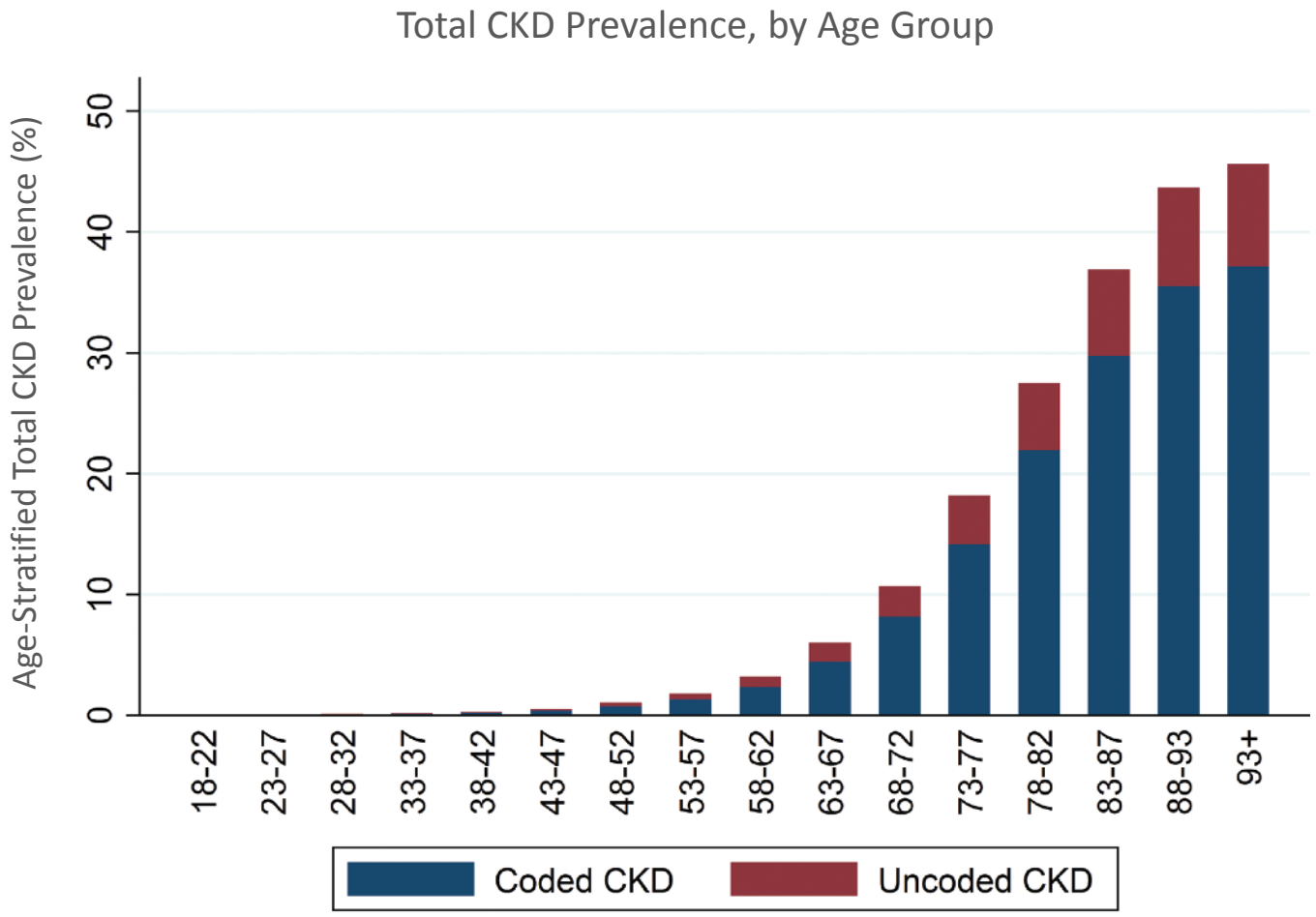
NHS England

Chronic Kidney Disease

Paul Cockwell

Queen Elizabeth Hospital Birmingham

Findings


Total CKD Prevalence, by Age Group
Age-Stratified Total CKD Prevalence (%)
0
10
20
30
40
50
18-22
23-27
28-32
33-37
38-42
43-47
48-52
53-57
58-62
63-67
68-72
73-77
78-82
83-87
88-93
93+
Coded CKD
Uncoded CKD

1. Chronic kidney disease (G3b, A3).
2. Probable hypertensive/ischaemic nephropathy.
3. Congestive cardiac failure.
4. Previous atrial fibrillation.
5. Myocardial infarction, 20 years ago.
6. Type 2 diabetes for more than 10 years without retinopathy.
7. Hypertension.
8. Permanent pacemaker plus implantable defibrillator in situ.
9. Sleep apnoea with nocturnal CPAP.
10. Obesity.
11. Gout.

Methods

Prognosis of CKD by eGFR and proteinuria categories

Kidney function stage eGFR (ml/min/1.73m) Description and range			Kidney damage stage albumin/creatinine ratio Description and range		
			A1	A2	A3
			Normal to mild increase <30mg/g	Moderate increase 30-300mg/g	Severe increase >300mg/g
G1	Normal or high	≥90			
G2	Mild decrease	60-89			
G3a	Mild to moderate decrease	45-59			
G3b	Moderate to severe decrease	30-44			
G4	Severe decrease	15-29			
G5	Kidney failure	<15			

Kidney Disease: Improving Global Outcomes (KDIGO) CKD Work Group. KDIGO 2012 Clinical Practice Guideline for the Evaluation and Management of Chronic Kidney Disease. Kidney Int Suppl. 2013;3(1):1–150

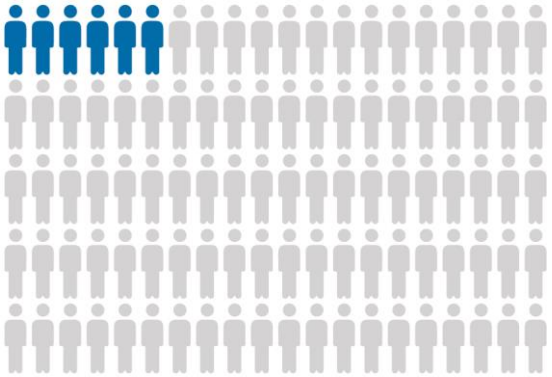
Findings

Findings for every
100 Patients

With CKD **Stage 3:**

6 patients

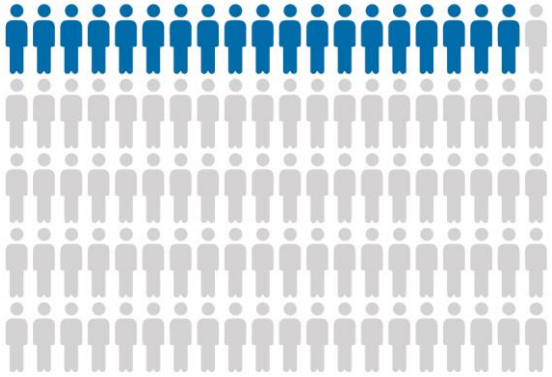
die annually



With CKD **Stage 4:**

19 patients

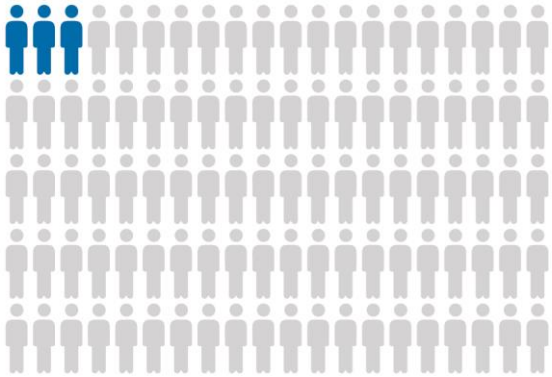
die annually



With **other renal codes:**

3 patients

die annually



Findings

Findings for every
100 Patients

With CKD **Stage 3:**

36 unplanned admissions annually

Findings

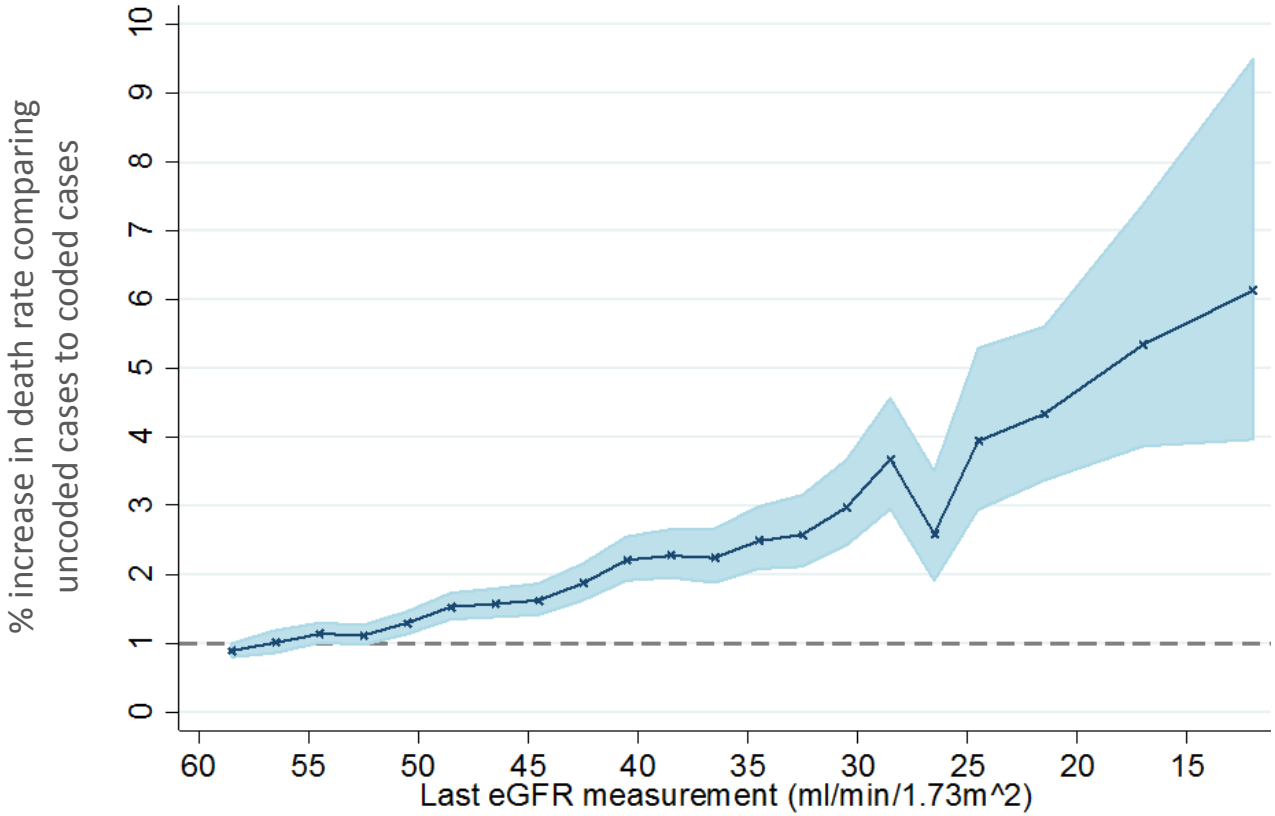
Findings for every
100 Patients

With CKD **Stage 4:**

75 unplanned admissions annually

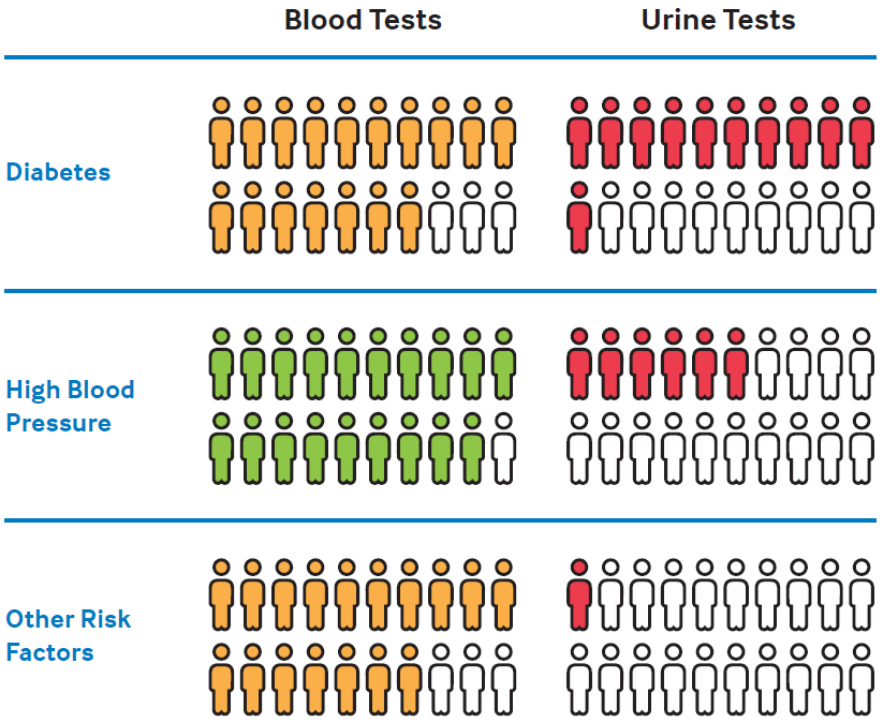
Findings

Comparison of death rates between uncoded and coded patients with biochemical CKD stages 3-5



Findings

Proportion of patients with different risk factors for CKD who **have had blood and urine tests**



Key: *There are no formal targets in the guidance, but the audit selected 70% and 90% as quality markers.*
Red < 70% **Amber 71-90%** **Green > 90%**

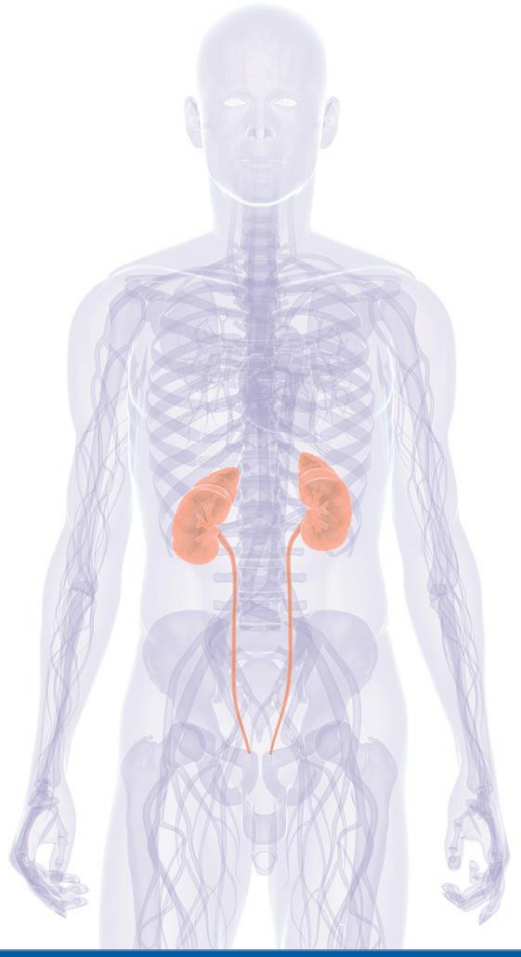
Nitsch D, Caplin B, Hull S, Wheeler D. National Chronic Kidney Disease Audit - National Report (Part 1). 2017

Recommendation of the national CKD audit

1. quality improvement tools and incentives, for identification and review

2. Improve coding of CKD

3. Test eGFR and ACR for people at high risk of CKD



1. Chronic kidney disease (G3b, A3).
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3. Congestive cardiac failure.
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7. Hypertension.
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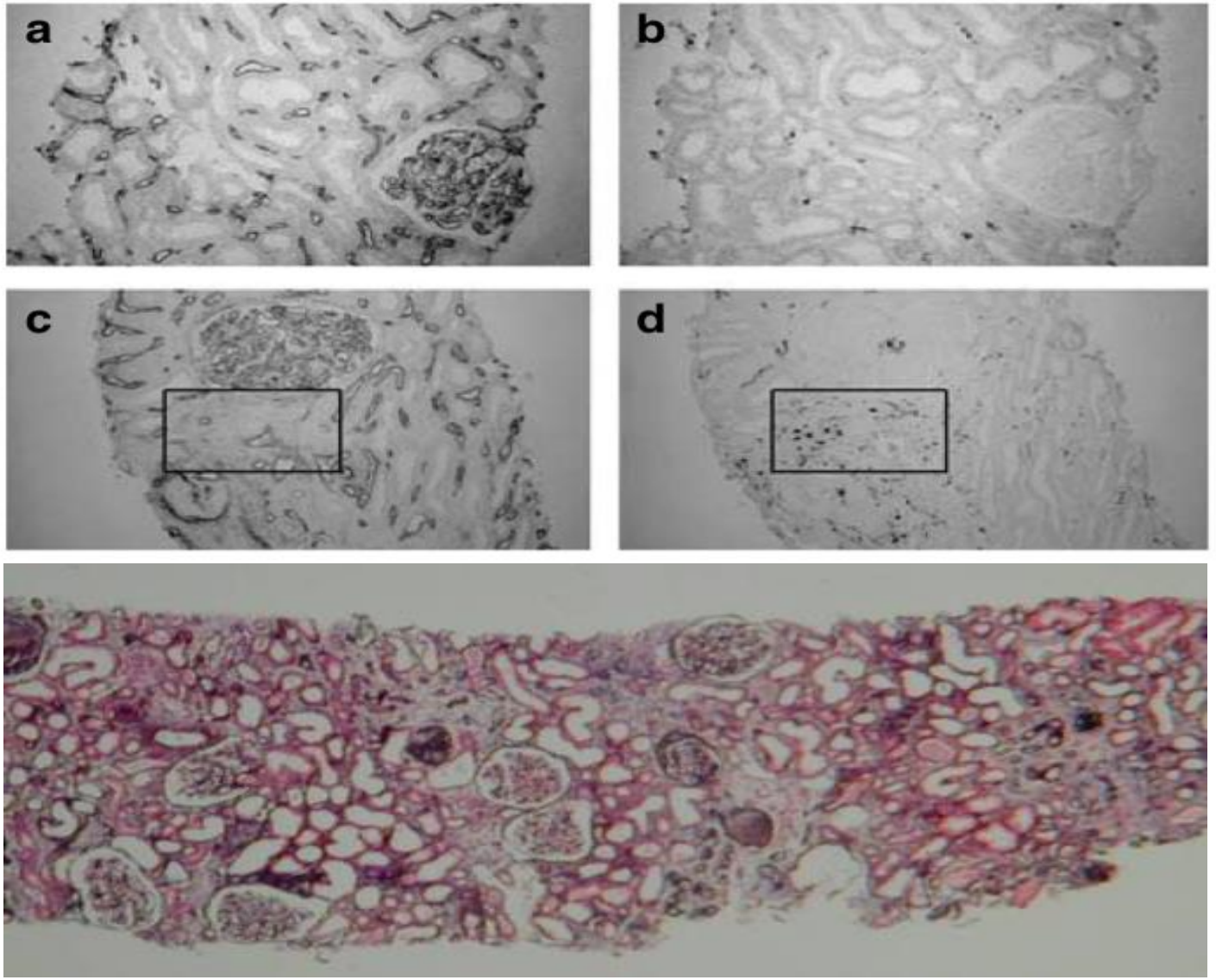
10. Obesity.
11. Gout.

vascular bed inflammation

normal

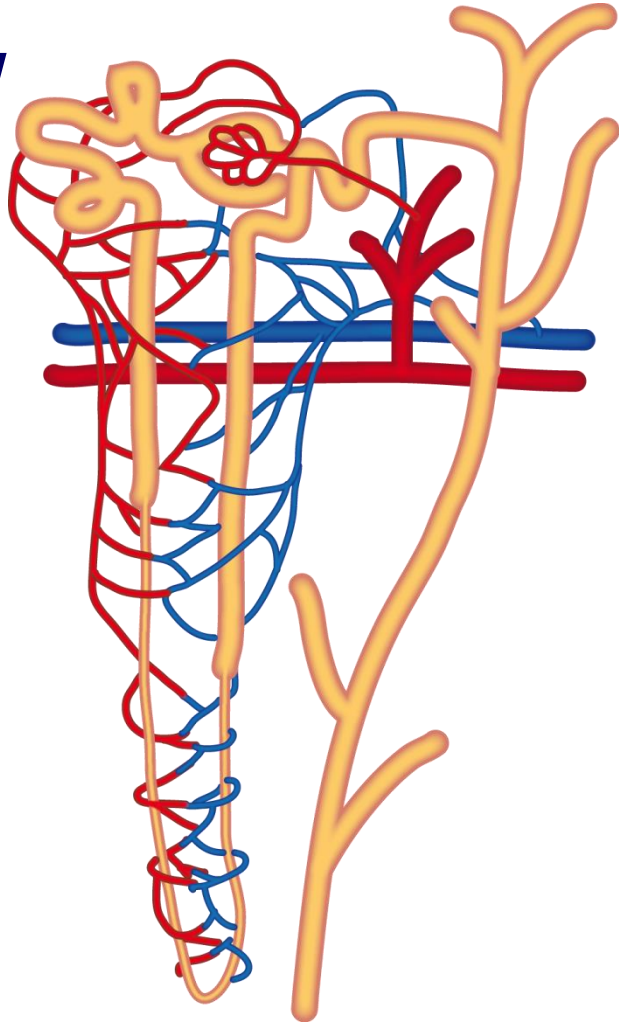
early disease

established disease



1 million nephrons/kidney – unique vasculature

Renal blood flow
(20% CO)



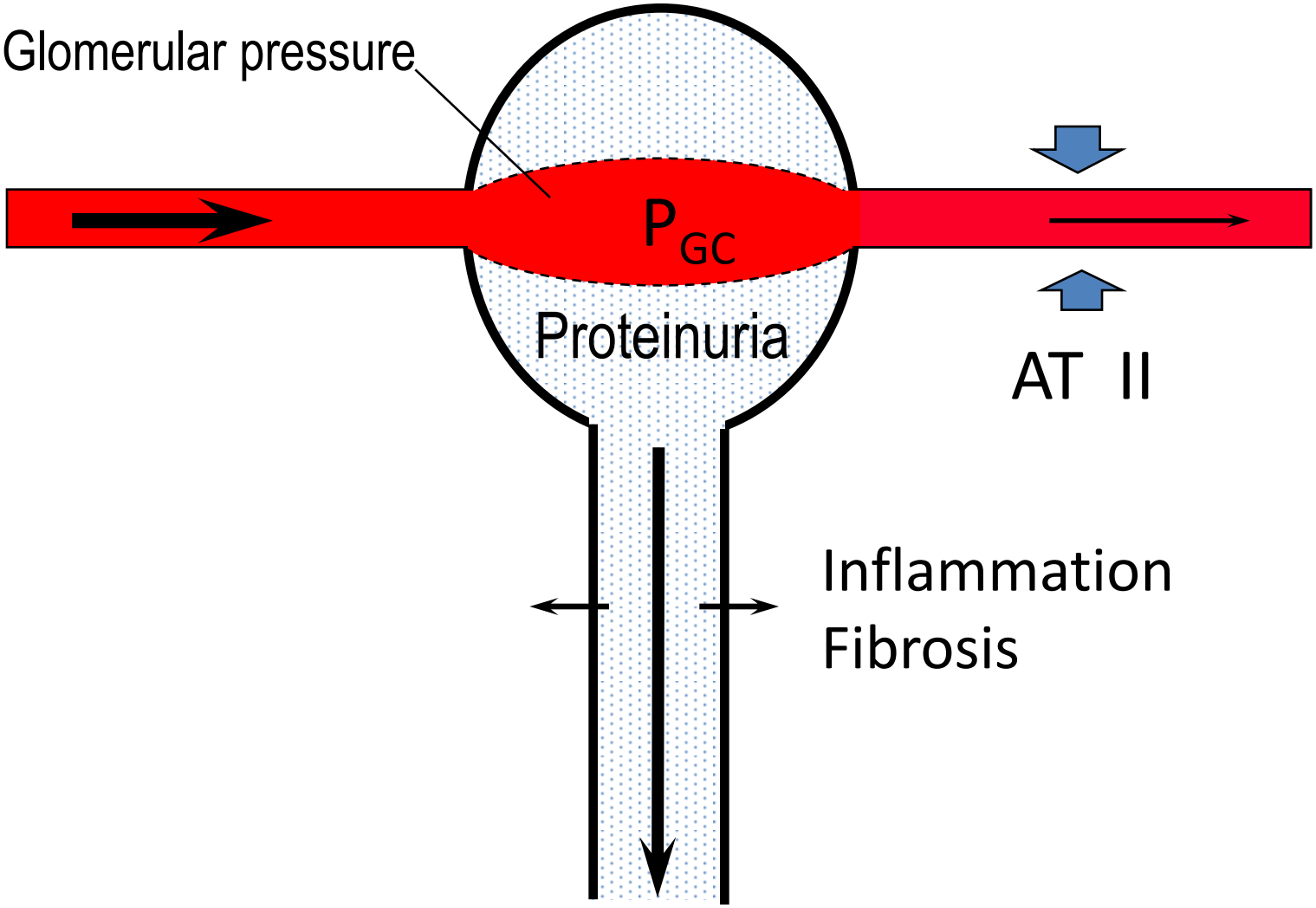
Oxygenation

— pO_2 6.5–13.5

— pO_2 3–6

— pO_2 1.3–2.6

High intraglomerular pressure promotes proteinuria



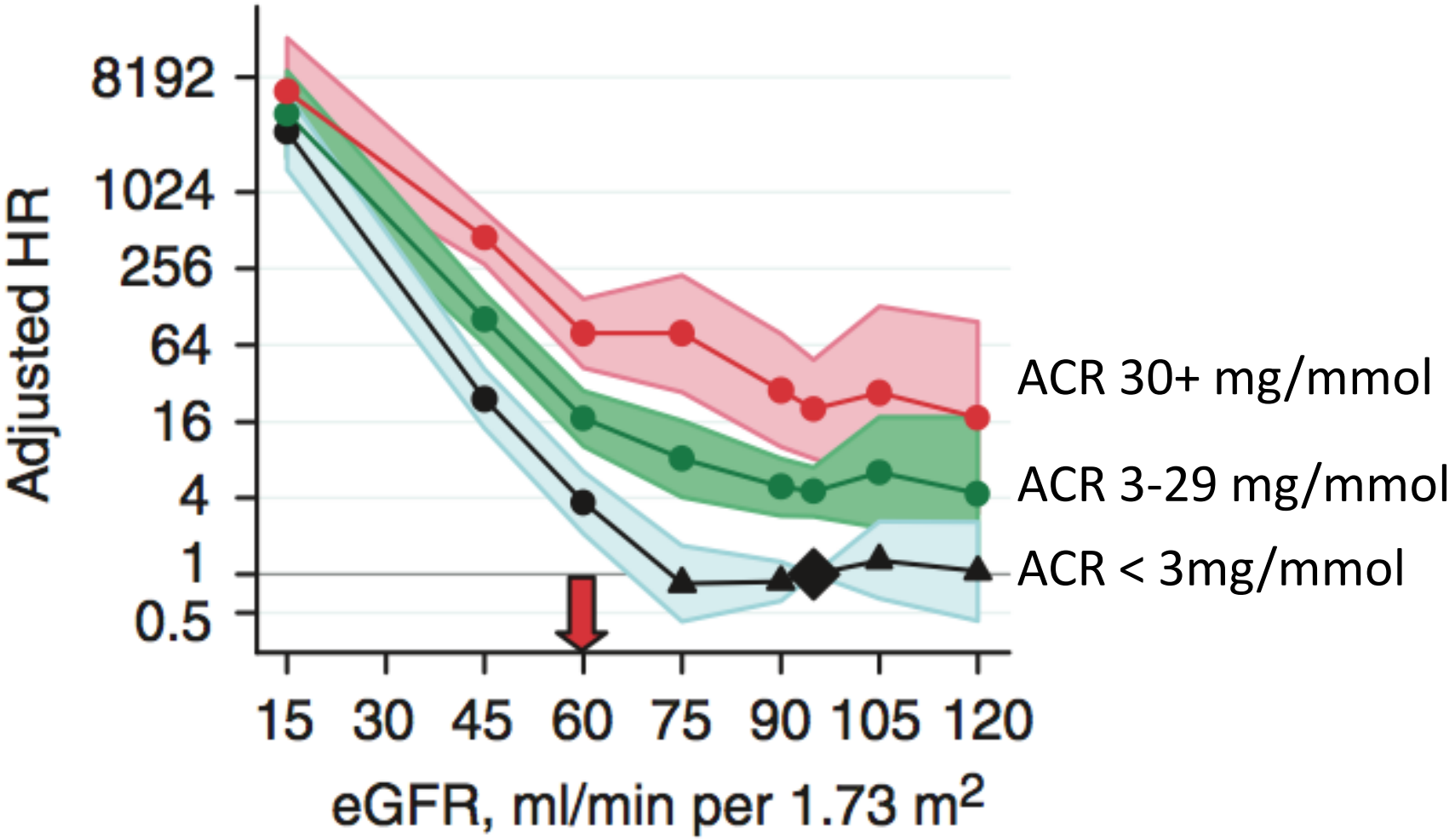
Chronic kidney Disease (CKD) staging

GFR stage	ml/min	GFR term
G1	≥90	normal or high
G2	60–89	normal or mild
G3a	45–59	mild to moderate
G3b	30–44	moderate to severe
G4	15–29	severe
G5	<15	kidney failure
Albuminuria	**UACR mg/mmol**	**Albuminuria**
A1	<3	normal
A2	3–30	high (micro)
A3	>30	very high (macro)

An ACR of 100 mg/mmol = AER of 1g/d

	Normal	High (micro)	Very High (macro)
ACR (mg/mmol)	<3	3-30	>30
PCR (mg/mmol)	<15	15-50	>50
AER (mg/day)	<10	10-300	>300
PER (mg/day	<50	50-500	>500
Urine diptest	-ve to trace	Trace to 1+	>1+

Risk of ESKD in respect of eGFR and proteinuria

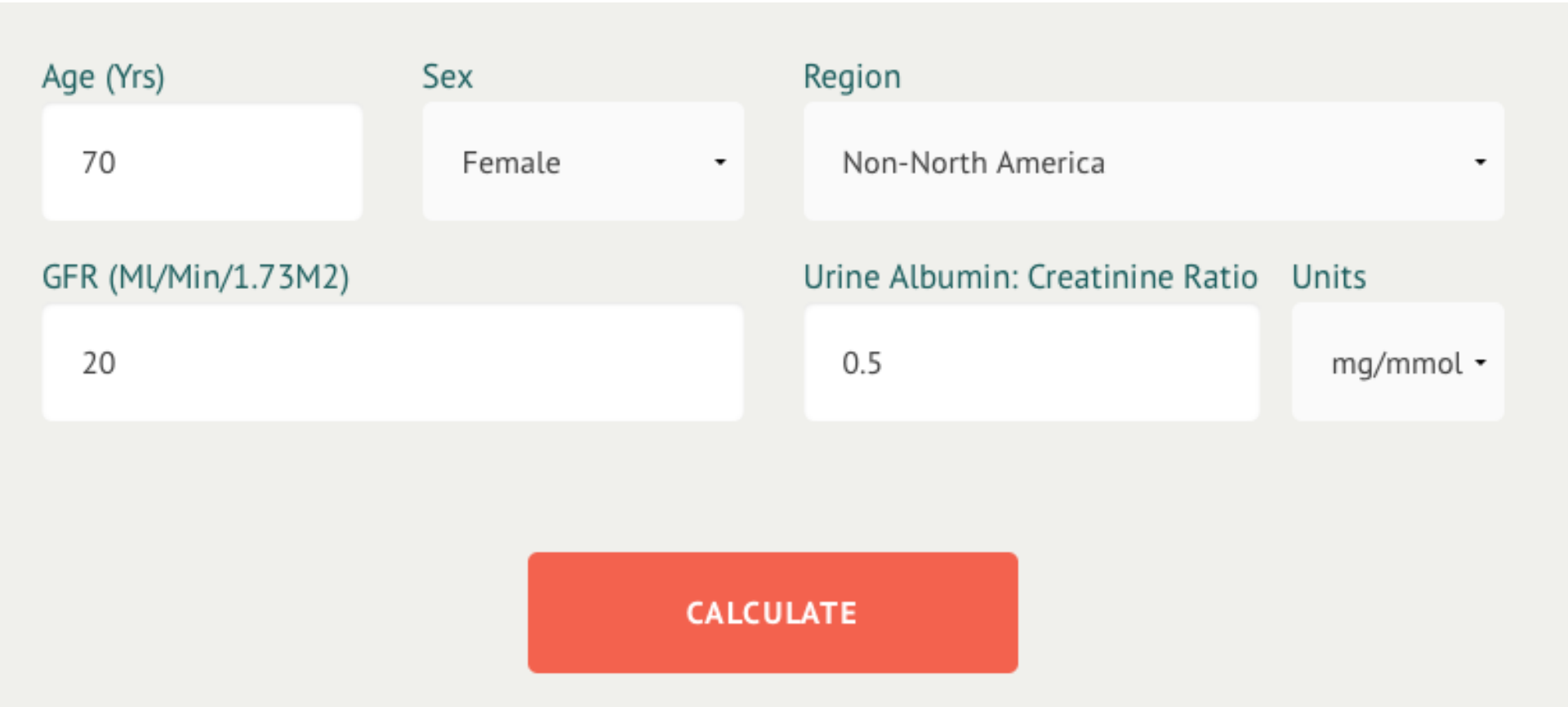


Adapted from Levey et al KI 2011

70 year female; eGFR 20, ACR 0.5 mg/mmol
Risk of end-stage renal failure at 2-years?

1. 1.7%
2. 7%
3. 17%
4. 37%

http://kidneyfailurerisk.com

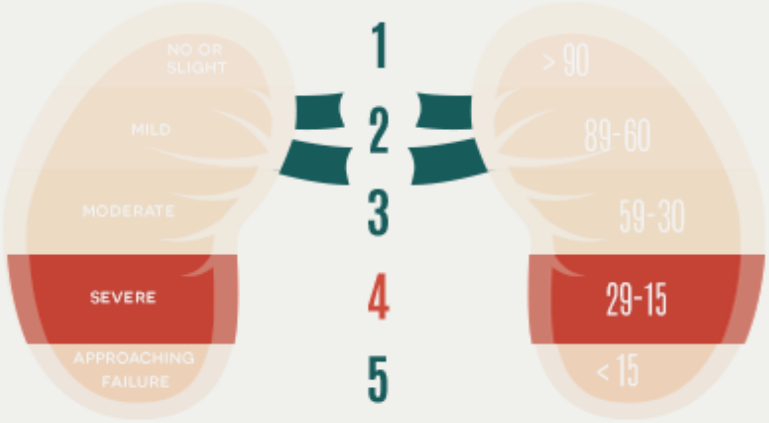


0.5	F	70	20
URINE ALBUMIN-CREATININE RATIO	SEX	AGE	GFR

ASSESSMENT

STAGE 4

SEVERE DECREASE IN FUNCTION



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

AT 2 YEARS	AT 5 YEARS
1.7 %	6.44 %

0–5 % IS LOW RISK 5–15 % IS INTERMEDIATE RISK 15 % IS HIGH RISK

PRINT YOUR RESULTS

DOWNLOAD YOUR RESULTS

40 year male; eGFR 20, ACR 100 mg/mmol
Risk of end-stage renal failure at 2-years?

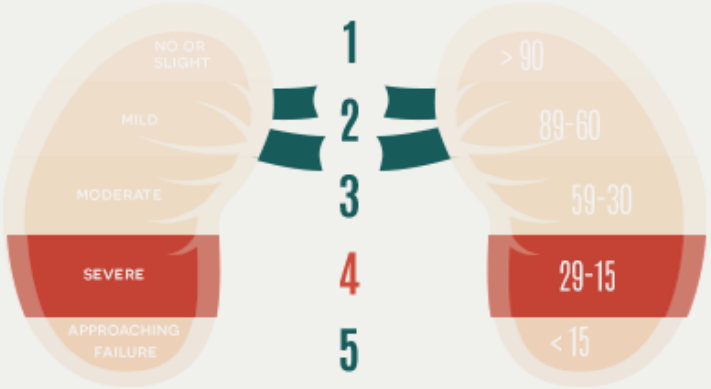
1. 1.7%
2. 7%
3. 17%
4. 37%

100	M	40	20
URINE ALBUMIN-CREATININE RATIO	SEX	AGE	GFR

ASSESSMENT

STAGE 4

SEVERE DECREASE IN FUNCTION



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

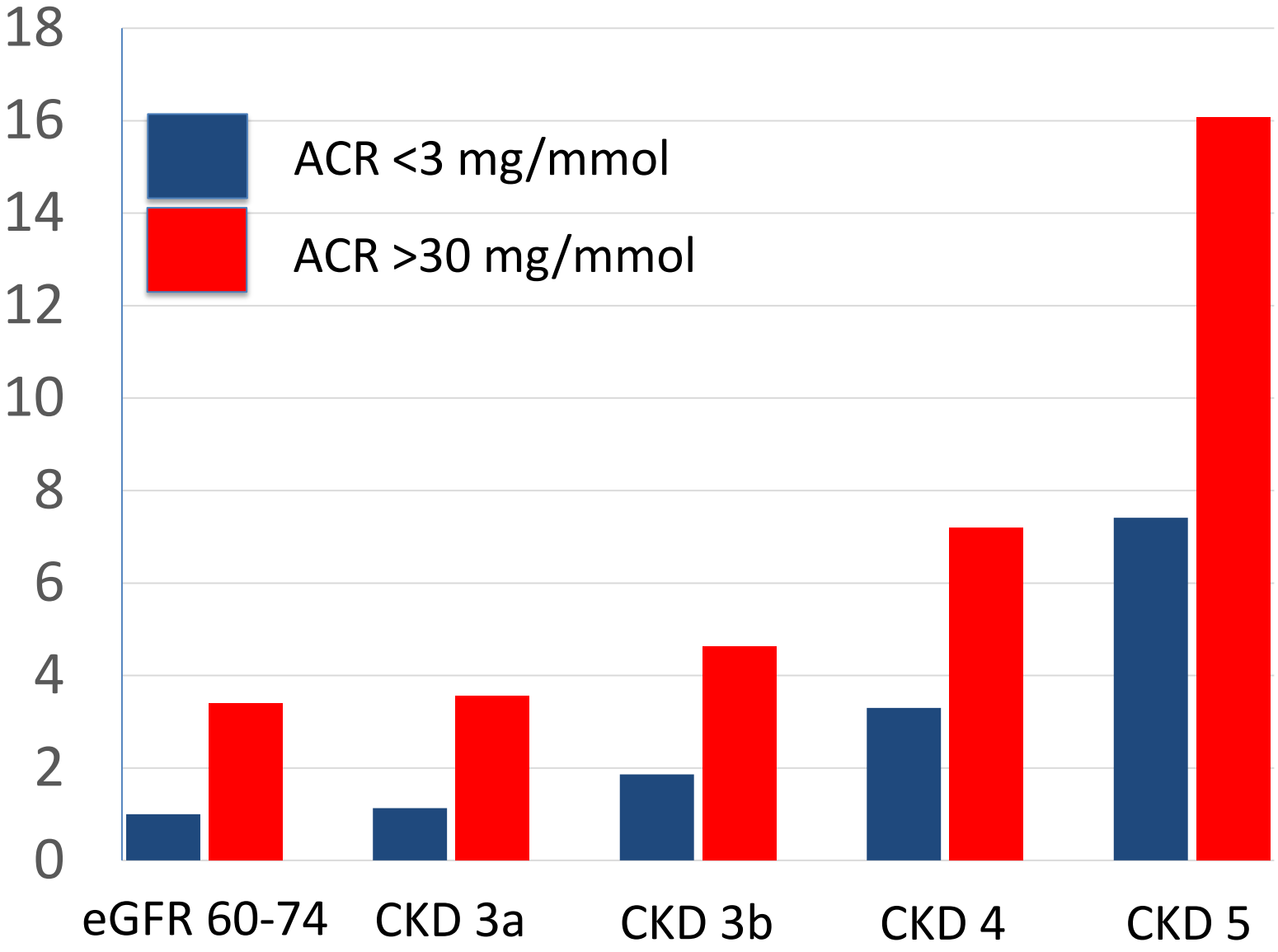
AT 2 YEARS	AT 5 YEARS
37.19 %	83.48 %

0–5 % IS LOW RISK 5–15 % IS INTERMEDIATE RISK 15 % IS HIGH RISK

PRINT YOUR RESULTS

DOWNLOAD YOUR RESULTS

Relative risk of death by stage of CKD (female)



based on Nitsch BMJ 346 (2013): doi:10.1136/bmj.f324.

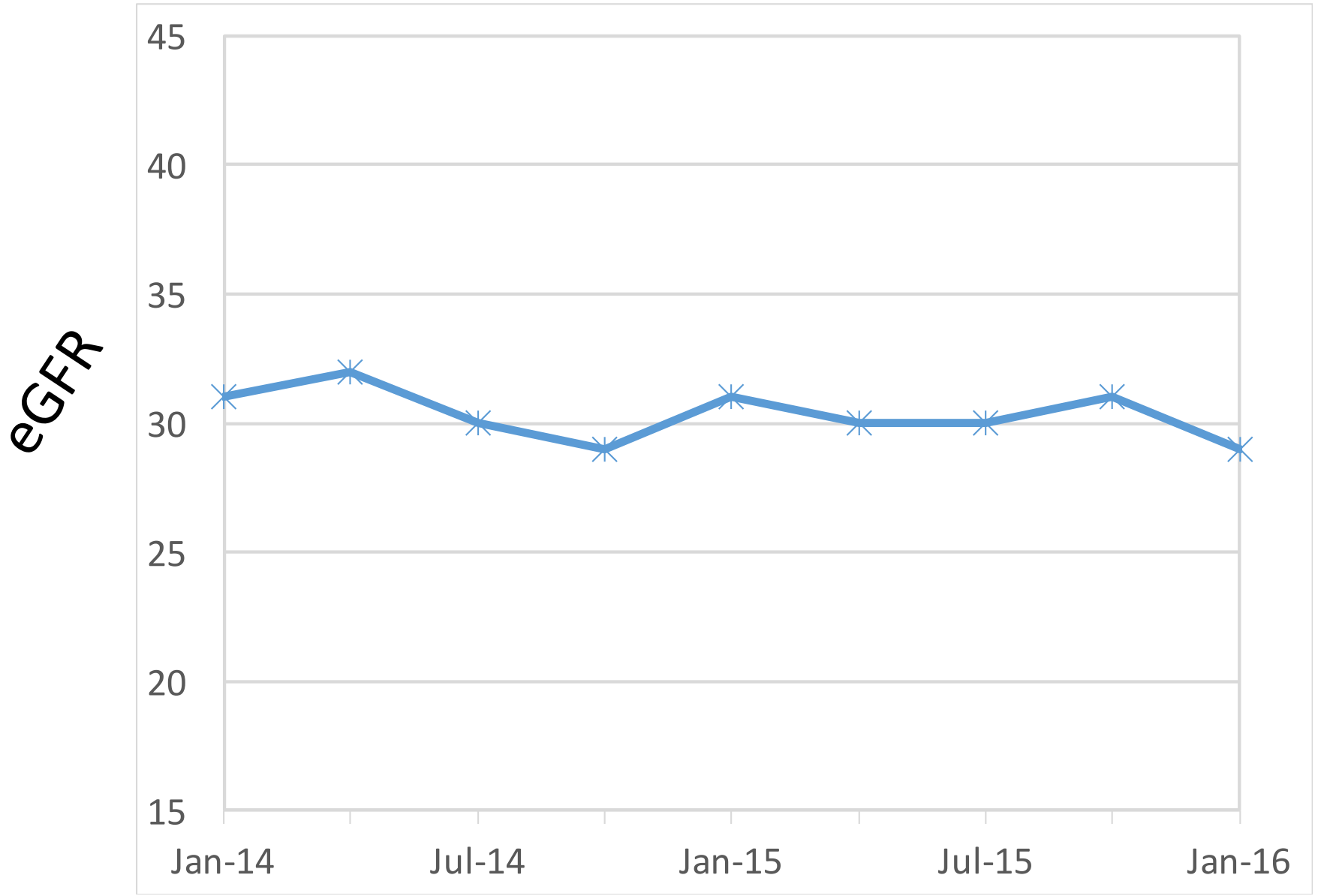
Evidence base for CKD

Therapy	Patient group	Comment
ACEi/ARB	Diabetes & ACR>3	Include normotensive
ACEi/ARB	ACR >30 (no diabetes)	Target BP <130/80
Antihypertensive conventional	CKD ACR<30	Target BP <140/90
Statin (for CVD primary prevention)	CKD 3-5	Not dialysis

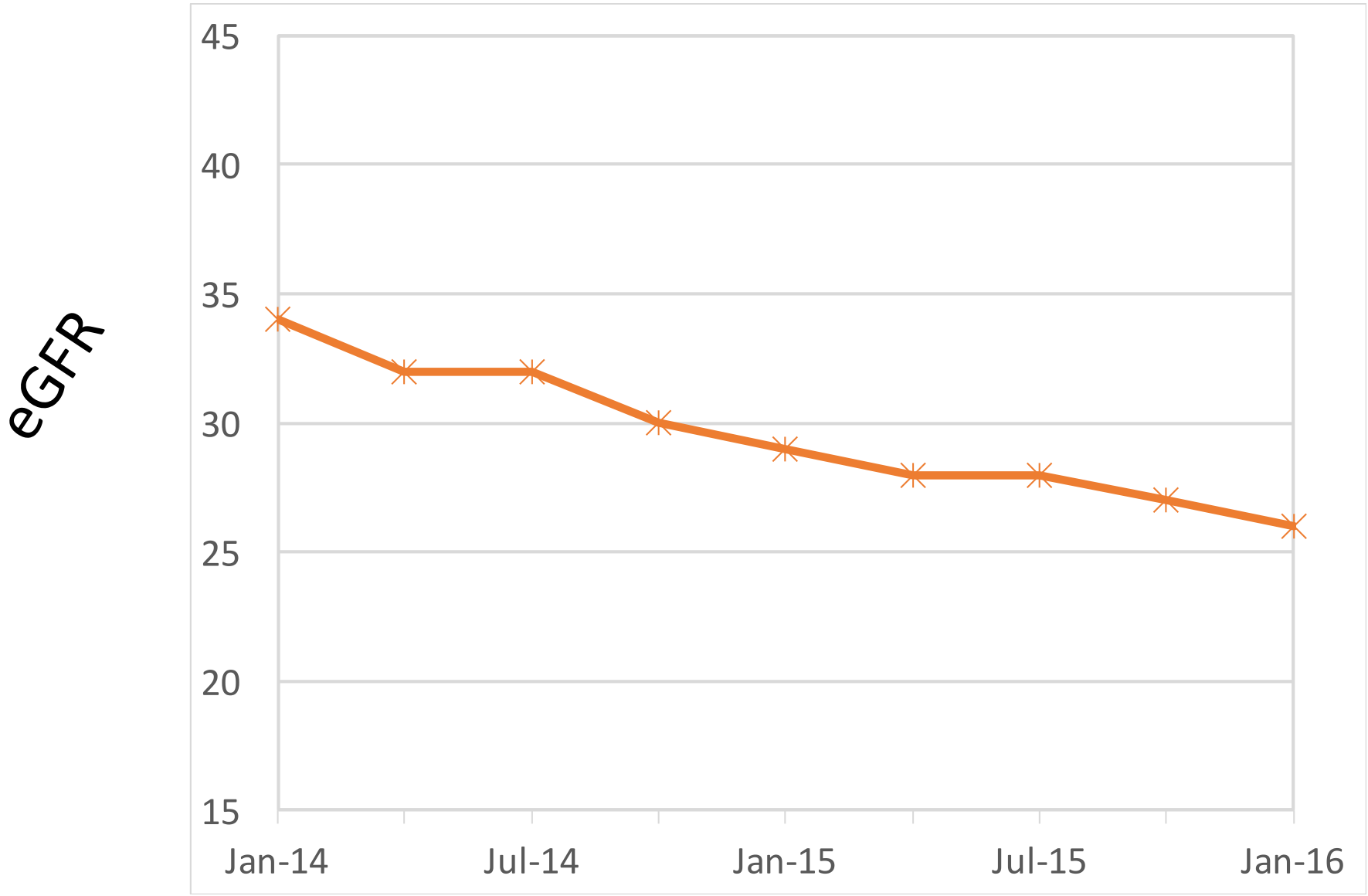
Recent phase 3 studies in CKD

	Target	Comment
Combined RAAS blockade NCT00549757	RAAS	Study terminated
Bardoxolone NCT01351675	Fibrosis	Study terminated
Immunosuppression (IgA nephropathy) NCT00554502	Inflammation	-ve and possible harm
Anaemia NCT00093015	Cardiovascular disease	Increased risk of stroke with target Hb >120 g/l

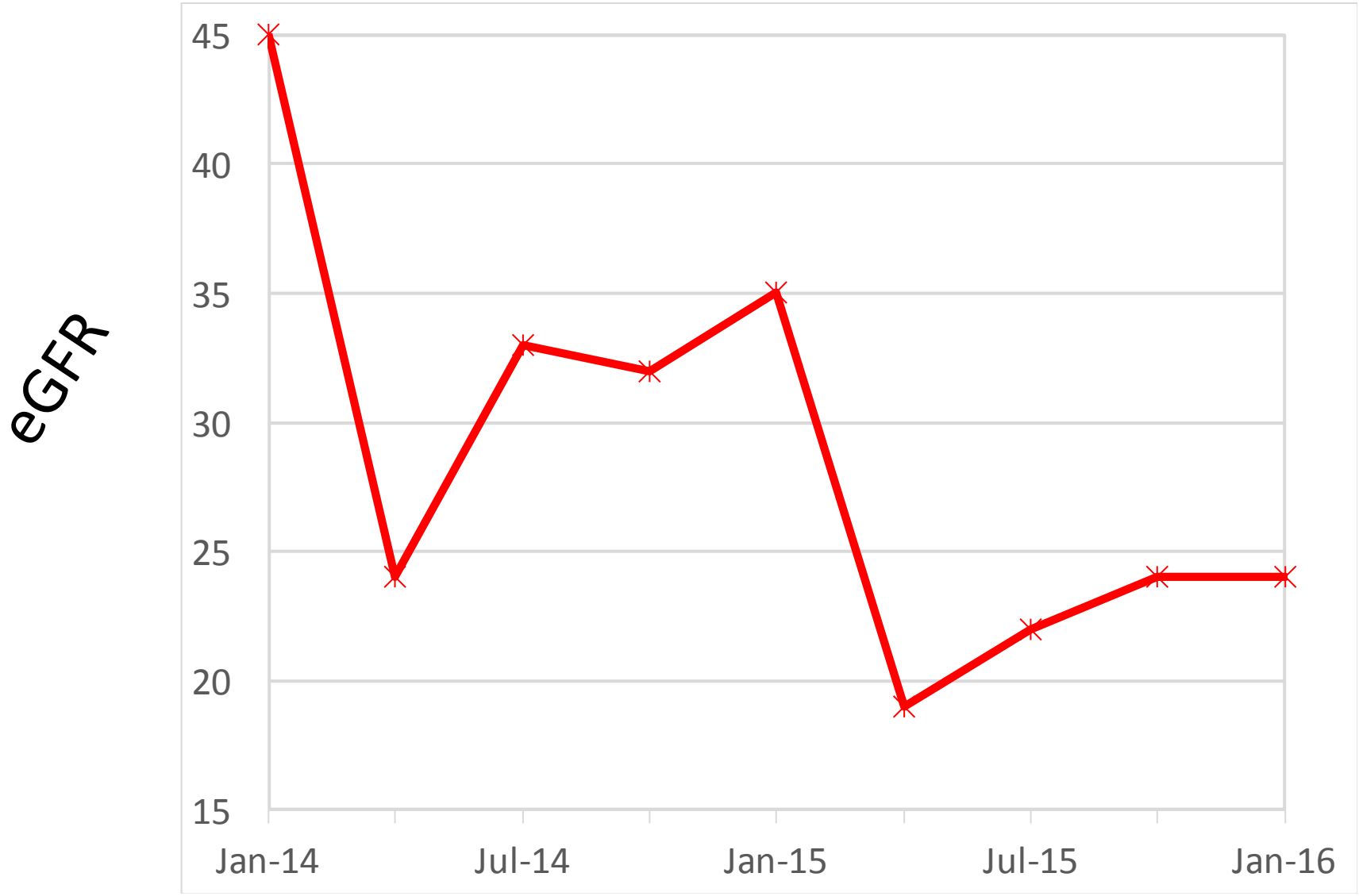
CKD - Slow Progressor



Proteinuric CKD (fast progressor)



Acute Kidney Injury on CKD



Indication for referral to a nephrologist

- CKD 4/5 (with or without diabetes)
- ACR >70mg/mmol or PCR >100mg/mmol (unless known to be due to diabetes and already on appropriate treatment)
- Proteinuria and haematuria in the absence of infection
- An accelerated decline in eGFR (>10ml.min/1.73m2 within 5 years)
- Poorly controlled hypertension despite the use of 4 agents at therapeutic doses
- Patients with or suspected of having rare or genetic causes of CKD
- Patients with renal outflow obstruction should be referred to a Urologist, unless they are at risk of progressing to ESKD

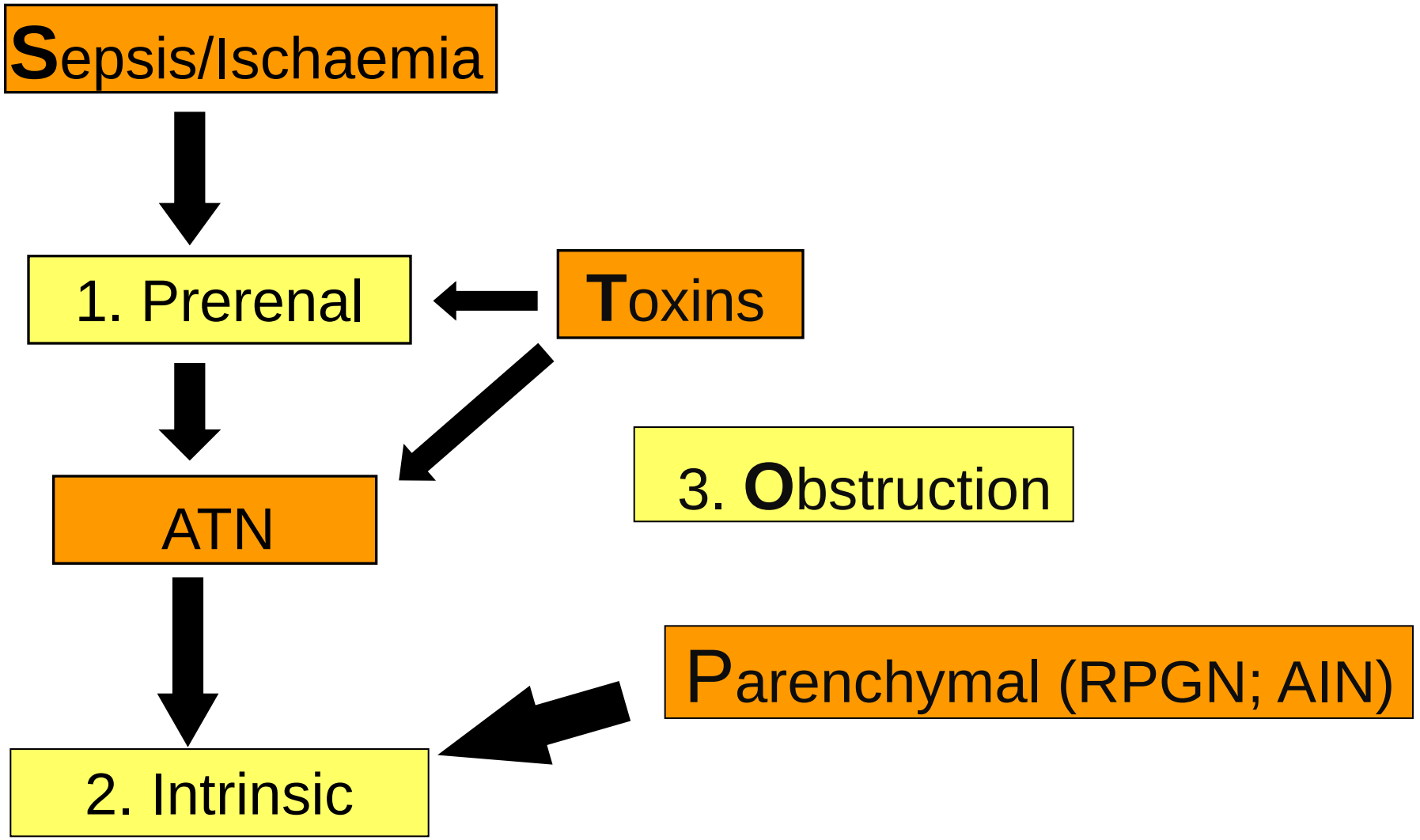
Acute Kidney Injury (AKI) Staging

Stage	Creatinine from baseline	Urine output
1	≥26.4 µmol/L or ≥1.5–2x	<0.5 mL/kg/h for ≥6h
2	≥2–2.9 times	<0.5 mL/kg/h for ≥12h
3	≥3 times **or** ≥352 µmol/L **or** on dialysis	<0.3 mL/kg/h for ≥24h **or** anuria for ≥12h

Only one criterion is required

Kidney International 2012;Vol 2: 1–141.

AKI (STOP) – the major risk factor is CKD

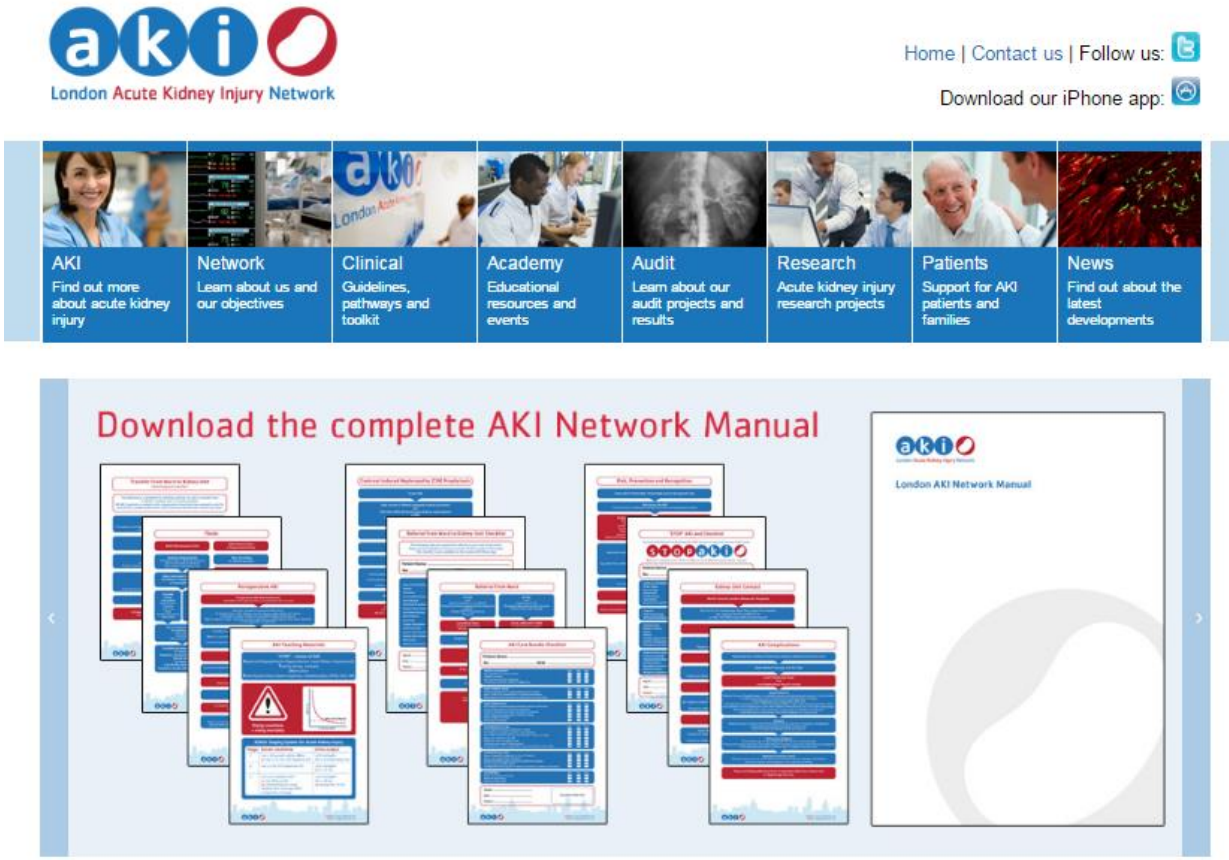


Acute kidney injury: prevention, detection and management

Clinical guideline

Published: 28 August 2013

nice.org.uk/guidance/cg169



1. an eGFR <60 ml/min/1.73m^2

- A new patient registers with your practice. He is a 52 year old Afro-Caribbean man

- As part of routine health screening, he is found to be hypertensive; his eGFR is checked and is reported as 58 ml/min/1.73 m^2

- His urine diptest is negative for blood and protein, and a urinary albumin creatinine ratio is <3 mg/mmol

Does he have CKD and what should you do next?

2. proteinuria with diabetes

- A 64 year old man with type 2 diabetes mellitus diagnosed six years ago has a urinary ACR of 12 mg/mmol reported as part of his annual diabetes check up.

- His eGFR is 51 ml/min/1.73 m^2 and is declining at around 2 ml/min/1.73 m^2/yr.

How should you proceed?

3. Proteinuria without diabetes

- A 17 year old man attends your surgery with a fever and sore throat
- As part of your clinical assessment you perform a urine diptest, which shows +++ protein but no leucocytes or nitrites
- His eGFR is normal

How should you proceed?

4. haematuria in a patient aged ≥60 years

- A 61 year old woman with hypertension, ischaemic heart disease, and a 40 pack year history of smoking attends your surgery.

- She has an eGFR reported as 45 ml/min/1.73m^2.

- A urine diptest reveals blood ++

How should you proceed

Urological investigations reveal no urinary tract abnormality.

Her most recent eGFR result is 43 ml/min/1.73m^2.

Should she be referred to a nephrologist?

5. Haematuria in a young patient

- A 24 year old woman presents with a several month history of arthralgia and mouth ulcers.

- You perform a urine diptest which reveals blood ++ and protein ++

How should you proceed?

6. Hypertension and CKD

- A 62 year old woman has a new diagnosis of type 2 diabetes.
- She is found to be hypertensive with a BP of 158/95. She has an ACR of 32 mg/mmol.
- She is commenced on ramipril at 2.5 mg. Her baseline eGFR is 55 ml/min/1.73m^2
- You check her kidney function one week later
- Her eGFR is now 46 ml/min/1.73m^2

How should you proceed?

7. Renal ultrasound scan

- A 70 year old South Asian woman has an eGFR of 45 ml/min/1.73m^2, which is stable.
- She complains of non-specific abdominal pain and intermittent loin tenderness.
- You decide to get an ultrasound of her abdomen, which is reported as showing one simple cyst on the left kidney and two on the right kidney.
- There is no known family history of polycystic kidney disease

<u>Does this US require follow-up</u>

9. Anaemia and CKD

- A 69 year old Caucasian woman with stage 3b CKD has a haemoglobin level of 95 g/l.

What should you do?

10. Statins and Anti-platelets in CKD

- A 55 year old man has an eGFR of 52 ml/min/1.73m2 which is stable.

- He is a lifelong smoker. He is not known to have cardiovascular disease.

Should he be prescribed a statin and aspirin?

11. hyperkalemia

-
- A 75 year old man with stage 4 CKD secondary to diabetes has a check eGFR of 15 and a K of 6.1.
- His baseline renal function is GFR of 25.
- He tells you he has been generally unwell over the last few days with rigors and a productive cough and has not been eating and drinking very much
- His medication includes irbesartan 300mg OD and furosemide 40mg BD, aspirin 75mg and Novomix 30 insulin 25 units morning and evening
- He looks dehydrated and pale, with a BP of 100/60 and temperature of 35.1.

How are you going to proceed?

12. vitamin D deficiency and CKD

- A 68 year old Asian woman with stage 4 CKD and a current eGFR of 28 ml/min/1.73m^2 has a corrected calcium of 1.8 mmol/l

How do you manage her?

13. Diuretic dosing

- A 65 year old man with known heart failure attends the surgery with worsening peripheral oedema and breathlessness

- He is on treatment that includes an ACE inhibitor at maximum dose and furosemide at 80mg once daily

- His last eGFR was 24 ml/min/1,.73m^2 two months ago, which is stable compared with previous readings

How do you manage this patient?