Diagnosing and monitoring CKD

About this series

The aim of the "How to" series is to provide readers with a guide to clinical procedures and aspects of diabetes care that are covered in the clinic setting.

What and why

- CKD describes abnormal kidney function or structure, present for more than 3 months.
- CKD is diagnosed and monitored using eGFR, which measures kidney function, and ACR, which measures kidney damage (see *How to test for microalbuminuria*[1]).
- To diagnose CKD: an eGFR of <60 is required on at least 2 occasions over a period of at least 90 days, with or without markers of kidney damage.
- Laboratories use CKD-EPI or MDRD to estimate GFR.

! **It is important to remember, a raised ACR indicates risk even when the eGFR is normal.**

Send a non-fasting venous blood sample to the lab within 12 hours of venepuncture.

If the person is of African or African–Caribbean origin, apply a correction factor (**multiply eGFR by 1.159**)

Has the person been previously tested?

Yes

No

If eGFR >60:

eGFR 60–89: Code G2
eGFR ≥90: Code G1
Do not diagnose CKD (in the absence of markers of kidney damage
see blue box overleaf

REPEAT ANNUALLY

eGFR values of ≥60 become less accurate as true GFR increases, which is why many labs do not report an exact figure for eGFR >60.

If eGFR <60:
Repeat test within 2 weeks to exclude AKI
see purple box overleaf
If remains <60, repeat after at least 90 days. If <60, code and manage as below.

If eGFR <30
eGFR 15–29: Code G4
eGFR <15: Code G5
Diagnose CKD
Assess & code ACR[1]
Monitor as per ***Table 1***
Consider referral

If eGFR 30–44
Code G3b
Diagnose CKD
Assess & code ACR[1]
Monitor as per ***Table 1***

If eGFR 45–59 **
Code G3a
Diagnose CKD
Assess & code ACR[1]
Monitor as per ***Table 1***

Consider referral as per local pathway or CG 182[3] if:

- eGFR <30 (G4 or G5).
- Sustained decrease in eGFR of ≥25%, and a change in eGFR category or sustained decrease in eGFR of ≥15 within 12 months.
- Hypertension poorly controlled on at least 4 agents.
- Suspected renal artery stenosis.

Involve the person with diabetes in the referral decision.

Table 1. Frequency of monitoring of eGFR for people with, or at risk of, CKD (adapted from CG 182[3]).

Frequency of monitoring of eGFR (number of times per year, by GFR and ACR category).	ACR categories (mg/mmol), description and range		
eGFR categories, description and range	A_1 <3 Normal to mildly increased	A_2 3–30 Moderately increased	A_3 >30 Severely increased
G1 ≥90 Normal and high	≤1	1	≥1
G2 60–89 Mild reduction	≤1	1	≥1
G3a 45–59 Mild–moderate reduction	1	1	2
G3b 30–44 Moderate–severe reduction	≤2	2	≥2
G4 15–29 Severe reduction	2	2	3
G5 <15 Kidney failure	4	≥4	≥4

Consider using **eGFR cystatinC[!] if available locally when an improved assessment of risk is needed and at initial diagnosis to confirm/exclude CKD in people with:

eGFR creatinine 45–59 sustained for at least 90 days
AND
no proteinuria or other marker of kidney disease

[!] When using eGFR cystatinC, hypothyroidism may lead to overestimation, hyperthyroidism to underestimation.

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Useful abbreviations
ACE-I: Angiotensin-converting enzyme inhibitor
ACR: Albumin:creatinine ratio
AKI: Acute kidney injury
ARB: Angiotensin receptor blocker
CKD: Chronic kidney disease
CVD: Cardiovascular disease
eGFR: estimated glomerular filtration rate
NSAIDs: Nonsteroidal anti-inflammatory drugs

Units
eGFR units are mL/min/1.73 m^2 throughout if not included.

NICE has not checked the use of its content in this article to confirm that it accurately reflects the NICE publication from which it is taken.

References
[1]Gadsby (2017) How to test for microalbuminuria. *Diabetes & Primary Care* **19**: 13
[2]NICE (2013) *Acute kidney injury: prevention, detection and management* (CG 169). NICE, London
[3]NICE (2014) *Chronic kidney disease in adults: assessment and management* (CG 182). NICE, London
[4]NICE (2016) *Cardiovascular disease: risk assessment and reduction, including lipid modification* (CG 181). NICE, London
[5]Yenigun EC et al (2015) *Hippokratia* **19**: 148–2

What next

Interpret eGFR with caution

- eGFR values of ≥60 become less accurate as true GFR increases.
- Reduced muscle mass (e.g. muscle wasting, amputations) will lead to overestimation *(false high)*.
- Increased muscle mass (e.g. body builders) will lead to underestimation *(false low)*.
- Dehydration may lead to underestimation.

ACE-I/ARB monitoring

- ACE-Is/ARBs can cause a decline in eGFR. Check potassium and eGFR before starting therapy and within 1–2 weeks of starting and at every dose increase.
- If eGFR decreases by <25%, repeat eGFR in 1–2 weeks (no need to modify dose if result is the same).
- If eGFR decreases by ≥25% investigate other causes, if none found, reduce dose or consider stopping drug.

Markers of kidney disease[3]

- Albuminuria (ACR >3 mg/mmol).
- Urine sediment abnormalities.
- Electrolyte and other abnormalities due to tubular disorders.
- Abnormalities detected by histology.
- Structural abnormalities detected by imaging.
- History of kidney transplantation.

Be alert

- In people with a new finding of reduced eGFR, repeat the eGFR within 2 weeks to exclude causes of acute deterioration of eGFR (e.g. AKI or starting renin–angiotensin system antagonist therapy).
  - **If AKI suspected**, follow CG 169[2].
  - **If AKI not suspected** but eGFR remains <60, repeat eGFR after at least 90 days to confirm or refute diagnosis.
- Deterioration in eGFR in those with short duration of diabetes and the absence of retinopathy should raise suspicions of non-diabetic kidney disease and referral for renal biopsy may be appropriate[5].

How to assess rate of CKD progression

- Obtain minimum of 3 eGFR values over a period of not less than 90 days.
- **Accelerated progression** of CKD is:
  a sustained decrease in eGFR of ≥25% and a change in eGFR category within 12 months
  OR
  sustained decrease in eGFR of 15 mL/min/1.73 m^2 per year.

CKD management in primary care

- Lifestyle advice: exercise, smoking cessation, achieve healthy weight, dietary advice regarding potassium, phosphate and salt intake as appropriate.
- Aim for BP control <130/80 mmHg if diabetes and CKD.
- Offer ACE-I/ARB if they have CKD, diabetes and ACR ≥3 mg/mmol.
- Offer statins as per NICE CG 181[4].
- Offer antiplatelet drugs for secondary CVD prevention.
- Avoid NSAIDs if possible.

Local pathway notes