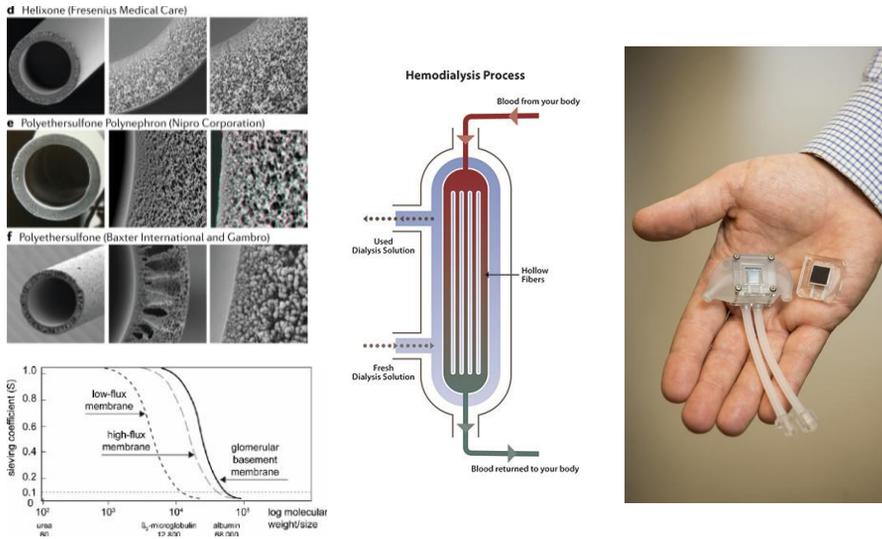
2004



2020

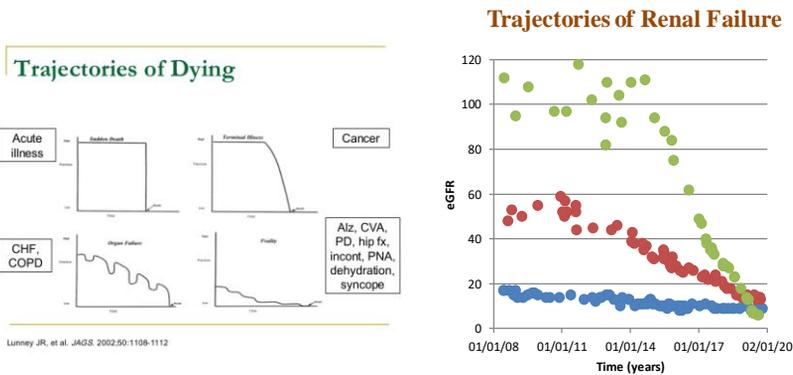
20

Technology



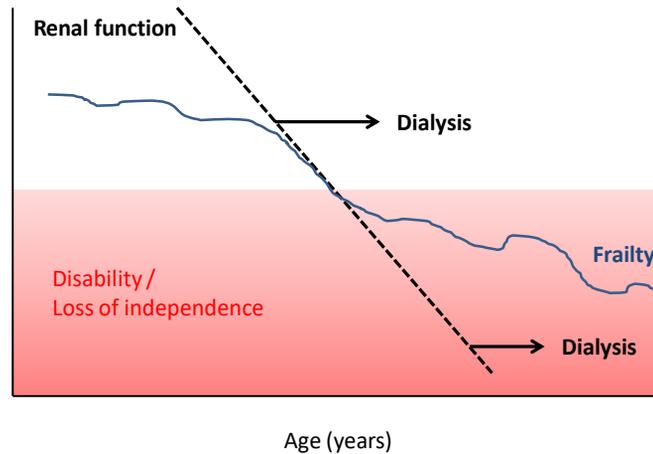
21

Prediction



22

Trajectory of illness



23

Future challenges

- Optimisation of referral & management of patients with advanced CKD
- Design of CKD frailty index for more accurate risk prediction
 - Based on IPOS renal
 - Combined with (novel) biomarkers
- Optimal content/format for patient education
 - Aim for >30% home therapies
- Can dialysis start be delayed safely with aggressive medical symptom control?
- What is the best dialysis modality (for frail elderly)?
 - PD/HD, duration/frequency, location, membrane
 - Prospective trial of incremental dialysis
 - Adequacy measures & symptom control
- How to track multi-dimensional outcomes in dialysis population?
 - Track symptoms & frailty with early review
 - Transition to palliative care

24