Approach to kidney disease in the elderly

Dr Dilushi Wijayaratne
Lecturer & Specialist nephrologist
Department of Medicine, UCFM

Why talk about CKD in the elderly?

- Higher prevalence of CKD in elderly
- Chronic disease→ Organ failure
- Elderly population is increasing → could translate into increased burden
- Challenges in diagnosing CKD in the elderly
- Some systemic diseases which are more common in the elderly may have renal involvement – eg. cancer, vasculitis
- As a group they are more comorbid, frail
- Outcomes of Rx may differ from in younger
- Different management priorities across aging – needs individualised care

Why talk about CKD in the elderly?

- Higher prevalence of CKD in elderly
- Chronic disease→ Organ failure
- Elderly population is increasing → could translate into increased burden
- Challenges in diagnosing CKD in the elderly
- Some systemic diseases which are more common in the elderly may have renal involvement – eg. cancer, vasculitis
- As a group they are more comorbid, frail
- Outcomes of Rx may differ from in younger
- Different management priorities across aging – needs individualised care

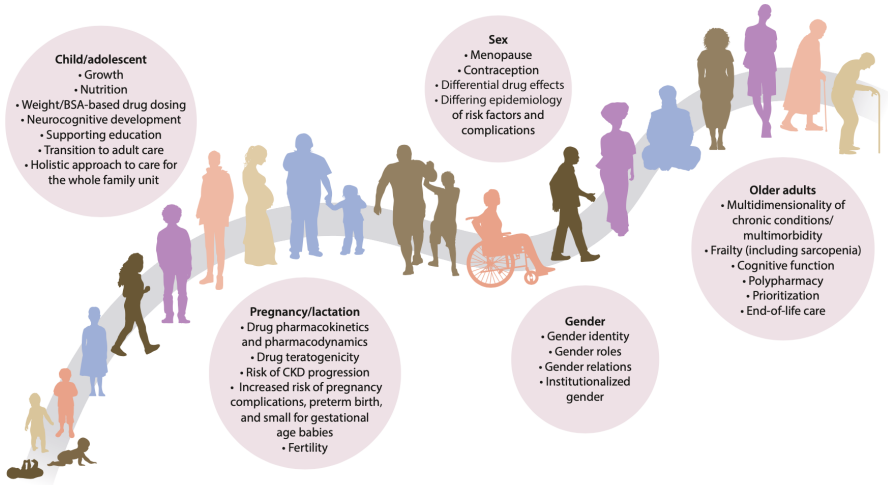


Figure 4| Special considerations for chronic kidney disease (CKD) care across the lifespan. BSA, body surface area.

Why talk about CKD in the elderly?

- Higher prevalence of CKD in elderly
- Chronic disease→ Organ failure
- Elderly population is increasing → could translate into increased burden
- Challenges in diagnosing CKD in the elderly
- Some systemic diseases which are more common in the elderly may have renal involvement – eg. cancer, vasculitis
- As a group they are more comorbid, frail
- Outcomes of Rx may differ from in younger
- Different management priorities across aging – needs individualised care

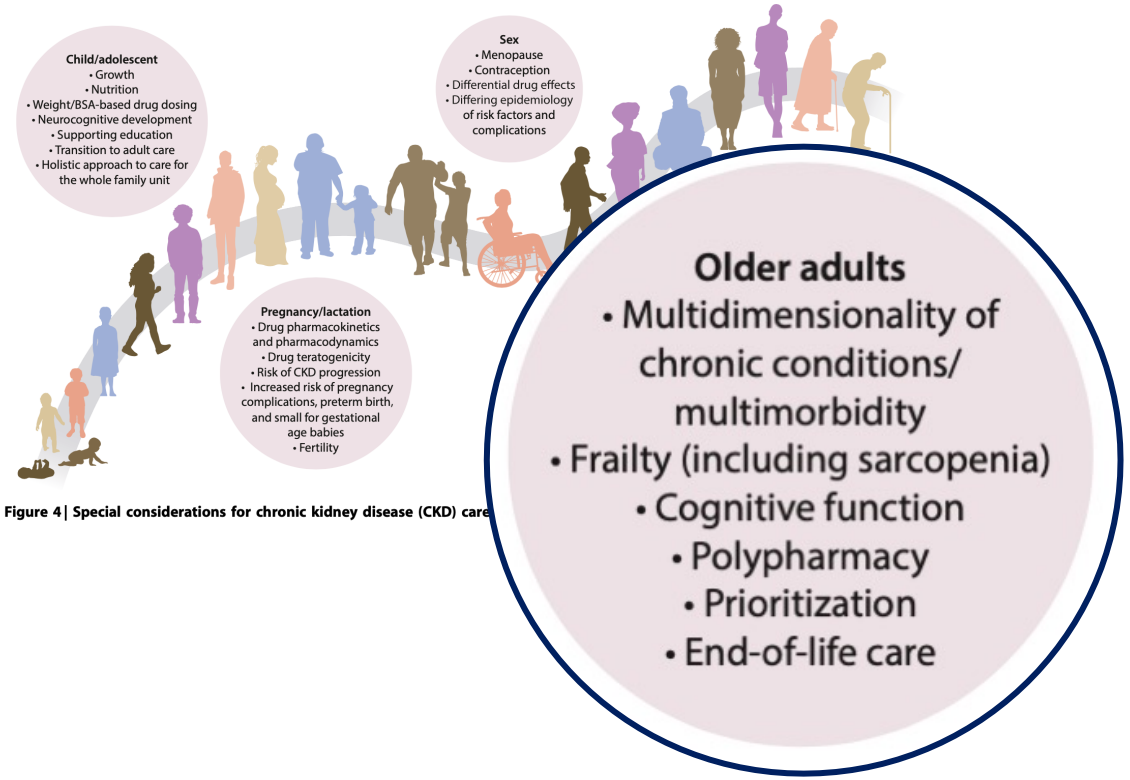


Figure 4| Special considerations for chronic kidney disease (CKD) care

Why talk about CKD in the elderly?

- Higher prevalence of CKD in elderly
- Chronic disease→ Organ failure
- Elderly population is increasing → could translate into increased burden
- **Challenges in diagnosing CKD in the elderly**
- Some systemic diseases which are more common in the elderly may have renal involvement – eg. cancer, vasculitis
- As a group they are more comorbid, frail
- **Outcomes of Rx may differ** from in younger
- **Different management priorities across aging** – needs individualised care

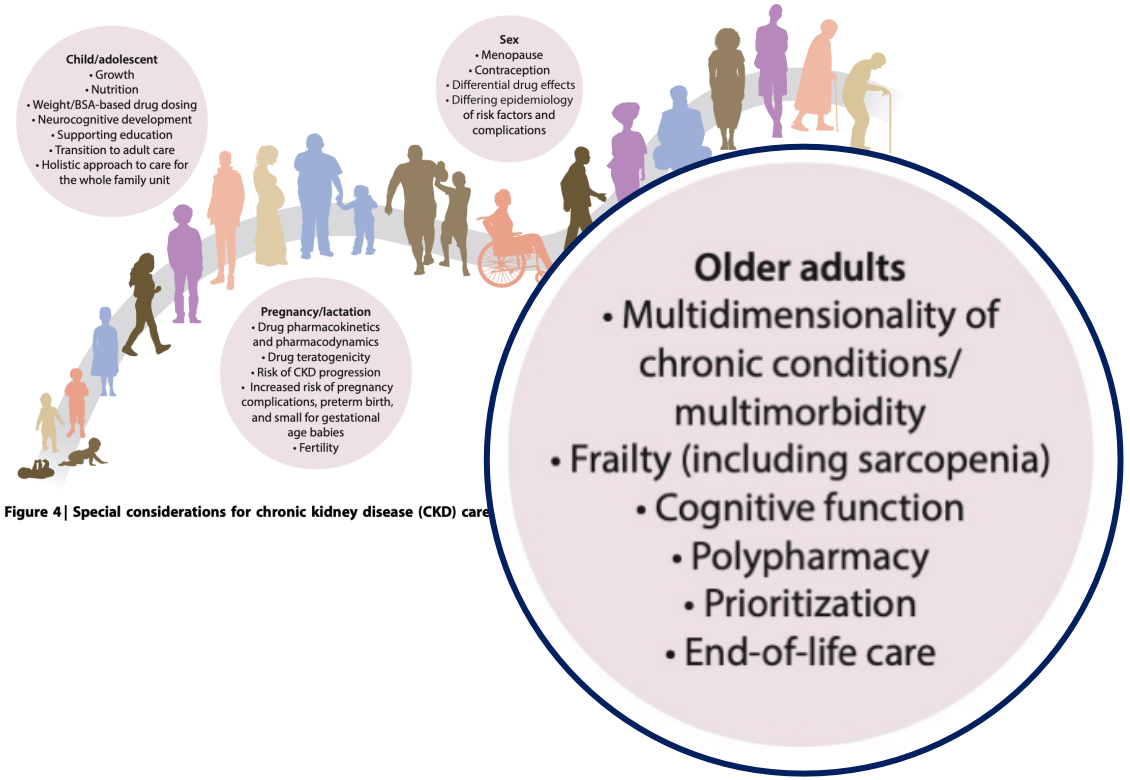


Figure 4| Special considerations for chronic kidney disease (CKD) care

Some considerations in managing older patients

- Most of our treatments aim to improve mortality or QoL
- RCTs often exclude elderly and comorbid - ? Efficacy, safety, effects on PROMs
- Patients often have unrealistic expectations of prognosis→ affect their treatment choices
- Aim to provide a realistic outlook about expectations by risk assessment
- Our own value system ≠ patient value system; respect autonomy

Case 1- A typical referral

- A 75-year-old man is referred for evaluation of renal impairment.
- He has well-controlled HTN managed with amlodipine.
- BP 128/72 mmHg.
- Routine check up → SCr is 1.4 mg/dl
- eGFR (CKD –EPI) 59 ml/ min/1.73m^2
- **He has been asked to see a kidney doctor immediately.**
- **Daughter asks if he is going to need dialysis**

Case 1- A typical referral

- A 75-year-old man is referred for evaluation of renal impairment.
- He has well-controlled HTN managed with amlodipine.
- BP 128/72 mmHg.
- Routine check up → SCr is 1.4 mg/dl
- eGFR (CKD –EPI) 59 ml/ min/1.73m^2
- **He has been asked to see a kidney doctor immediately.**
- **Daughter asks if he is going to need dialysis**

Is this CKD?

What is the impact on this patient?

Defining CKD

- CKD is defined as
  - abnormalities of kidney structure or function
  - present for a minimum of 3 months
  - **with implications for health**
  - **(KDIGO, 2012)**

- Function – GFR – approximation eGFR based on serum creatinine or serum cystatin
- Structure- albuminuria (others eg. USS, renal biopsy)

Defining CKD

- Colour code indicates risk of progression to ESKD over time
- Using current criteria around 1/3 of US populations over 65 years have CKD

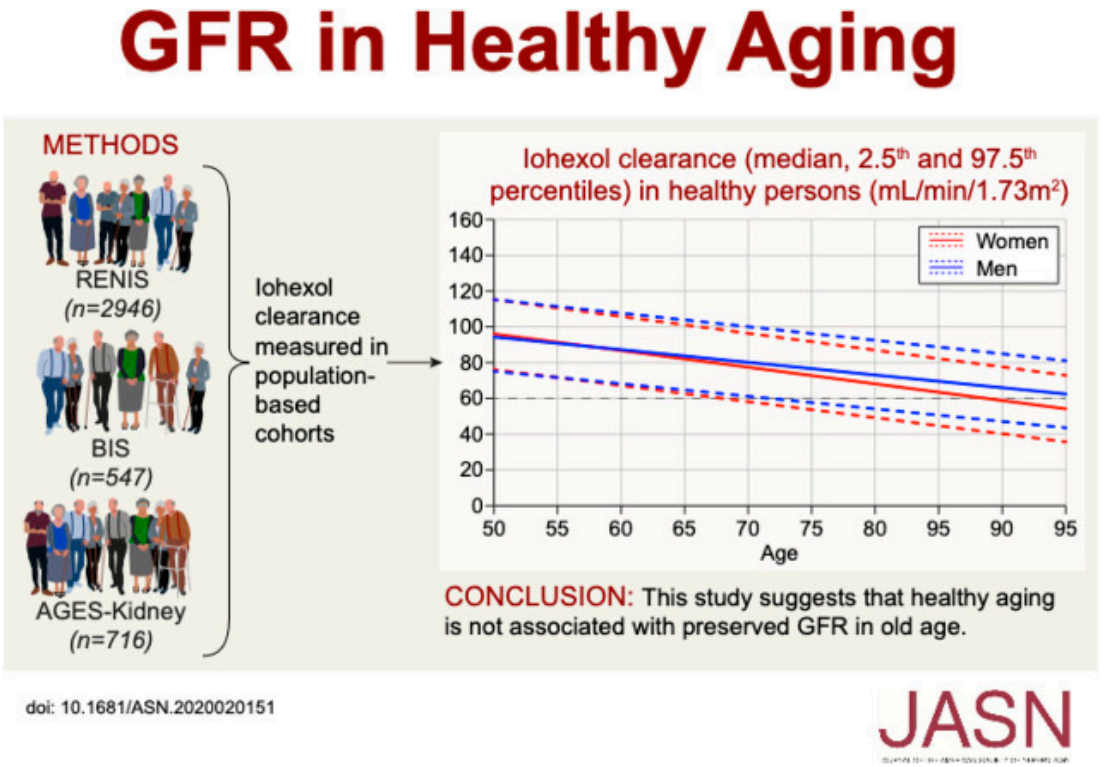
Prognosis of CKD by GFR and albuminuria categories: KDIGO 2012

GFR categories (ml/min/1.73 m^2), description and range				Persistent albuminuria categories, description and range		
				A1	A2	A3
				Normal to mildly increased	Moderately increased	Severely increased
				<30 mg/g <3 mg/mmol	30–300 mg/g 3–30 mg/mmol	>300 mg/g >30 mg/mmol
	G1	Normal or high	≥90			
	G2	Mildly decreased	60–89			
	G3a	Mildly to moderately decreased	45–59			
	G3b	Moderately to severely decreased	30–44			
	G4	Severely decreased	15–29			
	G5	Kidney failure	<15			

green, low risk (if no other markers of kidney disease, no CKD); yellow, moderately increased risk; orange, high risk; red, very high risk.

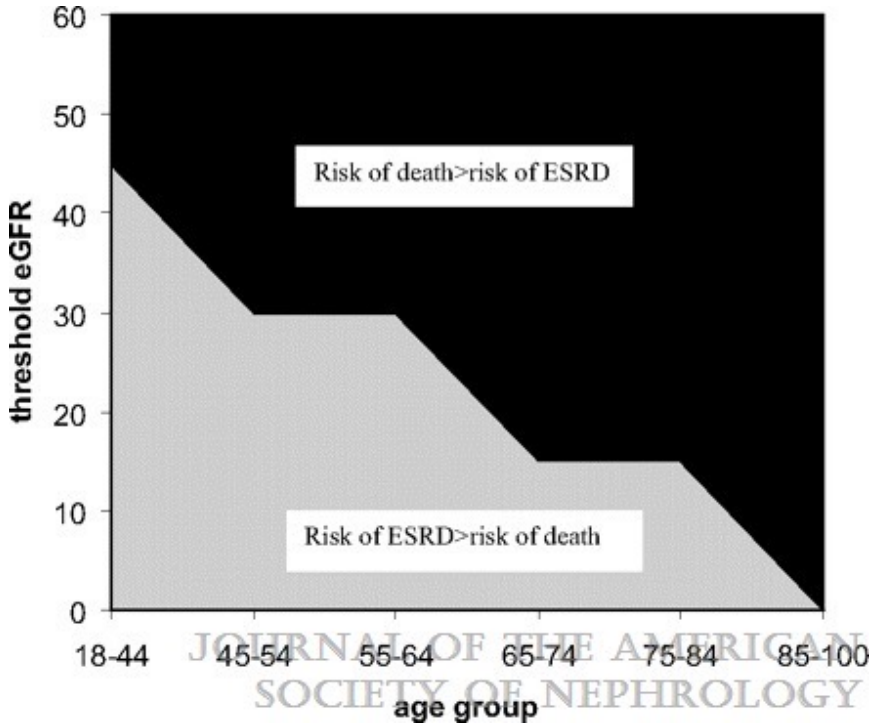
Is this CKD?

- **Normal ageing vs disease**
- On average after the age of 40 there is a GFR loss of ~ 0.7ml/min/y. *Not everyone has an age-related decline.*
- Progression slows with age.
- Loss of GFR is not associated with ↑single nephron GFR(hyperfiltration)
- Similarly biopsies show nephrosclerosis/ involution but not pathological changes



“Implications for health”

- What are the implications of eGFR on outcomes across the lifespan?
- US veterans (n= 209, 622)
- ~ 50% of sample > 75 years
- F/U med 3.2 years
- As patients age, for a given eGFR they are more likely to die of non-renal causes before they reach ESKD

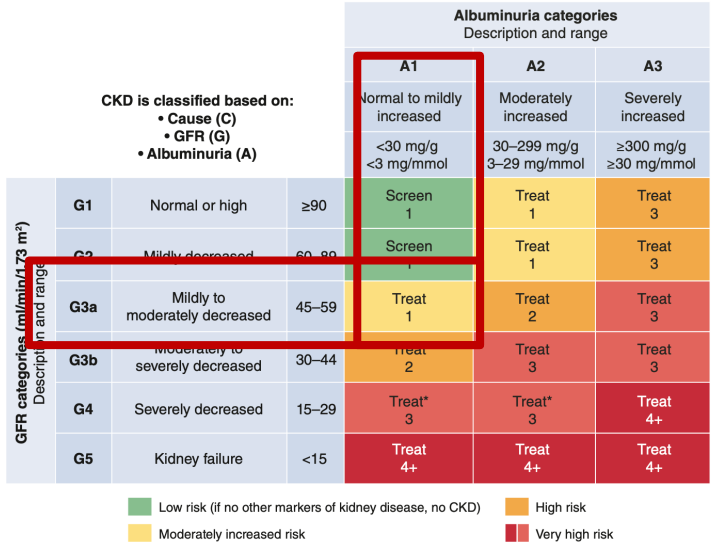


O’Hare, JASN , 2007

“Implications for health”

Largest proportion of “CKD” is among elderly patients with eGFR 45-60ml/min and no/minimal albuminuria

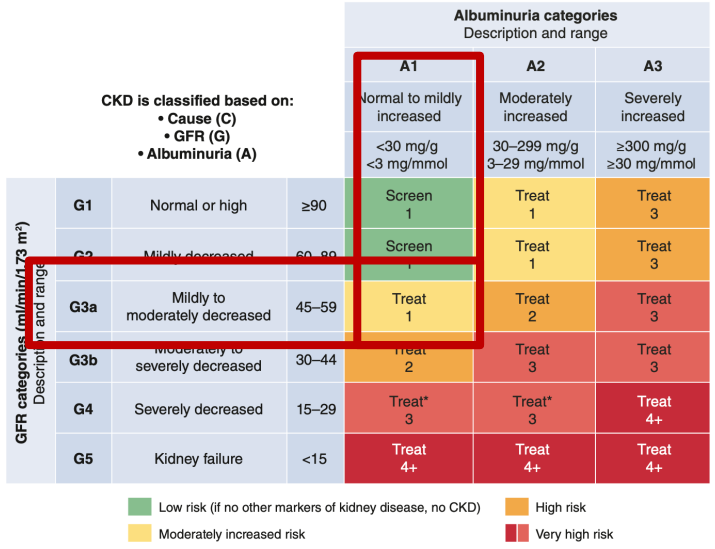
CKD G3 A1



“Implications for health”

Largest proportion of “CKD” is among elderly patients with eGFR 45-60ml/min and no/minimal albuminuria

CKD G3 A1



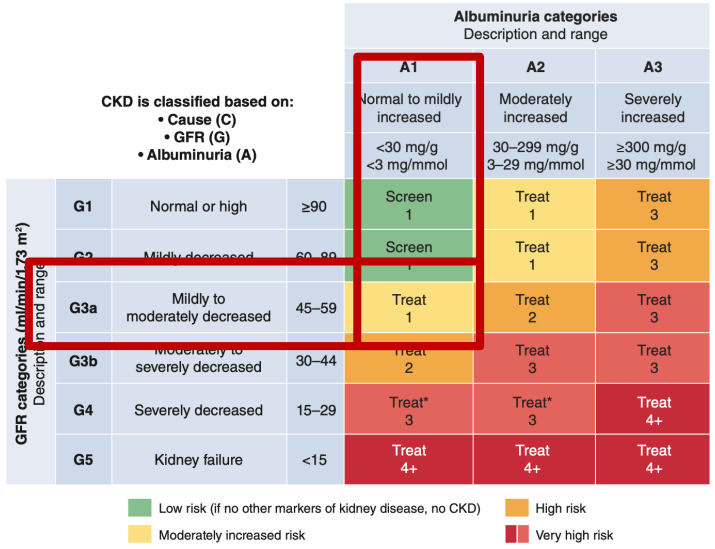
Overall	Urine albumin-creatinine ratio, mg/g					Urine albumin-creatinine ratio, mg/g				
eGFRcr	<10	10–29	30–299	300–999	1000+	<10	10–29	30–299	300–999	1000+
	All-cause mortality: 82 cohorts 26 444 384 participants; 2 604 028 events					Myocardial infarction: 64 cohorts 22 838 356 participants; 451 063 events				
105+	1.6	2.2	2.9	4.3	5.8	1.1	1.4	2.0	2.7	3.8
90–104	ref	1.3	1.8	2.6	3.1	ref	1.3	1.6	2.2	3.2
60–89	1.0	1.3	1.7	2.2	2.8	1.1	1.3	1.6	2.2	3.1
45–59	1.3	1.6	2.0	2.4	3.1	1.4	1.7	2.0	2.8	3.7
30–44	1.8	2.0	2.5	3.2	3.9	1.9	2.0	2.4	3.2	4.3
15–29	2.8	2.8	3.3	4.1	5.6	2.7	3.1	3.1	4.2	5.1
<15	4.6	5.0	5.3	6.0	7.0	4.6	5.6	4.8	6.0	6.0
	Cardiovascular mortality: 76 cohorts 26 022 346 participants; 776 441 events					Stroke: 68 cohorts 24 746 436 participants; 461 785 events				
105+	1.4	2.0	3.0	4.1	5.4	1.2	1.6	2.2	3.1	4.3
90–104	ref	1.3	1.9	2.7	3.6	ref	1.3	1.6	2.4	3.1
60–89	1.0	1.4	1.7	2.4	3.2	1.1	1.3	1.7	2.2	3.0
45–59	1.4	1.7	2.2	2.8	3.8	1.4	1.6	1.9	2.3	2.9
30–44	2.0	2.3	2.8	3.7	4.6	1.6	1.7	2.0	2.4	3.0
15–29	3.2	3.1	3.5	5.0	6.5	1.8	2.1	2.1	2.7	3.0
<15	6.1	6.4	6.4	7.3	8.2	3.2	2.8	2.9	3.2	3.8
	Kidney failure with replacement therapy: 57 cohorts 25 466 956 participants; 158 846 events					Heart failure: 61 cohorts 24 603 016 participants; 1 132 443 events				
105+	0.5	1.2	2.9	7.7	25	1.2	1.7	2.7	4.2	6.9
90–104	ref	1.8	4.3	12	43	ref	1.3	2.0	2.8	4.2
60–89	2.3	4.9	10	27	85	1.1	1.4	1.9	2.7	4.2
45–59	13	19	37	89	236	1.6	1.8	2.4	3.4	5.0
30–44	50	58	115	240	463	2.2	2.5	3.1	4.2	6.5
15–29	283	301	443	796	1253	3.6	3.5	4.1	5.8	8.1
<15	770	1040	1618	2297	2547	5.1	5.7	5.8	7.9	9.9
	Acute kidney injury: 49 cohorts 23 914 614 participants; 1 408 929 events					Atrial fibrillation: 50 cohorts 22 886 642 participants; 1 068 701 events				
105+	1.0	1.6	2.4	3.7	5.5	1.1	1.3	1.7	2.4	3.5
90–104	ref	1.4	2.1	3.2	5.0	ref	1.2	1.5	1.9	2.3
60–89	1.6	2.2	3.1	4.3	6.7	1.0	1.2	1.4	1.7	2.2
45–59	3.5	4.0	5.1	6.9	9.0	1.2	1.3	1.5	1.8	2.4
30–44	5.6	5.9	6.8	8.6	11	1.4	1.5	1.7	2.0	2.4
15–29	8.3	8.0	8.5	9.9	10	1.9	1.8	2.0	2.6	3.0
<15	8.5	11	7.9	5.5	5.7	2.6	2.5	3.1	3.6	4.2
	Hospitalization: 49 cohorts 25 426 722 participants; 8 398 637 events					Peripheral artery disease: 54 cohorts 24 830 794 participants; 378 924 events				
105+	1.4	1.7	2.1	2.1	2.3	0.9	1.4	1.9	2.8	5.0
90–104	ref	1.1	1.3	1.5	1.7	ref	1.3	1.9	2.8	4.3
60–89	1.0	1.1	1.3	1.5	1.8	1.0	1.3	1.8	2.5	3.8
45–59	1.3	1.3	1.5	1.7	2.1	1.5	1.7	2.1	2.9	4.2
30–44	1.5	1.5	1.6	1.9	2.3	2.0	1.9	2.5	3.6	5.0
15–29	1.8	1.8	1.9	2.4	2.8	3.3	3.3	3.8	5.7	8.1
<15	2.7	2.8	3.0	3.2	3.8	9.1	9.0	9.6	13	14

Figure 5 | Associations of chronic kidney disease (CKD) staging by estimated glomerular filtration rate by creatinine (eGFRcr) an albumin-to-creatinine ratio (ACR) categories and risks for 10 common complications in multivariable-adjusted analyses. Number

“Implications for health”

Largest proportion of “CKD” is among elderly patients with eGFR 45-60ml/min and no/minimal albuminuria

CKD G3 A1



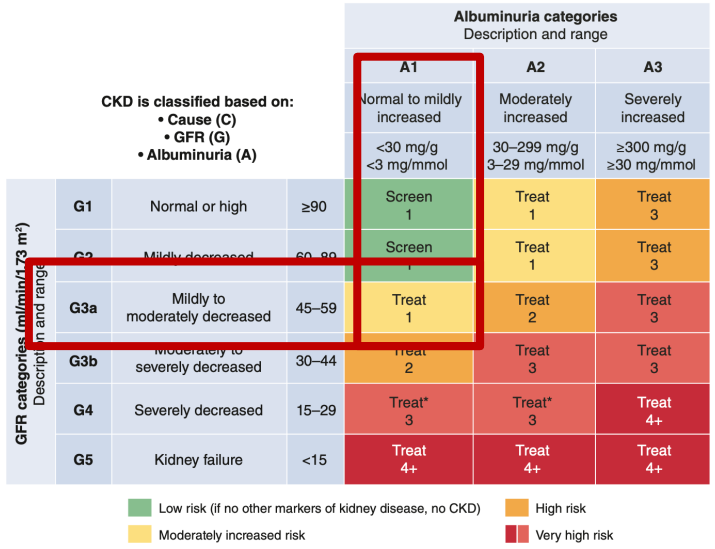
Overall	Urine albumin-creatinine ratio, mg/g					Urine albumin-creatinine ratio, mg/g				
eGFRcr	<10	10–29	30–299	300–999	1000+	<10	10–29	30–299	300–999	1000+
	All-cause mortality: 82 cohorts 26 444 384 participants; 2 604 028 events					Myocardial infarction: 64 cohorts 22 838 356 participants; 451 063 events				
105+	1.6	2.2	2.9	4.3	5.8	1.1	1.4	2.0	2.7	3.8
90–104	ref	1.3	1.8	2.6	3.1	ref	1.3	1.6	2.2	3.2
60–89	1.3	1.3	1.7	2.2	2.8	1.1	1.3	1.6	2.2	3.1
45–59	1.3	1.6	2.0	2.4	3.1	1.4	1.7	2.0	2.8	3.7
30–44	1.8	2.0	2.5	3.2	3.9	1.9	2.0	2.4	3.2	4.3
15–29	2.8	2.8	3.3	4.1	5.6	2.7	3.1	3.1	4.2	5.1
<15	4.6	5.0	5.3	6.0	7.0	4.6	5.6	4.8	6.0	6.0
	Cardiovascular mortality: 76 cohorts 26 022 346 participants; 776 441 events					Stroke: 68 cohorts 24 746 436 participants; 461 785 events				
105+	1.4	2.0	3.0	4.1	5.4	1.2	1.6	2.2	3.1	4.3
90–104	ref	1.3	1.9	2.7	3.6	ref	1.3	1.6	2.4	3.1
60–89	1.3	1.4	1.7	2.4	3.2	1.1	1.3	1.7	2.2	3.0
45–59	1.4	1.7	2.2	2.8	3.8	1.4	1.6	1.9	2.3	2.9
30–44	2.0	2.3	2.8	3.7	4.6	1.6	1.7	2.0	2.4	3.0
15–29	3.2	3.1	3.5	5.0	6.5	1.8	2.1	2.1	2.7	3.0
<15	6.1	6.4	6.4	7.3	8.2	3.2	2.8	2.9	3.2	3.8
	Kidney failure with replacement therapy: 57 cohorts 25 466 956 participants; 158 846 events					Heart failure: 61 cohorts 24 603 016 participants; 1 132 443 events				
105+	0.5	1.2	2.9	7.7	25	1.2	1.7	2.7	4.2	6.9
90–104	ref	1.8	4.3	12	43	ref	1.3	2.0	2.8	4.2
60–89	2.3	4.9	10	27	85	1.1	1.4	1.9	2.7	4.2
45–59	13	19	37	89	236	1.6	1.8	2.4	3.4	5.0
30–44	50	58	115	240	463	2.2	2.5	3.1	4.2	6.5
15–29	283	301	443	796	1253	3.6	3.5	4.1	5.8	8.1
<15	770	1040	1618	2297	2547	5.1	5.7	5.8	7.9	9.9
	Acute kidney injury: 49 cohorts 23 914 614 participants; 1 408 929 events					Atrial fibrillation: 50 cohorts 22 886 642 participants; 1 068 701 events				
105+	1.0	1.6	2.4	3.7	5.5	1.1	1.3	1.7	2.4	3.5
90–104	ref	1.4	2.1	3.2	5.0	ref	1.2	1.5	1.9	2.3
60–89	1.6	2.2	3.1	4.3	6.7	1.0	1.2	1.4	1.7	2.2
45–59	3.5	4.0	5.1	6.9	9.0	1.2	1.3	1.5	1.8	2.4
30–44	5.6	5.9	6.8	8.6	11	1.4	1.5	1.7	2.0	2.4
15–29	8.3	8.0	8.5	9.9	10	1.9	1.8	2.0	2.6	3.0
<15	8.5	11	7.9	5.5	5.7	2.6	2.5	3.1	3.6	4.2
	Hospitalization: 49 cohorts 25 426 722 participants; 8 398 637 events					Peripheral artery disease: 54 cohorts 24 830 794 participants; 378 924 events				
105+	1.4	1.7	2.1	2.1	2.3	0.9	1.4	1.9	2.8	5.0
90–104	ref	1.1	1.3	1.5	1.7	ref	1.3	1.9	2.8	4.3
60–89	1.0	1.1	1.3	1.5	1.8	1.0	1.3	1.8	2.5	3.8
45–59	1.3	1.3	1.5	1.7	2.1	1.5	1.7	2.1	2.9	4.2
30–44	1.5	1.5	1.6	1.9	2.3	2.0	1.9	2.5	3.6	5.0
15–29	1.8	1.8	1.9	2.4	2.8	3.3	3.3	3.8	5.7	8.1
<15	2.7	2.8	3.0	3.2	3.8	9.1	9.0	9.6	13	14

Figure 5 | Associations of chronic kidney disease (CKD) staging by estimated glomerular filtration rate by creatinine (eGFRcr) an albumin-to-creatinine ratio (ACR) categories and risks for 10 common complications in multivariable-adjusted analyses. Number

“Implications for health”

Largest proportion of “CKD” is among elderly patients with eGFR 45-60ml/min and no/minimal albuminuria

CKD G3 A1



Overall	Urine albumin-creatinine ratio, mg/g					Urine albumin-creatinine ratio, mg/g				
eGFRcr	<10	10–29	30–299	300–999	1000+	<10	10–29	30–299	300–999	1000+
	All-cause mortality: 82 cohorts 26 444 384 participants; 2 604 028 events					Myocardial infarction: 64 cohorts 22 838 356 participants; 451 063 events				
105+	1.6	2.2	2.9	4.3	5.8	1.1	1.4	2.0	2.7	3.8
90–104	ref	1.3	1.8	2.6	3.1	ref	1.3	1.6	2.2	3.2
60–89	1.3	1.3	1.7	2.2	2.8	1.1	1.3	1.6	2.2	3.1
45–59	1.3	1.6	2.0	2.4	3.1	1.4	1.7	2.0	2.8	3.7
30–44	1.8	2.0	2.5	3.2	3.9	1.9	2.0	2.4	3.2	4.3
15–29	2.8	2.8	3.3	4.1	5.6	2.7	3.1	3.1	4.2	5.1
<15	4.6	5.0	5.3	6.0	7.0	4.6	5.6	4.8	6.0	6.0
	Cardiovascular mortality: 76 cohorts 26 022 346 participants; 776 441 events					Stroke: 68 cohorts 24 746 436 participants; 461 785 events				
105+	1.4	2.0	3.0	4.1	5.4	1.2	1.6	2.2	3.1	4.3
90–104	ref	1.3	1.9	2.7	3.6	ref	1.3	1.6	2.4	3.1
60–89	1.3	1.4	1.7	2.4	3.2	1.1	1.3	1.7	2.2	3.0
45–59	1.4	1.7	2.2	2.8	3.8	1.4	1.6	1.9	2.3	2.9
30–44	2.0	2.3	2.8	3.7	4.6	1.6	1.7	2.0	2.4	3.0
15–29	3.2	3.1	3.5	5.0	6.5	1.8	2.1	2.1	2.7	3.0
<15	6.1	6.4	6.4	7.3	8.2	3.2	2.8	2.9	3.2	3.8
	Kidney failure with replacement therapy: 57 cohorts 25 466 956 participants; 158 846 events					Heart failure: 61 cohorts 24 603 016 participants; 1 132 443 events				
105+	0.5	1.2	2.9	7.7	25	1.2	1.7	2.7	4.2	6.9
90–104	ref	1.8	4.3	12	43	ref	1.3	2.0	2.8	4.2
60–89	2.3	4.9	10	27	85	1.1	1.4	1.9	2.7	4.2
45–59	13	19	37	89	236	1.6	1.8	2.4	3.4	5.0
30–44	50	58	115	240	463	2.2	2.5	3.1	4.2	6.5
15–29	283	301	443	796	1253	3.6	3.5	4.1	5.8	8.1
<15	770	1040	1618	2297	2547	5.1	5.7	5.8	7.9	9.9
	Acute kidney injury: 49 cohorts 23 914 614 participants; 1 408 929 events					Atrial fibrillation: 50 cohorts 22 886 642 participants; 1 068 701 events				
105+	1.0	1.6	2.4	3.7	5.5	1.1	1.3	1.7	2.4	3.5
90–104	ref	1.4	2.1	3.2	5.0	ref	1.2	1.5	1.9	2.3
60–89	1.6	2.2	3.1	4.3	6.7	1.0	1.2	1.4	1.7	2.2
45–59	3.5	4.0	5.1	6.9	9.0	1.2	1.3	1.5	1.8	2.4
30–44	5.6	5.9	6.8	8.6	11	1.4	1.5	1.7	2.0	2.4
15–29	8.3	8.0	8.5	9.9	10	1.9	1.8	2.0	2.6	3.0
<15	8.5	11	7.9	5.5	5.7	2.6	2.5	3.1	3.6	4.2
	Hospitalization: 49 cohorts 25 426 722 participants; 8 398 637 events					Peripheral artery disease: 54 cohorts 24 830 794 participants; 378 924 events				
105+	1.4	1.7	2.1	2.1	2.3	0.9	1.4	1.9	2.8	5.0
90–104	ref	1.1	1.3	1.5	1.7	ref	1.3	1.9	2.8	4.3
60–89	1.0	1.1	1.3	1.5	1.8	1.0	1.3	1.8	2.5	3.8
45–59	1.3	1.3	1.5	1.7	2.1	1.5	1.7	2.1	2.9	4.2
30–44	1.5	1.5	1.6	1.9	2.3	2.0	1.9	2.5	3.6	5.0
15–29	1.8	1.8	1.9	2.4	2.8	3.3	3.3	3.8	5.7	8.1
<15	2.7	2.8	3.0	3.2	3.8	9.1	9.0	9.6	13	14

Figure 5 | Associations of chronic kidney disease (CKD) staging by estimated glomerular filtration rate by creatinine (eGFRcr) an albumin-to-creatinine ratio (ACR) categories and risks for 10 common complications in multivariable-adjusted analyses. Number

“Implications for health”- $eGFR_{cr - cys}$

- Average of $eGFR_{cr}$ and $eGFR_{cys}$ approximate mGFR better than either alone
- May be due to “balancing out” of non GFR determinants of filtration markers
- **Increased RR** for all outcomes noted as eGFR falls <60ml/min, even in non- albuminuric and across all age groups

Age <65	ACR, mg/g				ACR, mg/g			
eGFRcr-cys	<10	10–29	30–299	300+	<10	10–29	30–299	300+
	All-cause mortality				Myocardial infarction			
105+	0.99	1.2	1.5	2.4	0.93	1.0	1.1	2.6
90–104	ref	1.3	1.5	2.5	ref	1.2	1.3	1.9
60–89	1.2	1.6	2.0	2.9	1.3	1.4	1.6	2.1
45–59	2.1	2.7	2.9	4.5	1.8	2.6	3.1	3.5
30–44	2.7	3.8	4.2	5.6	1.9	2.3	3.0	3.9
<30	5.2	4.0	7.1	8.6	4.1	3.6	4.7	5.8
	Cardiovascular mortality				Stroke			
105+	0.95	1.4	1.7	4	0.96	1.2	1.6	2.7
90–104	ref	1.6	1.8	3.5	ref	1.2	1.5	2.2
60–89	1.3	1.7	2.3	3.9	1.2	1.4	1.7	2.6
45–59	2.5	4.0	4.6	6.0	1.9	2.0	2.5	3.8
30–44	3.1	6.6	5.3	7.1	2.6	3.7	3.5	3.5
<30	6.0	5.5	9.4	12	2.6	2.9	5.1	5.1
	Kidney failure replacement therapy				Heart failure			
105+	0.57	0.77	2.3	12	0.86	1.1	1.7	3.4
90–104	ref	1.4	3.9	11	ref	1.3	1.5	3.0
60–89	1.9	3.7	8.3	33	1.2	1.7	2.1	3.6
45–59	7.0	16	28	100	1.7	3.3	3.4	5.3
30–44	22	34	109	210	3.5	4.3	6.8	5.7
<30	335	267	419	625	7.5	6.3	9.7	8.9
	Acute kidney injury				Atrial fibrillation			
105+	0.75	1.0	1.4	3.4	0.93	1.0	1.3	1.9
90–104	ref	1.2	1.8	2.6	ref	1.2	1.4	2.3
60–89	1.6	2.7	2.9	5.8	1.1	1.3	1.5	1.8
45–59	4.2	6.0	5.6	7.6	1.5	2.0	2.1	2.6
30–44	5.7	9.4	9.8	9.4	1.8	2.4	3.0	2.8
<30	15	14	14	13	3.7	2.9	4.3	5.4
	Hospitalization				Peripheral artery disease			
105+	1.0	1.1	1.1	1.5	0.93	1.9	1.5	2.6
90–104	ref	1.1	1.2	1.3	ref	1.8	2.1	3.9
60–89	1.1	1.2	1.3	1.6	1.2	2.1	2.2	5.4
45–59	1.3	1.7	1.5	2.0	3.2	7.3	3.4	8.4
30–44	1.5	1.8	1.6	2.1	6.5	9.1	6.6	13
<30	2.1	2.4	2.4	3.5	1.4	7.6	18	16

Age 65+	ACR, mg/g				ACR, mg/g			
eGFRcr-cys	<10	10–29	30–299	300+	<10	10–29	30–299	300+
	All-cause mortality				Myocardial infarction			
105+	1.2	1.4	1.9	3.5	0.97	1.4	2.0	19
90–104	ref	1.2	1.4	2.0	ref	1.2	1.1	1.9
60–89	1.2	1.5	1.8	2.3	1.1	1.4	1.5	1.9
45–59	1.6	2.0	2.4	2.9	1.6	1.9	2.3	3.4
30–44	2.0	2.4	3.2	4.1	2.1	2.6	3.1	3.8
<30	3.4	4.1	5.1	6.5	4.9	3.0	5.1	5.0
	Cardiovascular mortality				Stroke			
105+	1.1	1.5	2.0	12	1.2	1.3	1.5	3.3
90–104	ref	1.4	1.4	3.4	ref	1.3	1.3	2.8
60–89	1.2	1.7	2.2	3.1	1.1	1.4	1.8	2.5
45–59	1.7	2.4	3.0	4.3	1.5	1.7	2.0	2.3
30–44	2.4	3.1	4.5	5.8	1.5	2.0	2.1	2.3
<30	5.7	5.2	5.1	7.8	1.7	2.0	2.4	4.8
	Kidney failure replacement therapy				Heart failure			
105+	2.0	1.0	2.1		0.99	1.5	1.7	7.0
90–104	ref	1.9	4.7	10	ref	1.3	1.5	2.2
60–89	1.4	2.6	6.2	19	1.2	1.5	2.0	3.2
45–59	3.7	7.9	16	42	1.6	2.0	2.9	4.1
30–44	14	14	46	137	2.3	2.9	3.5	6.1
<30	87	364	241	406	4.4	4.1	5.5	7.2
	Acute kidney injury				Atrial fibrillation			
105+	0.91	1.1	1.3	1.9	0.95	1.1	1.0	3.7
90–104	ref	1.3	1.4	3.9	ref	1.2	1.3	2.4
60–89	1.5	2.1	2.7	4.7	1.1	1.2	1.5	2.0
45–59	3.6	4.3	5.1	7.3	1.2	1.4	1.7	1.9
30–44	5.7	5.9	7.2	9.8	1.5	1.8	2.0	2.2
<30	10	11	11	22	1.8	1.8	2.2	3.2
	Hospitalization				Peripheral artery disease			
105+	1.0	1.1	1.2	2.2	1.1	2.3	2.9	4.9
90–104	ref	1.1	1.3	1.4	ref	1.3	2.0	4.8
60–89	1.1	1.2	1.3	1.5	1.3	1.6	2.0	3.2
45–59	1.2	1.2	1.4	1.6	2.0	2.8	3.1	3.1
30–44	1.5	1.4	1.6	2.0	3.5	2.8	3.8	5.9
<30	1.9	1.9	2.0	2.6	8.4	4.1	5.9	10

Figure 1 | Associations of chronic kidney disease (CKD) staging by estimated glomerular filtration rate by creatinine and cystatin C (eGFRcr-cys) and albumin-to-creatinine ratio (ACR) categories and risks for 10 common complications by age in multivariable-adjusted analyses. Numbers reflect the adjusted hazard ratio compared with the reference cell. Adjustment variables included age, sex, smoking status

What does this mean?

- GFR < 60ml/min is associated with ↑RR poorer cardiorenal outcomes even in the elderly
- eGFR based on creatinine and cystatin or mGFR are better predictors (often not practical)
- Marker vs cause?
- Is this reduction due to age/ disease in a given individual?
- Is there a risk overdiagnosis→ anxiety, overtreatment/ investigation, diversion of attention and resources from more important health concerns
- **HOWEVER,** the elderly do have a lower GFR which indicates a lower kidney reserve and increased vulnerability to AKI and nephrotoxicity
- Flipside- lower muscle mass can lead to overestimation of GFR and ACR in frail sarcopenic elderly

Case 2

- A 75-year-old man is referred for evaluation of renal impairment.
- He has a history of ischaemic heart disease and underwent CA stenting 5 years ago. His EF is 40%. He has hypertension, dyslipidaemia, bilateral knee joint osteoarthritis.
- His current medications include aspirin, atorvastatin, enalapril, atenolol, furosemide
- **Routine check up → serum creatinine is 2.8 mg/dl**
- **eGFR (CKD –EPI) 23 ml/ min/1.73m^2**
- **He has been asked to see a kidney doctor immediately. Daughter asks if he is going to need dialysis**

Urine ACR

8 mg/g
Previous eGFR 6 m ago was 22 ml/min

Is this CKD?

What is the impact on this patient?

From eGFR to risk

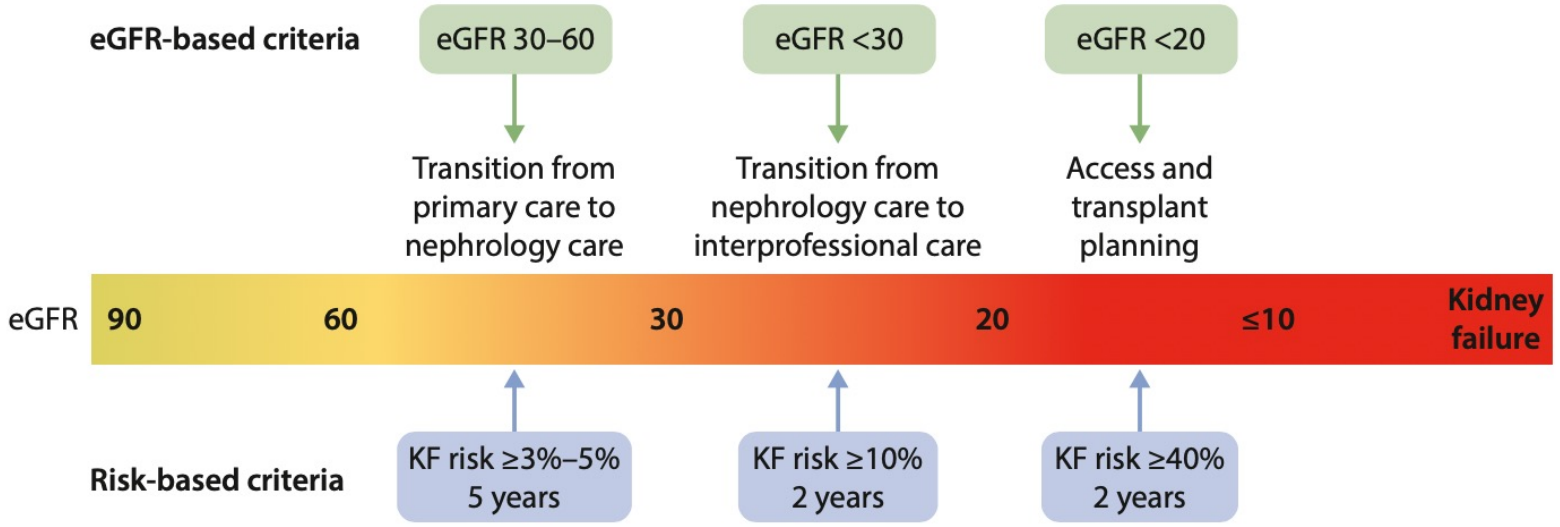
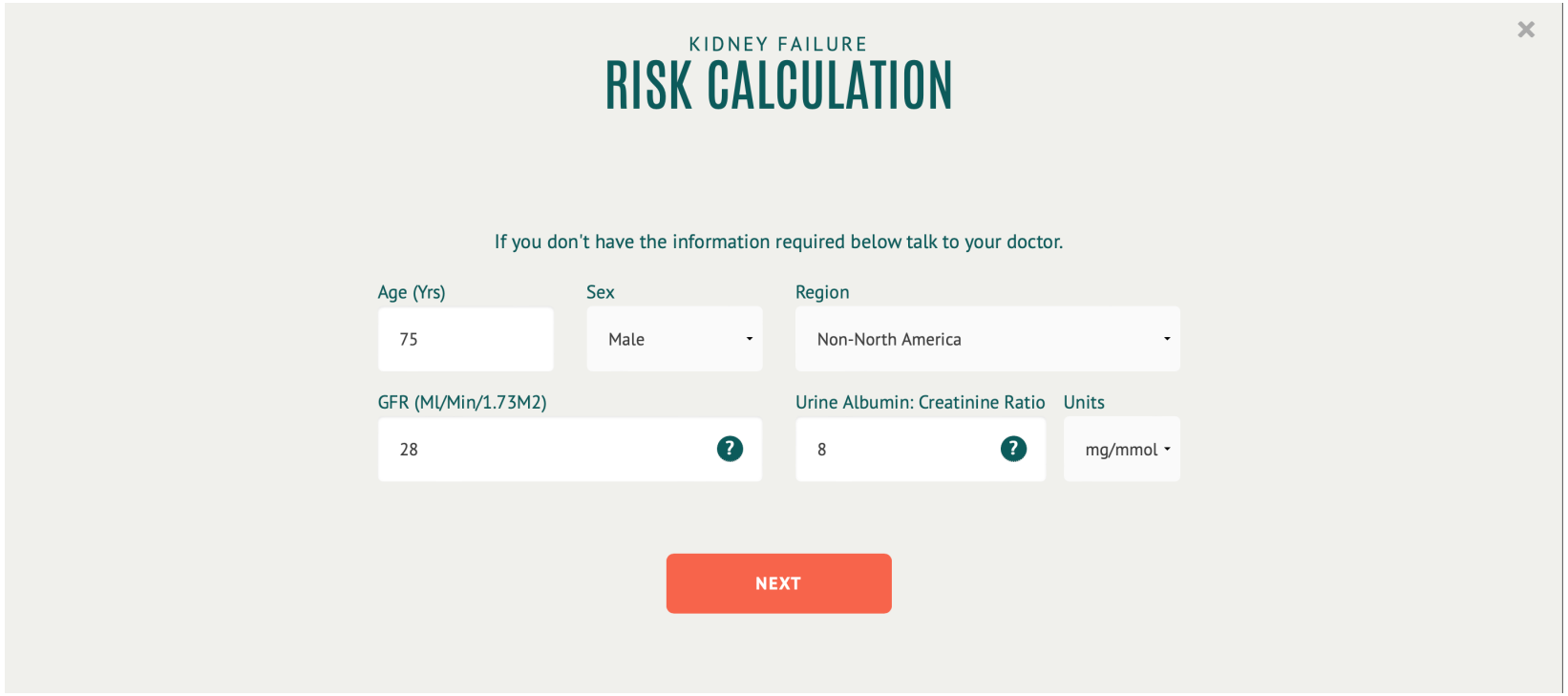


Figure 15 | Transition from an estimated glomerular filtration rate (eGFR)-based to a risk-based approach to chronic kidney disease care. KF, kidney failure.



Kidney failure risk equation (KFRE)
https://kidneyfailurerisk.com

KIDNEY FAILURE

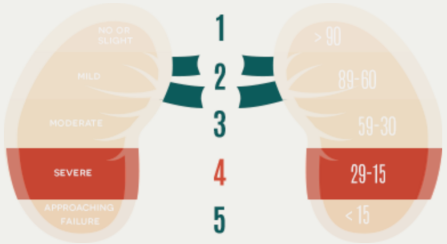
RISK CALCULATION

ASSESSMENT | LEARN MORE | WHAT KIDNEYS DO | SIGNS AND SYMPTOMS | TREATMENT OPTIONS

STAGE 4

SEVERE DECREASE IN FUNCTION

CKD STAGES | GLOMERULAR FILTRATION RATE



Patient risk of progression to kidney failure requiring dialysis or transplant:

AT 2 YEARS	AT 5 YEARS
2.78 %	10.37 %

Risk thresholds used in health systems include:

- 3-5 % over 5 years for referral to a kidney doctor
- 10 % over 2 years for team based care (Kidney Doctor, Nurse, Dietician, Pharmacist)
- 20-40 % over 2 years for planning a transplant or fistula

https://kidneyfailurerisk.com

KIDNEY FAILURE

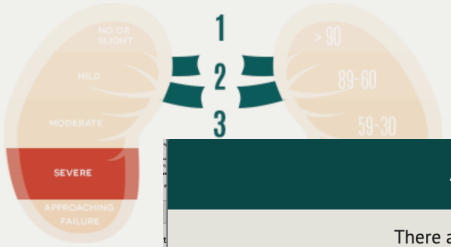
RISK CALCULATION

ASSESSMENT | LEARN MORE | WHAT KIDNEYS DO | SIGNS AND SYMPTOMS | TREATMENT OPTIONS

STAGE 4

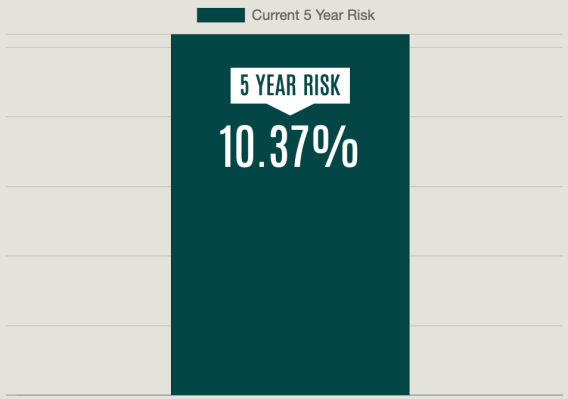
SEVERE DECREASE IN FUNCTION

CKD STAGES	GLOMERULAR FILTRATION RATE	Patient risk of progression to kidney failure requiring dialysis or transplant: AT 2 YEARS	AT 5 YEARS
1	> 90		
2	89-60		
3	59-30		



ASSESSMENT | LEARN MORE | WHAT KIDNEYS DO | SIGNS AND SYMPTOMS | TREATMENT OPTIONS

There are things you can do to reduce your risk of kidney failure over the next five years. Click below to see how the following will decrease your risk.



- Your current 5 year risk based on the answers you provided is **10.37%**
- Achieving good blood pressure control can reduce your 5 year risk from **10.37%** to **8.19%.**
- An ACE inhibitor (pril) or ARB (sartan) can reduce your 5 year risk from **10.37%** to **7.26%.**
- An SGLT2 inhibitor (gliflozin) can reduce your 5 year risk from **10.37%** to **5.70%.**
- If you have Type 2 Diabetes, a non-steroidal MRA (Finerenone), can reduce your 5 year risk from **10.37%** to **7.98%.**

https://kidneyfailurerisk.com

From eGFR to risk

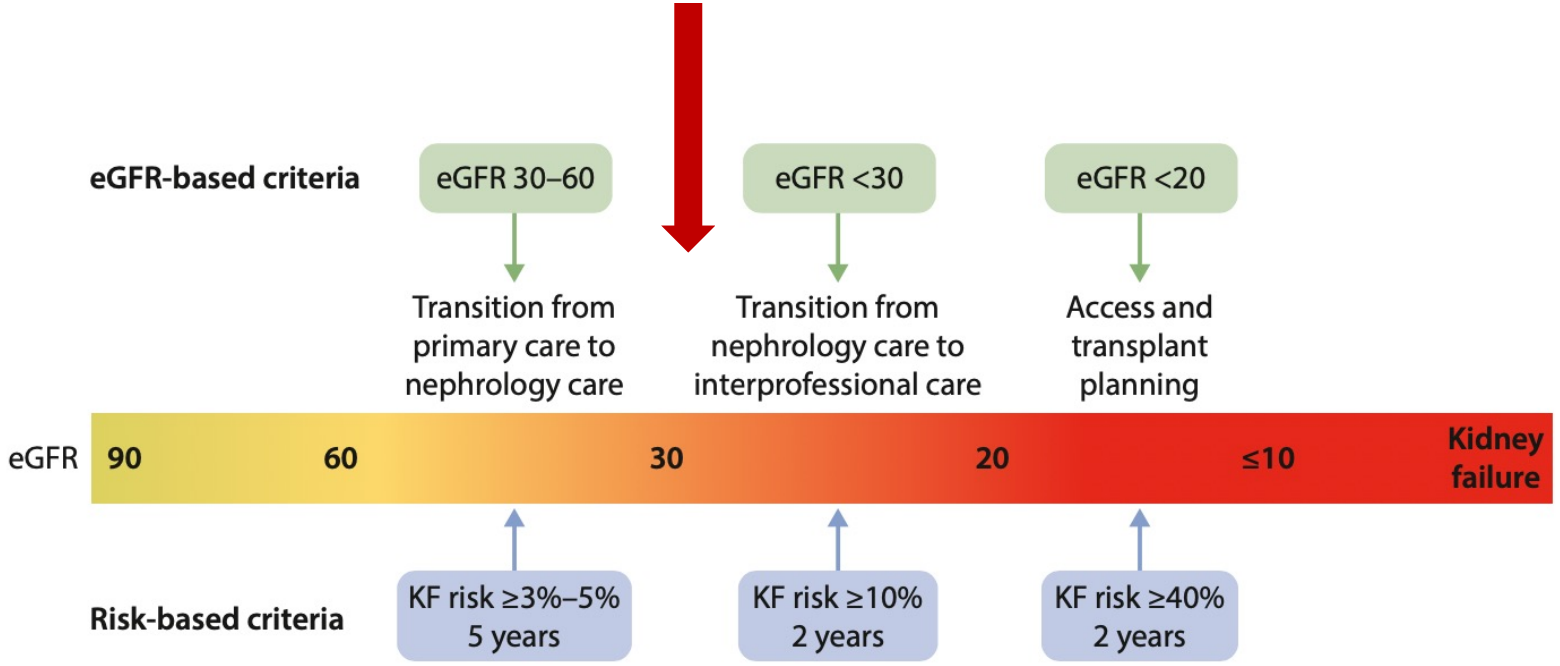


Figure 15 | Transition from an estimated glomerular filtration rate (eGFR)-based to a risk-based approach to chronic kidney disease care. KF, kidney failure.

Case 3

- 68-year-old man with type 2 DM, HTN, IHD referred for evaluation of reduced kidney function
- Feels generally well, has some fatigue. Notes mild ankle swelling in the evenings.
- BP 160/90mmHg
- eGFR 35 ml/min (was 38ml/min 1 year ago)
- UACR 1000 mg/g ; UPCR 3.5g/g
- Hb 9g/dl, MCV 88 fL
- S Ca, Phosphate – 2.1 / 1. 5 mmol/l
- Serum albumin 3.2 g/dl

In any patient with CKD

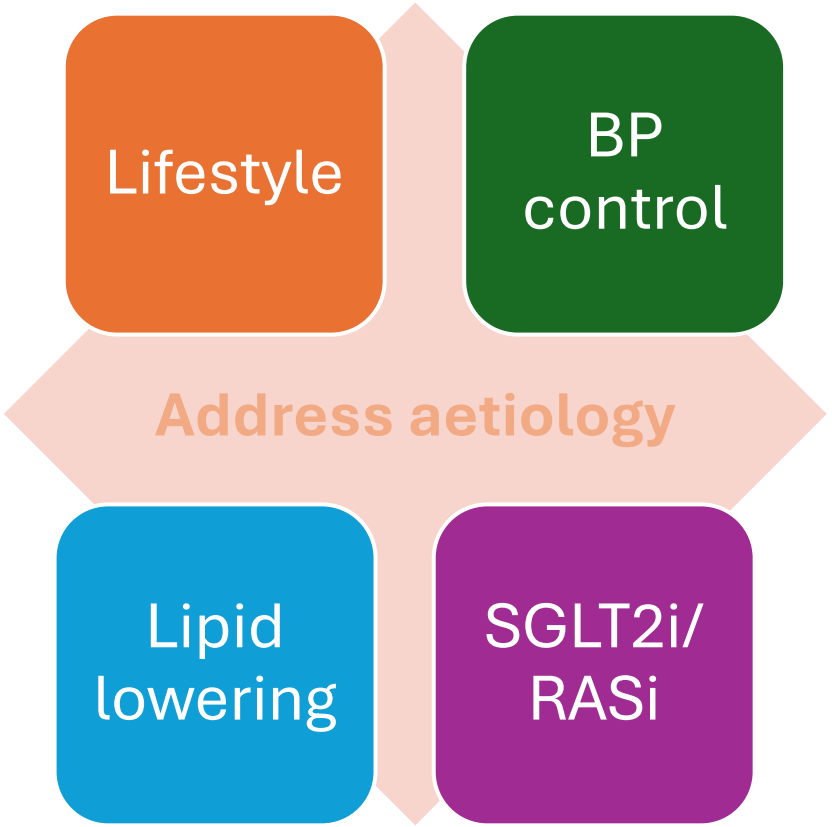
1. Identify and address the aetiology (Specific management)
2. Strategies to delay the progression of CKD and reduce CV risk
3. Look for and manage complications
4. Prepare for KRT

1. Identify and address the aetiology (Specific management)

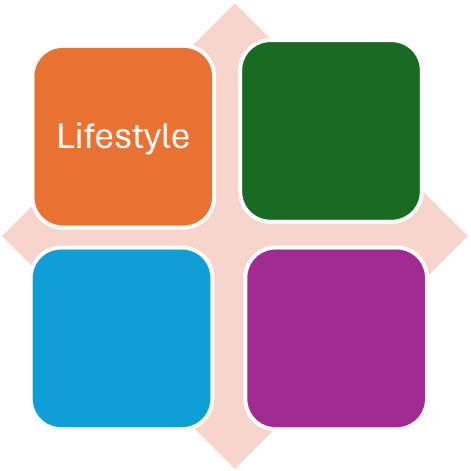
- Evaluation for cause of CKD – ?refer to nephrologist

2. Strategies to delay the progression of CKD + reduce CV risk

- Reverse/ control aetiology
- General measures:-



2. Strategies to delay the progression of CKD + reduce CV risk



A. Lifestyle :-

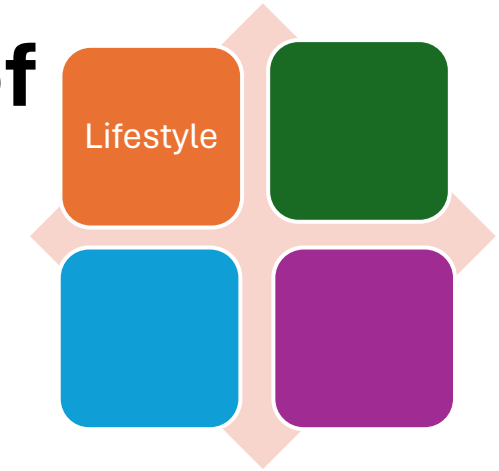
Healthy diet

Physical activity

Stop use of tobacco products

Weight management

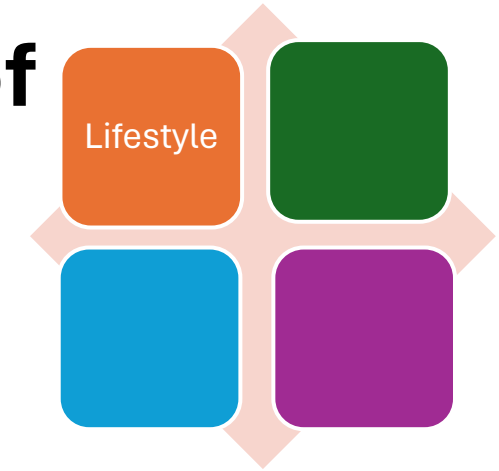
2. Strategies to delay the progression of CKD + reduce CV risk



A. Lifestyle :-

- ✓ Plant – based
- ✓ Un-processed
- ✓ Low salt < 2g/d
- ✓ Protein ~ 0.8g/kg/d (avoid > 1.3g/kg/d), *VLPD (0.3-4g/kg/d + KA supplement up to 0.6g/kg/d)*

2. Strategies to delay the progression of CKD + reduce CV risk



A. Lifestyle :-

- ✓ Plant – based
- ✓ Un-processed
- ✓ Low salt < 2g/d
- ✓ Protein ~ 0.8g/kg/d (avoid > 1.3g/kg/d), *VLPD (0.3-4g/kg/d + KA supplement up to 0.6g/kg/d)*

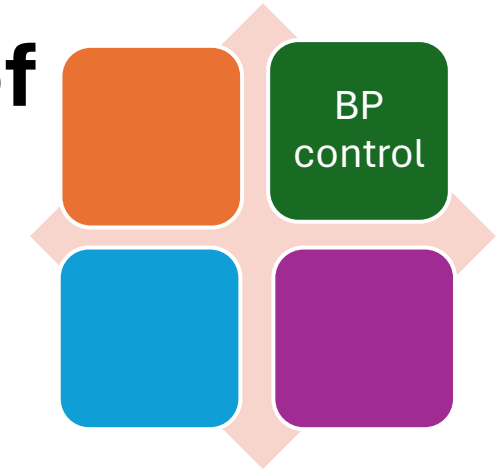
Lowers CKD progression

Geriatric guidelines → 1.0–1.2 g/ kg body weight/d to prevent age-related malnutrition and prevent sarcopenia.

Consider what dominates the clinical picture

- stable or slowly progressing CKD, age and related challenges to nutritional and functional status→ higher protein intake
- CKD with significant progression(metabolically stable) → lower protein diet

2. Strategies to delay the progression of CKD + reduce CV risk



B. BP control :-

Guideline – Aim SBP <120mmHg to reduce CV risk *

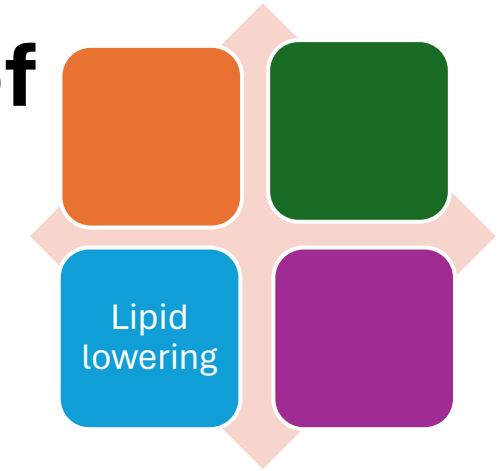
* Standardised office BP – difficult in practice. Repeated home measurements may be a substitute.

Eg 2 morning and evening BP measurements taken during the first week of every month

Preferred agent ACEi/ARB add on other to achieve target

Practice Point 3.4.1: Consider less intensive BP-lowering therapy in people with frailty, high risk of falls and fractures, very limited life expectancy, or symptomatic postural hypotension.

2. Strategies to delay the progression of CKD + reduce CV risk



C. Lipid lowering treatment :-

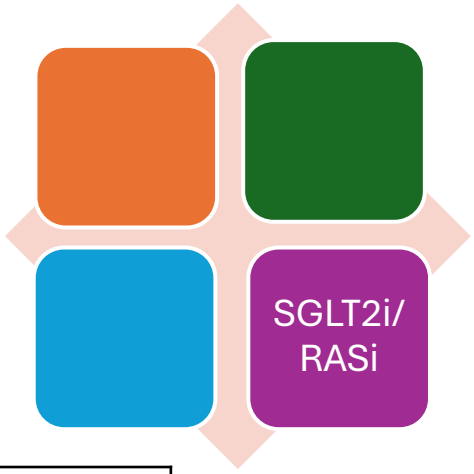
Adults aged > 50 years

eGFR	UACR	
	<30 mg/g	>30 mg/g
>60ml/min		Statin
<60 ml/min (not on HD)	Statin +/ ezetimibe	Statin +/- ezetimibe

Following once-daily **intensive** statin-based regimens are safe in CKD (including people on dialysis):

- atorvastatin 20 mg
- rosuvastatin 10 mg
- simvastatin 20 mg combined with ezetimibe 10 mg

2. Strategies to delay the progression of CKD + reduce CV risk

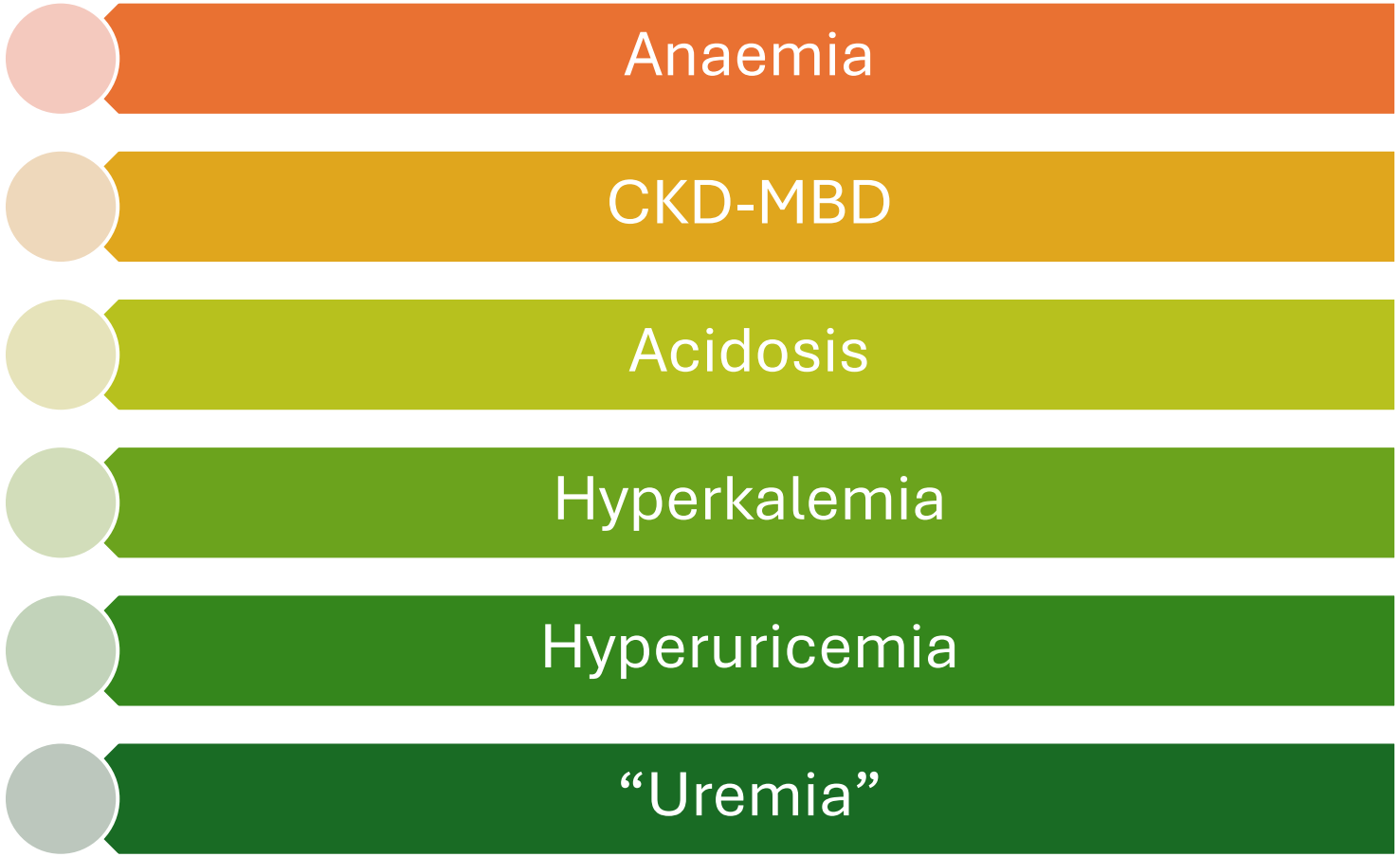


D. SGLTi and RASi:-

eGFR	UACR		
	<30 mg/g	30-200 mg/g	>200 mg/g
45-90 ml/min			SGLT2i
20-45 ml/min	SGLT2i	SGLT2i	SGLT2i
Any eGFR		ACEi/ARB	ACEi/ARB

- Frail and very old patients have generally been excluded from these trials.
- An individualised approach is advisable- what are we trying to achieve?
- The KFRE may be helpful in prognosticating, to avoid what may be unnecessary treatment (low risk for progression within life span)

3. Look for and manage complications

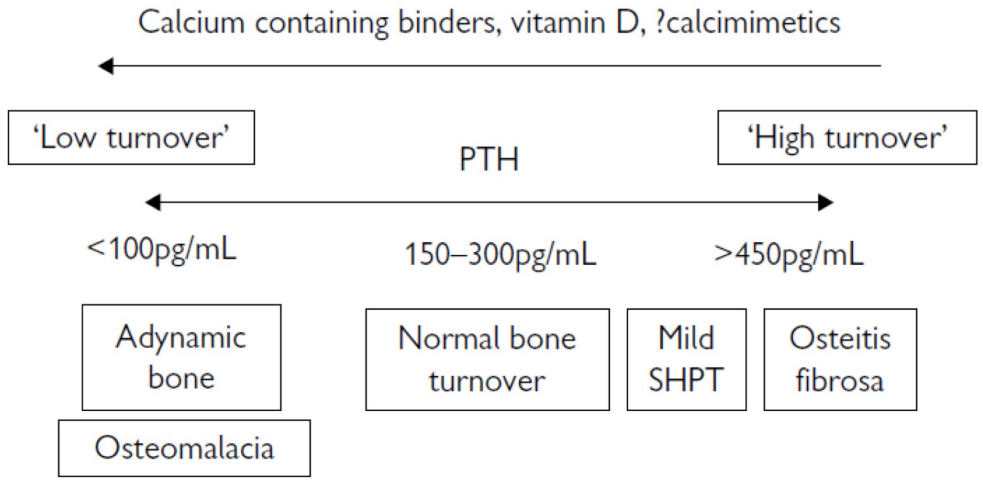


Anaemia

- Hb <12 g/dl women, < 13 g/dl in man,
- All anaemia in a patient with CKD is not due to CKD – severity, trend
- Evaluate – BP, haematinics, other
- Treat according to symptoms and severity (? Threshold)
- Replete iron stores- TSAT >30%, ferritin > 500
  - Oral iron, parenteral in later stages
- ESA- usually not recommended if Hb > 10. Aim Hb < 11.5 g/dl. Caution stroke/ active malignancy
- Blood transfusion

CKD MBD

- Indiscriminate use of Calcium supplements/ P binders and vitamin D analogues may do more harm than good
- Lower P levels *toward* normal if they are persistently rising
  - low P diet (avoid processed food)
  - Phosphate binders (with meals!)
- Avoid hypercalcemia
- Ideally PTH should be used to guide treatment with VDA (“severe and progressive SPHT)



OHNH, 2nd edition

Hyperuricemia

- Not necessary to actively “look for” asymptomatic hyperuricemia
- Uric acid lowering therapy in patients with gout– xanthine oxidase inhibitors are preferred
- Acute gout- avoid NSAIDs, colchicine/ GC

Acidosis

- Sodium bicarbonate if serum bicarbonate <18mmol/l

Hyperkalemia

- Often related to medications which may have valuable benefits (RASi)

1st line: **Address correctable factors**	• Review non-RASi medications (e.g. NSAIDs, trimethoprim) • Assess dietary potassium intake (dietary referral) and consider appropriate moderation of dietary potassium intake
2nd line: **Medications**	Consider: • Appropriate use of diuretics • Optimize serum bicarbonate levels • Licensed potassium exchange agents
3rd line: **Last resort**	• Reduce dose or discontinue RASi/MRA (Discontinuation is associated with increased cardiovascular events. Review and restart RASi or MRA at a later date if patient condition allows.)

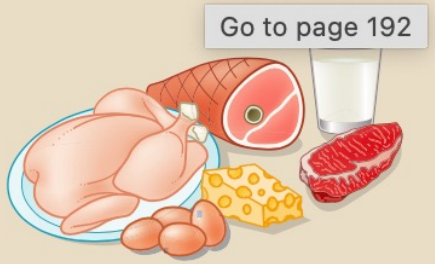
Hyperkalemia diet

Plant-based foods

Absorption rate
50%–60%

Plant-based foods may have low absorption rate, net alkalizing effect, and carbohydrate content encourages K^+ shifts into intracellular space, minimizing impacts on serum K^+

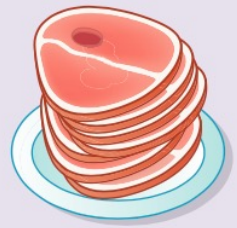
Go to page 192



Animal-based foods

Absorption rate
70%–90%

Animal-based protein has higher absorption and net acid effect results in higher amounts of K^+ remaining in serum



Processed foods

Absorption rate
90%

Potassium salts (often found in processed foods) absorption rate has been reported to be 90%

Figure 33 | Potassium absorption rates of plant-based, animal-based, and processed foods. Data from Picard K, Griffiths M, Mager DR, Richard C. Handouts for low-potassium diets disproportionately restrict fruits and vegetables. *J Ren Nutr*. 2021;31:210–214.[592]

Case 4

- 68 F, type 2 DM, HTN, IHD. Non-smoker
- Feels generally well, has some **fatigue**. Notes mild ankle **swelling** in the evenings.
- BP 160/90mmHg ; BMI 22 kg/m^2
- **CKD eGFR 35 ml/min (was 38ml/min 1 year ago) Stage G3 A3**
- **UACR 1000 mg/g ; UPCR 3.5g/g**
- Hb 9g/dl, MCV 88 fL , **TSAT 18%, S ferritin 150**
- S Ca, Phosphate – WNL, **PTH – 1.5x ULN**
- Serum albumin 3.2 g/dl
- **Serum bicarbonate-** 21mmol/l
- Serum potassium 5.1 mmol/l
- Serum uric acid level- not necessary

✓ **HbA1C – aim <7% with appropriate medications**

General

✓ **Lifestyle advice- diet (low salt low phos./plant based), activity**
✓ **BP control- ACEi/ ARB, Aim SBP ~120 , furosemide, other (monitor K)**
✓ **Lipid lowering- atorvastatin 20mg nocte**
✓ **SGLT2i eg empagliflozin 10mg/d**

Complications-

✓ **Anaemia- Fe supplements (may need Epo if fatigue does not improve)**
✓ **CKD MBD- diet, monitor bone profile**
✓ **Acidosis- monitor, consider correcting to avoid hyperkalemia on RASi**

5 years later

- 73 years
- eGFR 10 ml/min
- Is approaching ESKD – options MCM vs KRT

What about KRT?

- Initiating dialysis will allow patients to live longer vs MCM
- But may not be the case in highly comorbid

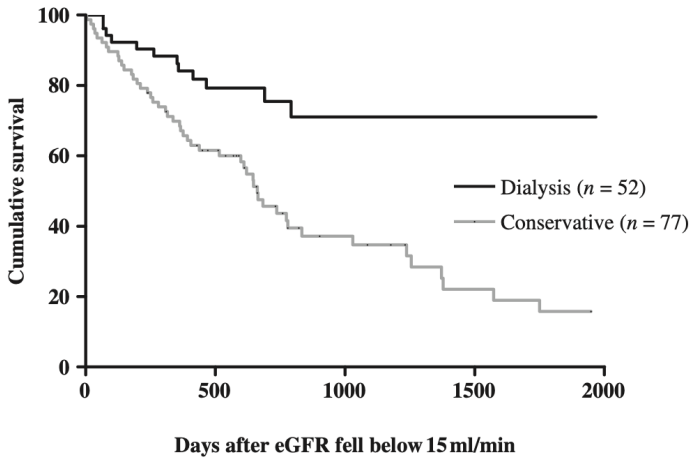


Fig. 2. Kaplan–Meier survival curves comparing the dialysis and conservative groups (log rank statistic = 13.63, $P < 0.001$).

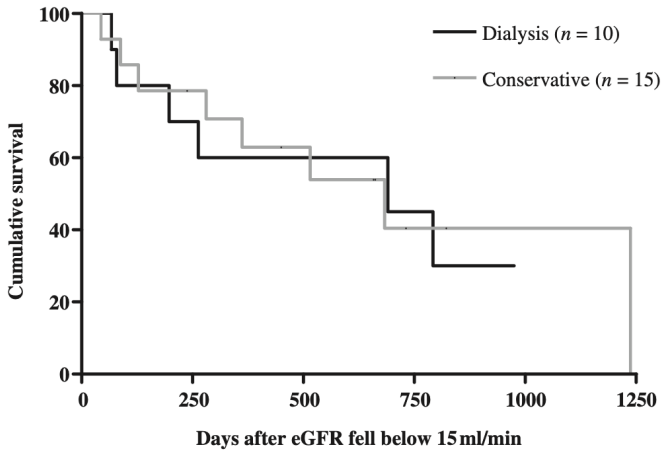


Fig. 3. Kaplan–Meier survival curves for those with high comorbidity (score = 2), comparing dialysis and conservative groups (log rank statistic <0.001, df 1, $P = 0.98$).

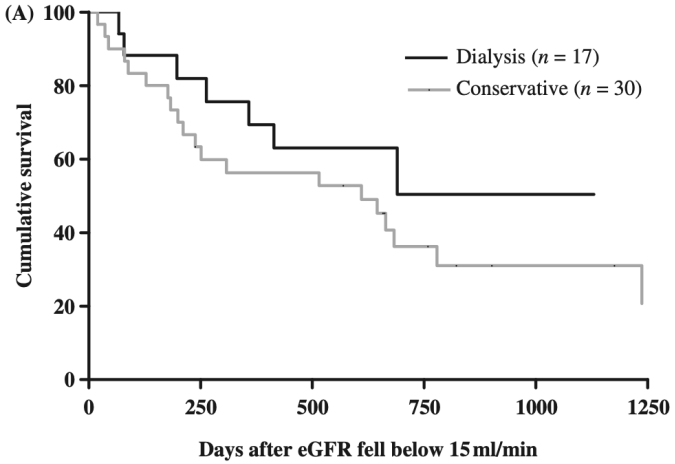


Fig. 4. (A) Kaplan–Meier survival curves for those with ischaemic heart disease, comparing the dialysis and conservative groups (log rank statistic 1.46, df 1, $P = 0.27$). **(B)** Kaplan–Meier survival

Murthagh, NDT , 2007

Living to dialyse or dialysing to live?

- Observational study
- Patients >70 years
- Counselled for MCM or RRT
- Those who chose MCM were older
- CCI similar
- Survival time for MCM from putative dialysis date

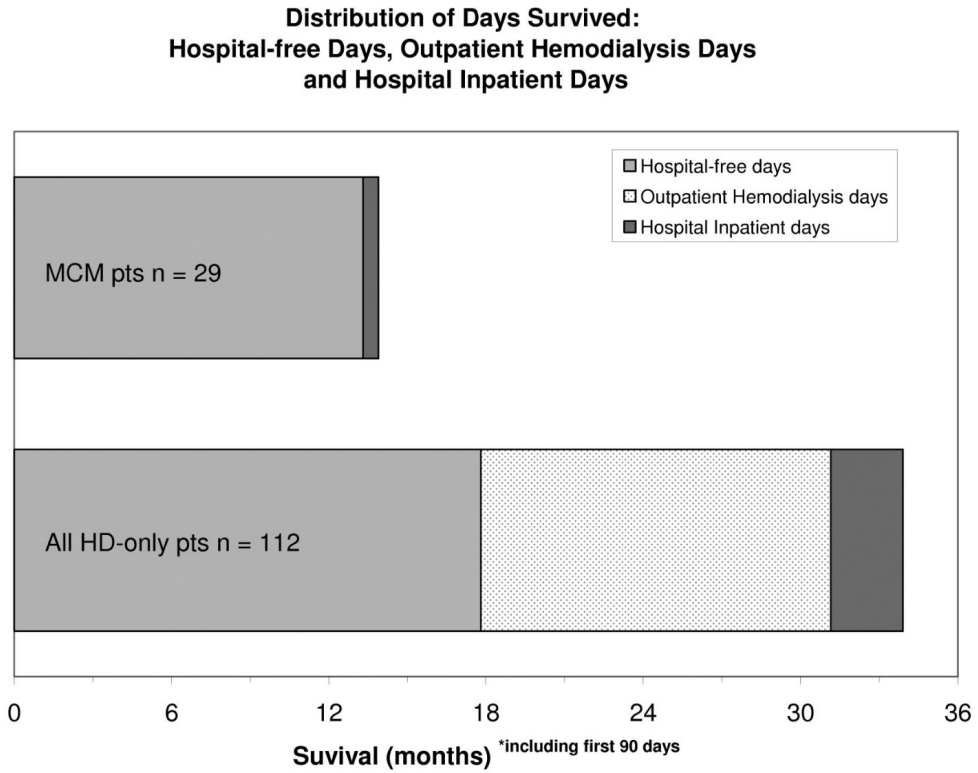


Figure 3. Median survival for MCM cohort and the hemodialysis-only subgroup in the RRT cohort. Data shown are how many days were spent hospital-free, compared with in-patient stays in hospital and outpatient hospital attendances for dialysis.

Carson R, 2009, CJASN

MCM – advanced CKD

- Offered ongoing specialist follow-up in the clinic and hospitalization if necessary.
- HB optimized using erythropoietin and intravenous iron, maintaining a target 110 g/L.
- BP and cholesterol management was similar for both MCM and RRT patients.
- For MCM patients only
  - calcium and phosphate balance was focused on symptomatic treatment to control pruritus, rather than targets
  - Fluid overload was treated with loop diuretics
  - Dietary input was limited to potassium restriction.
  - **End-of-life care, including access to hospice and home palliative care, was discussed with all patients who chose not to undergo dialysis, and arrangements were made in accordance with individual wishes.**

Carson R, 2009, CJASN

Advanced CKD in elderly : In our setting

- Limited access to dialysis at present – how do we practise just medicine in this context of limited resources?
  - Frailty/ co-morbidity vs biological age
  - Surprise test
- Many emotional and contextual factors affect the patient experience and decision: Cost, guilt, burden, self- worth
- Communication- understanding about ideals of death
- Formal training
- Strengthen & develop the connections with geriatrics and palliative care services
- Local research to better understand the needs of our population

Thank you


© Randy Glasbergen
glasbergen.com
GLASBERGEN
"Your doctor can only do so much.
The rest is up to you. Stop getting older."