

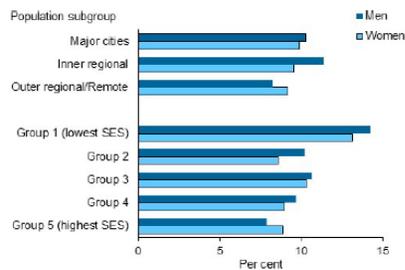
## **Urinalysis in Everyday Practice**

### **Outline**

- ✓ Population risk for CKD
- ✓ CKD screening
- ✓ Urine testing recommendations
- ✓ Urine testing in children

## How common is CKD in Australia?

Prevalence of CKD, among persons aged 18 and over



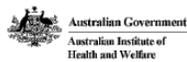
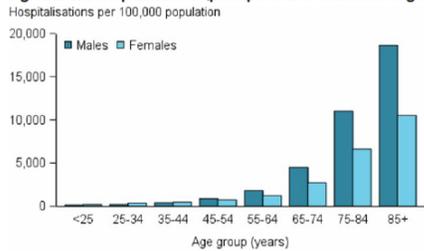
1 in 3 at Increased Risk

1 in 10 with Chronic Kidney Disease

**1 in 1400 on dialysis or living with a transplant**

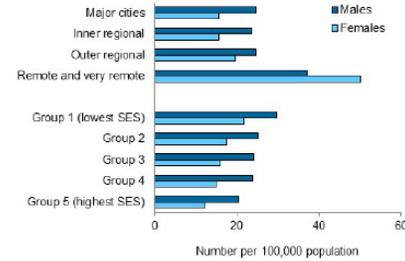


Figure 2: CKD hospitalisations (principal and/or additional diagnosis), by age and sex, 2014-15



## How common is CKD in Australia?

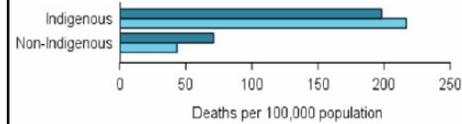
Incidence of ESKD, by remoteness and socioeconomic group, 2009-2013



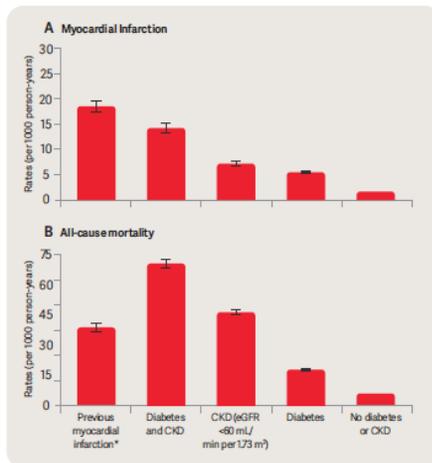
The number of Australians with moderate to severe loss of kidney function nearly doubled between 1999-2000 and 2011-12.



CKD deaths (underlying and/or associated cause),



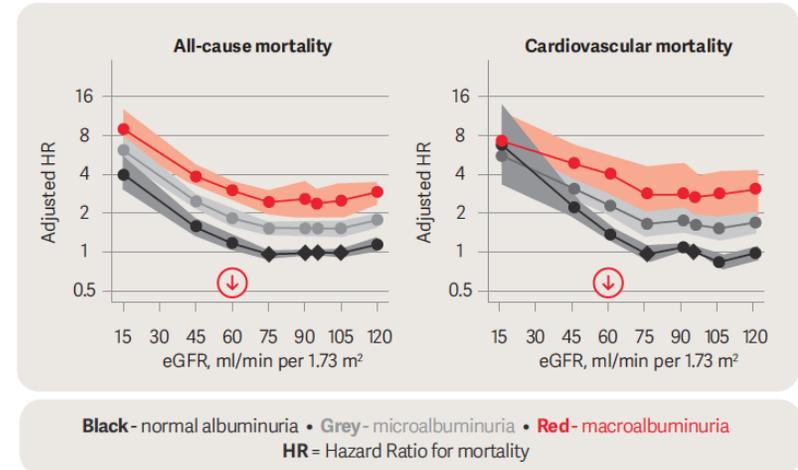
## Association with Cardiovascular Disease



Risk of coronary events and all-cause mortality according to the presence or absence of CKD, diabetes, and previous myocardial infarction<sup>6</sup>

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Higher urinary albumin excretion increases relative risk of all-cause mortality and cardiovascular mortality at all levels of eGFR<sup>10</sup>



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## Screening for CKD

Indications for assessment*	Recommended assessments	Frequency
Diabetes	Urine ACR, eGFR, blood pressure	Every 1-2 years†
Hypertension		
Established cardiovascular disease**	If urine ACR positive repeat twice over 3 months (preferably first morning void)	Every 1-2 years†
Family history of kidney failure		
Obesity (BMI ≥30 kg/m <sup>2</sup> )	If eGFR < 60mL/min/1.73m <sup>2</sup> repeat within 7 days	Every 1-2 years†
Smoker		
Aboriginal or Torres Strait Islander origin aged ≥ 30 years‡	See recommendations in booklet	Every 1-2 years†
History of acute kidney injury		

**1 in 3 Australian adults is at increased risk of CKD due to these risk factors**

\*Whilst being aged 60 years of age or over is considered to be a risk factor for CKD, in the absence of other risk factors it is not necessary to routinely assess these individuals for kidney disease.

\*\*Established cardiovascular disease is defined as a previous diagnosis of coronary heart disease, cerebrovascular disease or peripheral vascular disease.

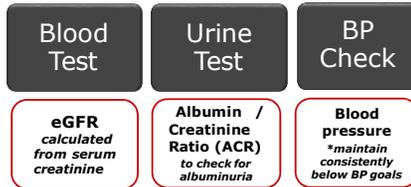
† Annually for individuals with diabetes or hypertension.

‡ Refer to booklet for more details regarding recommendations for testing in Aboriginal and Torres Strait Islander peoples.  
Chronic Kidney Disease (CKD) Management in General Practice, 3rd edition. Kidney Health Australia: Melbourne, 2015



## Kidney Health Check

### Kidney Health Check



**⚠ An eGFR < 60 mL/min/1.73m<sup>2</sup> = increased risk of adverse renal, cardiovascular and other clinical outcomes, IRRESPECTIVE OF AGE**

N.B. Dipstick testing is not a sufficient test for CKD screening

Chronic Kidney Disease (CKD) Management in General Practice, 3rd edition. Kidney Health Australia: Melbourne, 2015



## Urine testing recommendations

Urine testing  
for proteinuria

Urine Albumin/ Creatinine  
ratio (ACR) recommended  
for everyone

### Clinical tip

The preferred method for assessment of albuminuria in both diabetes and non-diabetes is urinary ACR measurement in a first void spot specimen

Where a first void specimen is not possible or practical, a random spot urine specimen for urine ACR is acceptable



## Urine tests

### Albumin / Creatinine Ratio (ACR)

- Association between albuminuria and progressive kidney disease in population studies
- Severity of albuminuria is predictive of outcome
- Therapeutic intervention can delay progression of disease and is most effective where there is significant albuminuria



## Urine tests

### Albumin / Creatinine Ratio (ACR)



- An **initial ACR** test should be **repeated** on a first void sample if the results are positive
- Initial ACR testing can be done utilising **point of care testing** (Siemens machine or similar).
- A positive result is best confirmed by the pathology laboratory.



- Albuminuria is present if at least **2 out of 3 ACR tests** are positive (including initial test)
- CKD is present if **albuminuria** persists for **at least 3 months**
- **Dipsticks** for protein in the urine are now **no longer recommended** for this purpose as their sensitivity and specificity is not optimal

## Urine ACR equivalents

### Approximate equivalents between urine ACR & other measures of albumin & protein

	Urine ACR (mg/mmol)	24h urine albumin (mg/day)	Urine PCR (mg/mmol)	24 h urine protein (mg/day)
Microalbuminuria	Male: 2.5-25 Female: 3.5-35	30-300	Male: 4-40 Female: 6-60	50-500
Macroalbuminuria	Male: >25 Female: >35	>300	Male: >40 Female: >60	>500



## Factors other than CKD known to increase urine albumin

- Urinary tract infection
- High dietary protein intake
- Congestive cardiac failure
- Acute febrile illness
- Heavy exercise within 24 hours
- Menstruation or vaginal discharge
- Drugs (especially NSAIDs)

Consumer fact sheet 'Albuminuria' is available to download at [www.kidney.org.au](http://www.kidney.org.au)

## When to test a child's urine

- Dysuria
- Fever
- Polyuria and polydipsia
- Late bedwetters
- Failure to thrive/poor growth
- Hypertension
- Oedema/facial swelling
- Gross haematuria

## Urine dipstick



Leukocytes 120s	Neg.	Trace 15	Small 75	Moderate 125	Large 500	cells/ $\mu$ l	
Nitrite 60s	Neg.	Positive Any degree of yellowish pink color					
Urobilinogen 60s	3.3	Normal	16	32	128	$\mu$ mol/l	
Protein 60s	Neg.	Trace 2	0.3	1.0	3.0	g/l	
pH 60s	5.0	6.0	6.5	7.0	7.5	8.0	8.5
Blood 60s	Neg.	None detectable 10 trace	10 trace	25 Small	60 Moderate	200 Large	cells/ $\mu$ l
Specific Gravity 45s	1.000	1.005	1.010	1.015	1.020	1.025	1.030
Ketone 40s	Neg.	Trace 2+	Small 1+	Moderate 2+	Large 3+	mmol/l	
Bilirubin 30s	Neg.	Trace 1+	Small 2+	Moderate 3+	Large 4+	$\mu$ mol/l	
Glucose 30s	Neg.	5	10	25	50	100	mmol/l

## Questions?





Subsequent biochemical testing reveals the following abnormal results:

Test	Results
Urea	13 mmol/L
Urate	0.65 mmol/L
Creatinine	150 $\mu$ mol/L
eGFR	52 mL/min/1.73m <sup>2</sup>
Albumin	23 g/L
Cholesterol	7.8 mmol/L
Urine ACR	325 mg/mmol

D. What is your working diagnosis?

E. What complications might Tom experience from his kidney disease?

F. What additional investigations would you perform?

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G. How would you treat Tom initially?

H. Should he be referred to nephrologist?

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## CASE 2:

Mary is a 4 years old girl who presents with macroscopic haematuria. She has had a low-grade fever and has complained of some mild abdominal pain. She has seen you previously for upper respiratory infections but has never been admitted to hospital. She is fully immunised.

Her urinalysis shows large blood, 2+ protein and 2+ leucocytes.

1. What further history is relevant?
2. What further investigations would you do?
3. What is the differential diagnosis?
4. Is renal imaging required?
5. Would you refer to a paediatric nephrologist?

### Answers:

- Need more history about the timing of the fever and any history of recent sore throat or skin infections
- Ask about dysuria and any previous history of UTIs
- Is there any oedema or evidence of recent weight gain? – would suggest a form of glomerulonephritis with fluid retention
- Is the blood pressure normal?
- The differential diagnosis includes UTI and post-infectious glomerulonephritis (the two most likely) but less likely diagnoses include IgA nephropathy and renal calculi
- Send urine for MC&S – ask specifically for microscopy for red cell casts and dysmorphic RBC (if present, suggests PIGN)
- Send a urine protein (or albumin) to creatinine ratio
- Check UEC, FBC, C3/4, ASOT and anti DNaseB (or refer to local paediatric service)
- Consider renal ultrasound (not urgent in the case of a first UTI or PIGN but if the abdo pain was to worsen and you suspect stones, an ultrasound should be done urgently).
- Refer to paediatric nephrologist urgently if
  - raised creatinine AND/OR
  - hypertension AND/OR
  - proteinuria present
- Be aware that following PIGN it may take 2 years for the microscopic haematuria to clear completely.