Barns Medical Practice
Service Specification
Outline: Chronic Kidney Disease

DATE DEVELOPED January 2020 **REVIEW DATE January2022**

Introduction

The term chronic kidney disease (often shortened to CKD) is used to describe long-term kidney problems that occur either when the kidneys don't work as well as normal or when the kidneys are damaged. Kidney disease is called chronic when the problem is present for longer than 3 months. Chronic kidney disease is common, especially in older people, and people often have the condition without knowing it. Many people have no symptoms and some people may not need any treatment. Chronic kidney disease (CKD) describes abnormal kidney function and/or structure. There is evidence that treatment can prevent or delay the progression disease.

Blood and urine tests are used to find out if you have kidney problems.

A blood test is used to find out how well your kidneys are working (your 'kidney function'). The test is used to estimate how much waste fluid your kidneys can remove from your blood in a minute. The result is called your GFR (or glomerular filtration rate) and this value is roughly the same as your percentage of normal kidney function.

A urine test is used to show how much protein is leaking into your urine. A small amount of leaking is normal, but an increase in the amount (called proteinuria) can be a sign that your kidneys are damaged.

You should be offered these tests if you are at risk of having chronic kidney disease. If your GFR test shows that you may have a problem with your kidneys that was not known about already, the test should be repeated within 2 weeks. Further tests after 3 months will confirm whether you have chronic (long-term) kidney disease.

The definition of CKD is based on the presence of kidney damage (ie albuminuria >3mg/mmol) or decreased kidney function (ie glomerular filtration rate (GFR) <60 ml/minute per 1·73 m^2) for three months or more, irrespective of clinical diagnosis.

When symptoms are severe they can be treated only by dialysis and transplantation (end-stage kidney disease). Kidney failure is defined as a GFR of less than 15 ml/minute per 1·73 m^2, or the need for treatment with dialysis or transplantation.

Accelerated progression of CKD is defined as a sustained decrease in GFR of 25% or more and a change in GFR category within 12 months, or a sustained decrease in GFR of 15 ml/minute/1.73 m^2 per year.

It is now realised that less severe CKD is quite common, and monitoring in primary care will enable the minority of patients who go on to develop a more severe form to be detected at any earlier stage. This is important because the earlier the intervention, the greater the impact.

- CKD is common, frequently unrecognised and often exists together with other conditions (such as CVD and diabetes).
- The risk of developing CKD increases with age.

Diagnosis

Kidney function should be assessed using a combination of GFR and albumin:creatinine ratio (ACR) categories. The current classification for CKD in NHS Ayrshire and Arran is based on the CGA triad (cause, GFR,albuminuria/proteinuria).

CKD: GFR

GFR is divided into 6 categories

KDIGO Category	GFR	Comment
G1	>90	G1 and G2 are only coded if other markers of damage are also present
G2	60-89	
G3a	45-59	
G3b	30-44	
G4	15-29	
G5	<15	Use suffix D if on dialysis

CKD: Proteinuria

Proteinurea is divided into three categories

KDIGO Category	uPCR	uACR	24 hour equivalent
A1	<15mg/mmol	<3mg/mmol	<150mg/day
A2	15-50mg/mmol	3-30mg/mmol	15-500mg/day
A3	>50	>30mg/mmol	>500mg/day

All patients being investigated for CKD may have urine analysis for proteinuria. Persistent proteinuria is a key marker for renal disease irrespective of EGFR results and has implications for ckd prognosis and progression.

NB: patients with a GFR of >60 ml/minute/1.73 m^2 **without** evidence of chronic kidney damage should **NOT** be considered to have CKD and do not necessarily need further investigation.

The other evidence of chronic kidney damage may be one of the following:

- Persistent microalbuminuria.
- Persistent proteinuria.
- Persistent haematuria (after exclusion of other causes - eg, urological disease).
- Structural abnormalities of the kidneys, demonstrated on ultrasound scanning or other radiological tests - eg, polycystic kidney disease, reflux nephropathy.
- Electrolyte abnormalities due to tubular disorders (for example renal tubular acidosis).
- Biopsy-proven chronic glomerulonephritis.

CKD is usually asymptomatic and often unrecognised because there are no specific symptoms, and it is often not diagnosed, or diagnosed at an advanced stage. Patients who are at increased risk of developing CKD should be offered screening tests to detect CKD, which should include assessment of the eGFR as well as urine ACR. Offer people testing for CKD if they have any of the following risk factors:

- Acute Kidney Injury (AKI).
- CVD (ischaemic heart disease, chronic heart failure, peripheral arterial disease or cerebral vascular disease).
- Structural renal tract disease, recurrent renal calculi or prostatic hypertrophy.
- Multisystem diseases with potential kidney involvement - eg, SLE.
- Family history of end-stage kidney disease (Stage 5 CKD) or hereditary kidney disease.
- Opportunistic detection of haematuria.

Investigations

Investigations are focused on assessment of renal function and therefore stage of CKD, identification of the underlying cause and assessment of complications of CKD.

- Assessment of renal function:
  - Serum urea is a poor marker of renal function, because it varies significantly with hydration and diet, is not produced constantly and is reabsorbed by the kidney.
  - Serum creatinine also has significant limitations. The level can remain within the normal range despite the loss of over 50% of renal function.
  - GFR less than 30 ml/minute/1.73 m^2, For most purposes in primary care, the best assessment or screening tool is the eGFR
- Biochemistry:
  - Plasma glucose: to detect undiagnosed diabetes or assess control of diabetes.
  - Serum sodium: usually normal, but may be low.
  - Serum potassium: raised.
  - Serum bicarbonate: low.
  - Serum albumin: hypoalbuminaemia in patients who are nephrotic and/or malnourished.
  - Serum calcium: may be normal, low or high.
  - Serum phosphate: usually high.
  - Serum alkaline phosphatase: raised when bone disease develops.
  - Serum parathyroid hormone: rises progressively with declining renal function.
  - Serum cholesterol and triglycerides: dyslipidaemia is common.
- Haematology:
  - Normochromic normocytic anaemia; haemoglobin falls with progressive CKD.
  - White cells and platelets are usually normal.
- Urine:
  - Urinalysis: dipstick proteinuria may suggest glomerular or tubulointerstitial disease.
  - Pyuria and/or white cell casts suggest interstitial nephritis (especially if eosinophils are present in the urine) or urinary tract infection (UTI).
  - Spot urine collection for total protein:creatinine ratio allows reliable estimation of total 24-hour urinary protein excretion. The degree of proteinuria correlates with the rate of progression of the underlying kidney disease and is the most reliable prognostic factor in CKD.
  - 24-hour urine collection for total protein and creatinine clearance. To detect and identify proteinuria, use urine ACR in preference, as it has greater sensitivity than protein:creatinine ratio (PCR) for low levels of proteinuria An early morning urine sample is preferable as there is a diurnal variation in urine protein loss, with morning urine being most concentrated and protein more likely to be detected at this time . For quantification and monitoring of proteinuria, PCR can be used as an alternative. ACR is the recommended method for people with diabetes.

- Patients in whom initial urinalysis reveals microscopic haematuria should have a urine culture performed to exclude a UTI. If a UTI is excluded, two further tests should be performed to confirm the presence of persistent microscopic haematuria.[
- Patients over 40 years of age with persistent non-visible/microscopic haematuria in the absence of significant proteinuria or a reduced GFR should be referred to a urology department for further investigation.
- Serum and urine protein electrophoresis: to screen for a monoclonal protein possibly representing multiple myeloma.

Criteria for referral to specialist services

Take into account the individual's wishes and comorbidities when considering referral.

Clinical judgement may suggest patients other than those listed who may be referred, or a different degree of urgency. Patients who may not seem suitable for dialysis may sometimes benefit from non-dialysis treatments such as erythropoietin. Some patients are unlikely to benefit from attending a hospital kidney clinic (e.g. a severely demented or very frail patient). Perhaps a useful rule of thumb is to consider patients whose life expectancy is likely to be more than a year.

- People with CKD in the following groups should normally be referred for specialist assessment:

- **CKD G4 and G5** should usually be referred and/or discussed.
- **All CKD G3, if age <50 years old** because of the lifetime risk of complications.
- **Deteriorating renal function** >15 mL/min/1.73m^2 per year or decrease in egfr by 25% or more in 12 months, assessing the trend is important .Take into consideration patient,s baseline egfr and ACR readings , as the course of ckd is often non –linear and erractic egfr or acr may need closer monitoring. Consideration of age is also important in monitoring any deterioration.
- **CKD A3**: refer routinely. If uPCR >300 mg/mmol or clinically nephrotic then refer promptly.
- **CKD G3b and A2**: refer routinely.
- Patients **with inadequately controlled blood pressure** despite treatment with a combination of ACEi/ARB, beta blocker, calcium channel blocker and a diuretic, or in whom one or more of these classes is contra-indicated.
- Refer as UCS if persistent haematuria and a urological cancer is suspected
- Refer if Acr > 70mg/mmol or more unless proteinuria is associated with diabetes mellitus and being managed appropriately. Also refer if acr >30mg/mmol with persistent haematuria after exclusion of uti.
- Renal stenosis or polycystic kidney disease
- Any complications of CKD etc renal bone and mineral disorders, severe anaemia requiring iron infusions or ethropoiesis stimulating therapy or persistent raised potassium

Regular Review

General issues

- Many patients equate kidney disease with renal dialysis. It is important to explain that CKD is a spectrum of disease. Mild CKD is common and rarely progresses to a more severe form later.
- Explain GFR and that this will need to be monitored on a regular basis to ensure that the condition is not deteriorating.
- If relevant, discuss the link between hypertension and CKD and that maintaining tight blood pressure control can limit the damage to the kidneys.
- Discuss the link between CKD and an increased risk of developing CVD.
- Encourage people with CKD to take exercise, achieve a healthy weight and stop smoking.
- Patients with diabetes mellitus and CKD should achieve good glycaemic control.
- Review all prescribed medication regularly to ensure appropriate doses.
- Avoidance of nephrotoxins - eg, IV radiocontrast agents, NSAIDs, aminoglycosides.
- Immunise against influenza and pneumococcus.
- G1,2,3a motitoring should include : BP, dipstick, ACR, U+Es
- G3b monitoring should include BP, dipstick, ACR, U+Es, bone profile and FBC

In those newly diagnosed with eGFR less than 60 ml/minute/1.73 m^2

- Review all previous measurements of serum creatinine to estimate GFR and assess the rate of deterioration.
- Review all medication including over-the-counter drugs; particularly consider recent additions (eg, diuretics, NSAIDs, or any drug capable of causing interstitial nephritis, such as penicillins, cephalosporins, mesalazine).
- Urinalysis: haematuria and proteinuria suggest glomerulonephritis, which may progress rapidly.
- Clinical assessment: eg, look for sepsis, heart failure, hypovolaemia, palpable bladder.
- Repeat serum creatinine measurement within five days to exclude rapid progression.
- Check criteria for referral (above). If referral is not indicated, ensure entry into a chronic disease management register and programme.

Monitoring

- The eGFR should be monitored regularly. The frequency will depend on the severity of kidney impairment.
- Patients with CKD should have the level of proteinuria assessed at least annually.
- Proteinuria should be assessed by ACR, ideally on an early-morning urine specimen.
- Detection of an initial abnormal eGFR result should prompt clinical assessment and a repeat test within two weeks to assess the rate of change

in GFR and exclude acute kidney injury. Repeat or conformatory eGFR should be done on a food fasted sample as meat can raise creatinine significantly.If the GFR is stable, a further test should be performed after 90 days to confirm the diagnosis of CKD.

- If the diagnosis of CKD is confirmed, at least three assessments of eGFR should be made over not less than 90 days, to evaluate the rate of change in GFR.
- Detection of an initial level of proteinuria (including levels compatible with microalbuminuria) should be confirmed with a repeat test performed on an early-morning urine specimen. For the diagnosis of microalbuminuria, two abnormal results from three specimens are required.
- In all newly identified CKD patients baseline observations should be recorded. This includes BP, dipstick urinalysis, albumin –creatinine ratio, plasma bone profile, glucose and FBC.
- All CKD G4 and G5 should have US of kidney and bladder to exclude obstructive pathology.

CVD prevention

- Patients with CKD should have an annual formal assessment of their cardiovascular risk factors including lipid profile, BMI, exercise, alcohol and smoking habits, as well as a review of interventions to reduce cardiovascular risk such as statins and oral antiplatelets and anticoagulants
- Offer antiplatelet drugs, statins to people with CKD for the secondary prevention of CVD, but be aware of the increased risk of bleeding and potential side effects and specialist advice should be sought if starting statin and egfr of 30ml/min/1.73m2

Blood pressure control

- Aim to keep the systolic blood pressure below 140 mm Hg (target range 120-139 mm Hg) and the diastolic blood pressure below 90 mm Hg.
- In people with CKD and diabetes, and also in people with an ACR of 70 mg/mmol or more, aim to keep the systolic blood pressure below 130 mm Hg (target range 120-129 mm Hg) and the diastolic blood pressure below 80 mm Hg.
- A low-cost renin angiotensin system antagonist - eg, angiotensin-converting enzyme (ACE) inhibitor or angiotensin-II receptor antagonist (AIIRA) should be used for people with CKD and:
    - Diabetes and an ACR of 3 mg/mmol or more.
    - Hypertension and an ACR of 30 mg/mmol or more.
    - An ACR of 70 mg/mmol or more (irrespective of hypertension or cardiovascular disease).
    - A combination of renin-angiotensin system antagonists should not be offered to people with CKD.
- In people with CKD, measure serum potassium concentrations and estimate the GFR before starting renin-angiotensin system antagonists. Repeat these measurements between one and two weeks after starting renin-angiotensin system antagonists and after each dose increase.

- Do not routinely offer a renin-angiotensin system antagonist to people with CKD if their pre-treatment serum potassium concentration is greater than 5.0 mmol/L. Stop renin-angiotensin system antagonists if the serum potassium concentration increases to 6.0 mmol/L or more and other drugs known to promote hyperkalaemia have been discontinued.

Nutrition and physical exercise

Lifstyle advice: exercise, smoking cessation,healthy weight,dietary advice regarding potassium phosphate and salt intake should be discussed as appropriate. Referral for specialst dietary advice may be appropriate in end stage renal disease to reduce risks of malnutrition.

Mineral and bone disorders Anaemia

Kidneys play an important role in keeping your bones healthy. If you have advanced chronic kidney disease (category G4 or G5), you might develop problems with your bones over the long term. This is called renal bone disease.

Your healthcare professionals should carry out tests for bone disease including calcium blood test, vitamin d, phosphate and possibly parathyroid hormone tests and discuss the results with you if you need treatment or further checks.

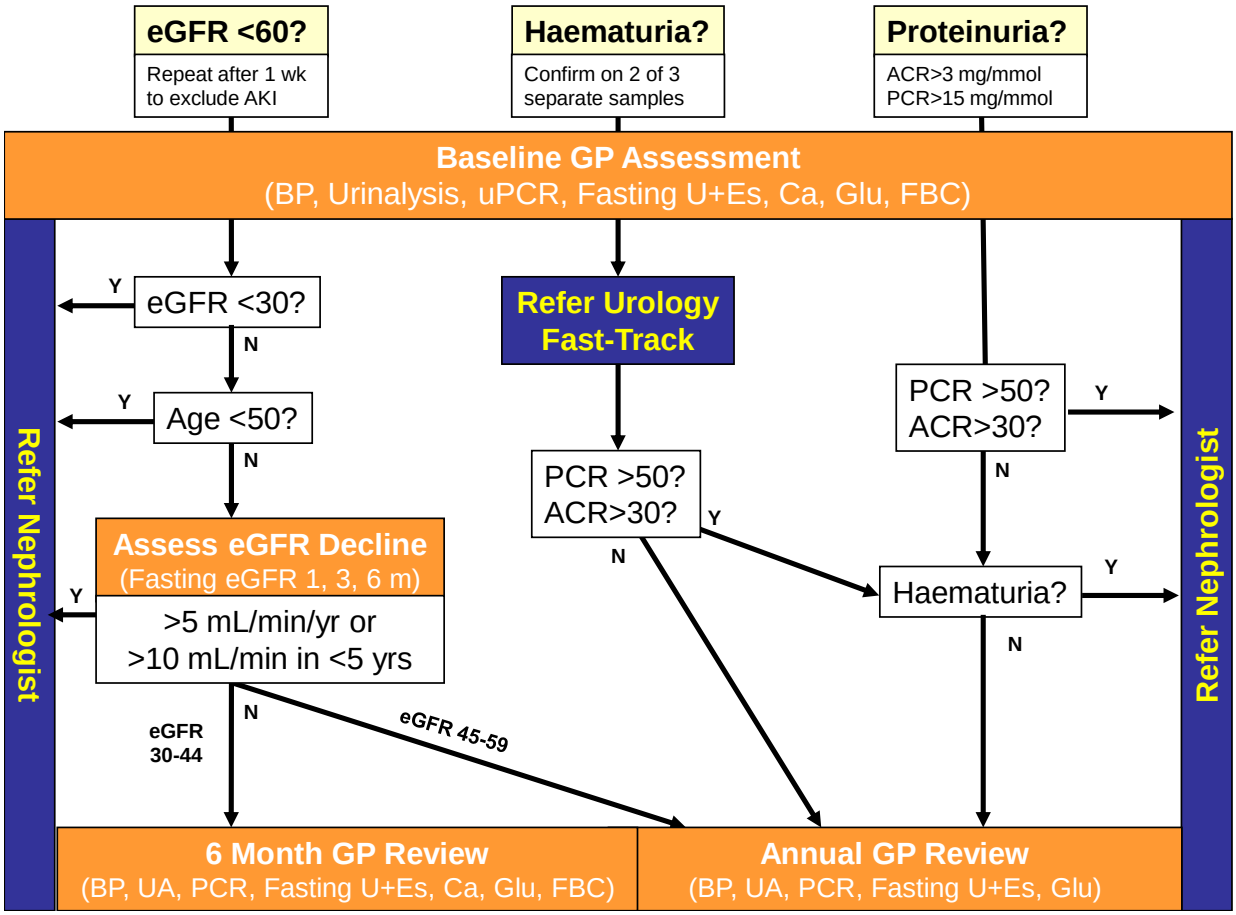
FBC blood test can be considered for all stages of CKD if anaemia is suspected and iron replacement, folic acid and B12 vitamin supplements should be offered to all renal patients .

REFERENCES

Chronic kidney disease: early identification and management of chronic kidney disease in adults in primary and secondary care (2019)
https://cks.nice.org.uk/chronic-kidney-disease

Diggle,J.(2017) How to diagnose and monitor CKD Diabetes and Primary care 19(2) page 59-60

APPENDIX 1


eGFR <60?
Repeat after 1 wk to exclude AKI
Haematuria?
Confirm on 2 of 3 separate samples
Proteinuria?
ACR>3 mg/mmol
PCR>15 mg/mmol
Baseline GP Assessment
(BP, Urinalysis, uPCR, Fasting U+Es, Ca, Glu, FBC)
Refer Nephrologist
Y
eGFR <30?
N
Y
Age <50?
N
Assess eGFR Decline
(Fasting eGFR 1, 3, 6 m)
Y
>5 mL/min/yr or
>10 mL/min in <5 yrs
N
eGFR 30-44
eGFR 45-59
Refer Urology Fast-Track
PCR >50? ACR>30?
Y
N
Haematuria?
Y
N
PCR >50? ACR>30?
Y
N
Haematuria?
Y
N
Refer Nephrologist
6 Month GP Review
(BP, UA, PCR, Fasting U+Es, Ca, Glu, FBC)
Annual GP Review
(BP, UA, PCR, Fasting U+Es, Glu)