

Chronic kidney disease: early identification and management of chronic kidney disease in adults in primary and secondary care

NICE guideline

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If you wish to comment on this version of the guideline, please be aware that all the supporting information and evidence is contained in the full version.

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Introduction

Chronic kidney disease (CKD) describes abnormal kidney function and/or structure. It is common, frequently unrecognised and often exists together with other conditions (for example, cardiovascular disease and diabetes). It also carries a high risk of mortality. The risk of developing CKD increases with increasing age, and some conditions that coexist with CKD become more severe as kidney dysfunction advances. CKD can progress to established renal failure in a small but significant percentage of people.

CKD is usually asymptomatic. But it is potentially detectable, and tests for detecting CKD are both simple and freely available. There is evidence that treatment can prevent or delay the progression of CKD, reduce or prevent the development of complications, and reduce the risk of cardiovascular disease. However, because of a lack of specific symptoms people with CKD are often not diagnosed, or diagnosed late when CKD is at an advanced stage.

At least 30% of people with advanced kidney disease are referred late to nephrology services from both primary and secondary care, causing increased mortality and morbidity. Over 2% of the total NHS budget is spent on renal replacement therapy (dialysis and transplantation) for those with established renal failure.

Strategies aimed at earlier identification and (where possible) prevention of progression to established renal failure are therefore clearly needed. This clinical guideline seeks to address these issues by providing guidance on:

- identifying people who have or are at risk of developing CKD
- identifying who needs intervention to minimise cardiovascular risk and what that intervention should be
- identifying who will develop progressive kidney disease and/or complications of kidney disease and how they can be managed
- identifying who needs referral for specialist kidney care.

Patient-centred care

This guideline offers best practice advice on the care of adults with chronic kidney disease.

Treatment and care should take into account patients' needs and preferences. People with chronic kidney disease should have the opportunity to make informed decisions about their care and treatment, in partnership with their healthcare professionals. If patients do not have the capacity to make decisions, healthcare professionals should follow the Department of Health guidelines – 'Reference guide to consent for examination or treatment' (2001) (available from www.dh.gov.uk). Healthcare professionals should also follow a code of practice accompanying the Mental Capacity Act (summary available from www.dca.gov.uk/menincap/bill-summary.htm).

Good communication between healthcare professionals and patients is essential. It should be supported by evidence-based written information tailored to the patient's needs. Treatment and care, and the information patients are given about it, should be culturally appropriate. It should also be accessible to people with additional needs such as physical, sensory or learning disabilities, and to people who do not speak or read English.

If the patient agrees, families and carers should have the opportunity to be involved in decisions about treatment and care.

Families and carers should also be given the information and support they need.

Key priorities for implementation

- An albumin:creatinine ratio (ACR) should normally be used to quantify proteinuria. 1.1.4.2
- People with non-diabetic CKD and ACR ≥ 30 mg/mmol (equivalent to proteinuria of ≥ 0.5 g/day) should be treated with ACEI/ARBs (angiotensin converting enzyme inhibitor/angiotensin receptor blockers) irrespective of the presence of hypertension or cardiovascular disease. 1.6.2.2
- People with CKD in the following groups should usually be referred for specialist assessment:
 - People with stage 4 and 5 CKD (with or without diabetes)
 - People with heavy proteinuria (ACR ≥ 70 mg/mmol, equivalent to proteinuria of 1g/24 hrs) unless explained by diabetes and already appropriately treated
 - People with proteinuria (ACR ≥ 30 mg/mmol, equivalent to proteinuria of 0.5g/24hr) and haematuria
 - Rapidly declining eGFR (> 5 ml/min/1.73m² in one year or less, or > 10 ml/min/1.73m² over 5 years or less)
 - Hypertension that remains poorly controlled despite the use of at least 4 anti-hypertensive drugs at therapeutic doses (see NICE clinical guideline 34, Hypertension: management of hypertension in adults in primary care)
 - People with, or suspected of having rare or genetic causes of CKD
 - Suspected renal artery stenosis (i.e. following ultrasound scan or fall in GFR on initiating ACE therapy). 1.4.1.1
- People should be advised to be tested for CKD if they have any of the following risk factors:
 - Diabetes (Type 1 & 2)
 - Hypertension

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- Cardiovascular disease (ischaemic heart disease, chronic heart failure, peripheral vascular disease and cerebral vascular disease)
 - Receiving drugs known to be potentially nephrotoxic
 - Structural renal tract disease, renal calculi or prostatic hypertrophy
 - Family history of stage 5 CKD or hereditary kidney disease
 - Incidental haematuria or proteinuria. 1.2.2.1
- In order to identify progressive CKD:
 - Exclude causes of acute deterioration of GFR e.g. acute kidney injury or initiation of ACEI/ARB therapy
 - Define progression as a decline in GFR of >5 ml/min/1.73m² within one year or less, or >10 ml/min/1.73m² within 5 years
 - A minimum of 3 GFR estimations are required
 - Focus particularly on those in whom a rate of decline of GFR continuing at the observed rate would lead to the need for renal replacement therapy within their lifetime. 1.3.1.1
 - In people with CKD aim to keep the systolic blood pressure between 120 mmHg and 140 mmHg and the diastolic blood pressure between 70 mmHg and 90 mmHg. 1.6.1.1

1 Guidance

The following guidance is based on the best available evidence. The full guideline ([\[add hyperlink\]](#)) gives details of the methods and the evidence used to develop the guidance.

1.1 *Investigation of CKD*

1.1.1 Measurement of kidney function

- 1.1.1.1 Whenever a request for serum creatinine measurement is made clinical laboratories should report an estimate of GFR using a prediction equation in addition to reporting the serum creatinine result.
- 1.1.1.2 The recommended prediction equation is the IDMS-traceable simplified MDRD equation, using creatinine assays with calibration traceable to a standardised reference material. Ideally creatinine assays that are specific and zero-biased compared to IDMS (e.g. enzymatic assays) should be used. When non-specific assays are used (e.g. Jaffe assays) appropriate assay-specific adjustment factors should be employed to minimise between-laboratory variation (e.g. those provided by national external quality assessment schemes).
- 1.1.1.3 Clinicians should ensure that, where indicated, a correction factor for ethnicity is applied to reported GFR values (multiply estimated GFR by 1.21 for African-Caribbean ethnicity).
- 1.1.1.4 Estimates of GFR are less accurate as true GFR increases and in particular reported values ≥ 60 ml/min/1.73m² should be interpreted with caution.

- 1.1.1.5 Where GFR is simply reported as >60 ml/min/1.73m² significant reductions in renal function may be inferred from a rise in serum creatinine concentration of $>20\%$.
- 1.1.1.6 Where a highly accurate measure of GFR is required a gold standard measure should be considered e.g. during monitoring of chemotherapy and in the evaluation of renal function in potential living donors.
- 1.1.1.7 In cases where there are extremes of muscle mass (e.g. amputees, muscle wasting disorders) GFR estimated from prediction equations should be interpreted accordingly.

1.1.2 Factors affecting the biological and analytical variability of GFR estimated from the measurement of serum creatinine

- 1.1.2.1 Ideally blood samples for GFR estimation should be obtained without the person having eaten any meat in the previous 12 hours. Blood samples should be received and processed by the laboratory within 12 hours of venepuncture.
- 1.1.2.2 A new finding of a eGFR result below 60 ml/min/1.73m² should be confirmed by repeating the test:
- Preferably obtained and processed under ideal conditions
 - Allowance for biological and analytical variability ($\pm 5\%$) should be made when interpreting changes in estimated GFR.

1.1.3 Detection of blood and protein in the urine

- 1.1.3.1 When testing for the presence of haematuria, reagent strips rather than urine microscopy are recommended
- A result of 1+ or more requires further evaluation
 - Urine microscopy should not be used to confirm a positive reagent strip test.

1.1.3.2 For the initial detection of proteinuria, if the ACR is >30 mg/mmol and <70 mg/mmol this should be confirmed by a subsequent early morning (first pass) sample. If the initial ACR is >70 mg/mmol the sample need not be repeated.

1.1.4 Urinary albumin:creatinine and protein: creatinine ratios, and their relationship to 24 hour urinary protein

1.1.4.1 In people without diabetes therapeutically significant proteinuria should be considered to be present when the ACR exceeds 30 mg/mmol (this is approximately equivalent to 0.5 g total protein/24hrs). In people with diabetes microalbuminuria is considered significant, and is defined as ACR \geq 2.5 mg/mmol in men and ACR \geq 3.5 mg/mmol in women.

1.1.4.2 An albumin:creatinine ratio (ACR) should normally be used to quantify proteinuria.

1.1.4.3 All people with diabetes, and people without diabetes with a GFR < 60 ml/min/1.73m², should have their urinary albumin excretion quantified by an ACR. The first abnormal result should be confirmed on an early morning sample (if not previously obtained).

1.1.4.4 Those with a GFR greater than or equal to 60 ml/min/1.73m² should have their urinary albumin/protein excretion quantified by laboratory testing if there is a strong suspicion of CKD (see also recommendation 1.2.2.1).

1.1.5 Indications for renal ultrasound in the evaluation of CKD

1.1.5.1 A renal ultrasound is recommended in all people with CKD who

- Have a rapidly declining GFR (> 5 ml/min/1.73m² within one year or less, or >10 ml/min/1.73m² over less than 5 years)
- Have visible or invisible haematuria
- Have symptoms of renal tract obstruction

- Have a family history of polycystic kidney disease and are aged over 20.
- Have stage 4 or 5 CKD
- Require a renal biopsy.

1.1.5.2 People with a family history of inherited kidney disease should be advised about the implications of an abnormal result before arranging a renal ultrasound scan.

1.2 *Classification and early identification of CKD*

1.2.1 The influence of GFR, age, gender, ethnicity and proteinuria on patient outcomes

1.2.1.1 The suffix P should be used to denote the presence of proteinuria when staging CKD.

1.2.1.2 For the purposes of this classification proteinuria is defined as a urinary albumin:creatinine ratio (ACR) ≥ 30 mg/mmol (urinary protein excretion ≥ 0.5 g/24hr)

1.2.1.3 Stage 3 CKD should be split into 2 subcategories defined by:

- GFR 45-59 ml/min/1.73m² (stage 3A)
- and
- GFR 30-44 ml/min/1.73m² (stage 3B).

1.2.1.4 At any given stage of CKD, management should not be influenced solely by age.

1.2.2 Who should be tested for CKD?

1.2.2.1 People should be advised to be tested for CKD if they have any of the following risk factors:

- Diabetes (Type 1 & 2)
- Hypertension

- Cardiovascular disease (ischaemic heart disease, chronic heart failure, peripheral vascular disease and cerebral vascular disease)
- Receiving drugs known to be potentially nephrotoxic
- Structural renal tract disease, renal calculi or prostatic hypertrophy
- Family history of stage 5 CKD or hereditary kidney disease
- Incidental haematuria or proteinuria.

1.2.2.2 In the absence of the above risk factors, age, gender, ethnicity or BMI should not be used as risk markers to test people for CKD.

1.3 *Defining progression of CKD and the risk factors associated with progression*

1.3.1 Defining progression

1.3.1.1 In order to identify progressive CKD:

- Exclude causes of acute deterioration of GFR e.g. acute kidney injury or initiation of ACEI/ARB therapy
- Define progression as a decline in GFR of >5 ml/min/1.73m² within one year or less, or >10 ml/min/1.73m² within 5 years
- A minimum of 3 GFR estimations are required
- Focus particularly on those in whom a rate of decline of GFR continuing at the observed rate would lead to the need for renal replacement therapy within their lifetime.

1.3.2 Risk factors associated with progression of CKD

1.3.2.1 Health professionals should work with people at risk of progression of CKD to optimise their health. The following factors are associated with progression:

- Cardiovascular disease
- Proteinuria

- Hypertension
- Type 1 and Type 2 diabetes
- Smoking
- Black or Asian ethnicity
- Chronic use of NSAIDS
- Renal tract outflow obstruction.

1.3.2.2 In people with CKD the chronic use of NSAIDS may be associated with progression and acute use is associated with a reversible fall in GFR. Caution should therefore be exercised and their effects on GFR monitored, particularly in people with a low baseline GFR and/or in the presence of other risks for progression.

1.4 Referral criteria

1.4.1 Indications for referral to specialist care

1.4.1.1 People with CKD in the following groups should usually be referred for specialist assessment:

- Stage 4 and 5 CKD (with or without diabetes)
- Heavy proteinuria (ACR ≥ 70 mg/mmol, equivalent to proteinuria of 1g/24 hrs) unless explained by diabetes and already appropriately treated
- Proteinuria (ACR ≥ 30 mg/mmol, equivalent to proteinuria of 0.5g/24hr) and haematuria
- Rapidly declining eGFR (> 5 ml/min/1.73m² in one year or less, or >10 ml/min/1.73m² over 5 years or less)
- Hypertension that remains poorly controlled despite the use of at least 4 anti-hypertensive drugs at therapeutic doses (see NICE clinical guideline 34, Hypertension: management of hypertension in adults in primary care)
- People with, or suspected of having rare or genetic causes of CKD

- Suspected renal artery stenosis (i.e following ultrasound scan or fall in GFR on initiating ACE therapy).

- 1.4.1.2 In some cases discussion of management issues with a specialist by letter or telephone may be most appropriate and it may not always be necessary for the person to be seen by the specialist.
- 1.4.1.3 Once a referral has been made and a plan jointly agreed, routine follow up in a specialist clinic may not be necessary; however criteria for future referral should be specified.
- 1.4.1.4 There are no absolute criteria for referral and referring clinicians should take into account an individual's wishes and comorbidities when considering referral.
- 1.4.1.5 People with CKD and renal outflow obstruction should normally be referred to urological services, unless urgent medical intervention is required.

1.5 Self management

1.5.1 Modification of lifestyle

- 1.5.1.1 People with CKD should be encouraged to take exercise, achieve a healthy weight and stop smoking.

1.5.2 Dietary intervention and renal outcomes

- 1.5.2.1 The risks and benefits of dietary protein restriction (protein intake <0.6 g/kg/day) in people with advanced CKD should be discussed with the individual with particular reference to retarding progression of disease versus protein-calorie malnutrition.
- 1.5.2.2 Where dietary restriction is prescribed this needs to be done within the context of education, detailed dietary assessment and supervision to ensure malnutrition is prevented.

1.6 *Blood pressure control*

1.6.1 Blood pressure control in people with CKD

- 1.6.1.1 In people with CKD aim to keep the systolic blood pressure between 120 mmHg and 140 mmHg and the diastolic blood pressure between 70 mmHg and 90 mmHg.
- 1.6.1.2 In people with diabetes and CKD or when the ACR is ≥ 30 mg/mmol, (equivalent to proteinuria of ≥ 0.5 g/day) aim to keep the systolic blood pressure between 120 mmHg and 130 mmHg and the diastolic blood pressure between 70 mmHg and 80 mmHg
- 1.6.1.3 If the systolic and diastolic blood pressure cannot both be kept in the desirable ranges priority should be given to achieving control of the systolic blood pressure.

1.6.2 Choice of anti-hypertensive agents for blood pressure control in people with CKD

- 1.6.2.1 Adults with diabetes and ACR >2.5 mg/mmol (men) or >3.5 mg/mmol (women) should be treated with ACEI/ARBs irrespective of the presence of hypertension or CKD stage.
- 1.6.2.2 People with non-diabetic CKD and ACR ≥ 30 mg/mmol should be treated with ACEI/ARBs irrespective of the presence of hypertension or cardiovascular disease.
- 1.6.2.3 In people with CKD without diabetes and ACR < 30 mg/mmol there is insufficient evidence to recommend for treatment with ACEI/ARBs to prevent or ameliorate progression of CKD.
- 1.6.2.4 The dose of ACEi/ARB should be titrated to the maximum tolerated therapeutic dose before addition of a second line agent.
- 1.6.2.5 To improve adherence, people who are prescribed ACEI or ARB therapy should be informed about the importance of:
 - achieving the optimal tolerated dose of ACEI/ARB

and

- monitoring GFR and serum potassium in achieving this safely.

1.6.3 Practicalities of treatment with ACEI/ARBs in people with CKD

- 1.6.3.1 Serum K⁺ concentrations and GFR should be measured prior to starting ACEI/ARB therapy and repeated between 1 and 2 weeks after starting ACEI/ARB therapy and after each dose increase.
- 1.6.3.2 ACEI/ARB therapy should not normally be started if the pre-treatment serum K⁺ concentration is above the normal reference range (typically > 5.0 mmol/l).
- 1.6.3.3 When hyperkalaemia precludes use of ACEI/ARBs assessment and exclusion of other factors known to promote hyperkalaemia should be undertaken and potassium levels re-checked.
- 1.6.3.4 Concurrent prescription of drugs known to promote hyperkalaemia is not a contraindication to use of ACEI/ARBs but more frequent monitoring of potassium levels may be required.
- 1.6.3.5 ACEI/ARB therapy should be stopped if the serum K⁺ concentration rises above 6.0 mmol/l and other drugs known to promote hyperkalaemia have been discontinued.
- 1.6.3.6 The ACEI/ARB dose does not need modifying if the GFR decrease (from baseline) is < 25% after starting ACEI/ARB therapy and/or after reaching the end of a dose titration.
- 1.6.3.7 If the fall in GFR after starting ACEI/ARB therapy or reaching the end of a dose titration of ACE and ARB is less than 25% of baseline GFR should be rechecked in 4-6 weeks. If the fall:
- remains less than 25% compared to baseline the ACEI/ARB dose does not need modifying

- exceeds 25% compared to baseline and the blood pressure is in the recommended range the dose of ACEI/ARB should be halved and other agents added to maintain blood pressure control, if required.

1.6.3.8 If the fall in GFR after starting ACEI/ARB therapy or reaching the end of a dose titration is 25% or more:

- other causes of a fall in GFR such as volume depletion or concurrent medication (e.g. NSAIDs) should be excluded
- if no other cause for the fall in GFR is found the ACEI/ARB therapy should be stopped or the dose halved if a lower dose was previously tolerated.

1.6.4 Considerations of age in prescription of ACEI/ARB therapy

1.6.4.1 Where indicated, the use of ACEI/ARBs should not be influenced by a person's age as there is no evidence that their appropriate use in older people is associated with a greater risk of adverse effects.

1.6.5 The role of aldosterone antagonism in people with CKD

1.6.5.1 There is insufficient evidence to recommend the routine use of spironolactone in addition to ACEI and ARB therapy to prevent or ameliorate progression of CKD.

1.7 *Decreasing/preventing proteinuria*

1.7.1 Statin therapy and reduction in proteinuria

1.7.1.1 Patients with a GFR less than 60 ml/min/1.73m² and ACR ≥30 mg/mmol should be treated with statins to reduce proteinuria.

1.8 *Reducing cardiovascular disease*

1.8.1 Lipid lowering in people with CKD

1.8.1.1 The use of statin therapy for primary prevention of CVD in people with CKD should not differ from its use in people without CKD and should be based on existing risk tables recommended for people with and without diabetes. It should be understood that the Framingham risk tables significantly underestimate risk in people with CKD¹.

1.8.1.2 Statin therapy should be offered in secondary prevention of CVD in people with CKD irrespective of baseline lipid values.

1.8.2 Anti-platelet therapy and anti-coagulation in people with CKD

1.8.2.1 People with CKD should be offered treatment with anti-platelet drugs for secondary prevention of CVD. CKD is not a contraindication to the use of low dose aspirin but clinicians should be aware of the increased risk of minor bleeding in people with CKD given multiple anti-platelet drugs.

1.9 *Asymptomatic hyperuricaemia*

1.9.1 Asymptomatic hyperuricaemia in people with CKD

1.9.1.1 There is insufficient evidence to recommend the routine use of drugs to lower uric acid in people with CKD who have asymptomatic hyperuricaemia.

¹ The Study of Heart and Renal Protection (SHARP) is an international multi-centre randomised controlled trial to determine the effects of lowering blood cholesterol with a combination of simvastatin (20mg daily) and the cholesterol-absorption inhibitor ezetimibe (10mg daily) on the risk of major vascular events among people with CKD who do not have established coronary heart disease. The study also aims to assess the effect of lowering cholesterol on the rate of loss of GFR in people with CKD.

1.10 *Managing isolated microscopic haematuria*

1.10.1 Isolated invisible (microscopic) haematuria

- 1.10.1.1 Persistent invisible haematuria in the absence of proteinuria should be differentiated from transient haematuria on the basis of 2 out of 3 positive reagent strip tests.
- 1.10.1.2 Persistent invisible haematuria should prompt exclusion of renal and bladder carcinoma in appropriate age groups.
- 1.10.1.3 Persistent invisible haematuria in the absence of proteinuria should be followed up annually with repeat testing for haematuria, ACR, GFR and blood pressure monitoring as long as the haematuria persists.

1.11 *Specific complications of CKD - renal bone disease*

1.11.1 Monitoring levels of calcium, phosphate, vitamin D and parathyroid hormone levels in people with CKD

- 1.11.1.1 There is no requirement to routinely measure calcium, phosphate, PTH and Vitamin D levels in people with stage 1, 2 and 3A and 3B CKD.
- 1.11.1.2 Calcium, phosphate and PTH should be measured in people with stage 4 and 5 CKD (GFR < 30 ml/min/1.73m²). The subsequent frequency of testing should be determined by the measured values and the clinical circumstances.

1.11.2 Risks and benefits of bisphosphonates for preventing osteoporosis in adults with CKD

- 1.11.2.1 Offer bisphosphonates if indicated for the prevention and treatment of osteoporosis in people with CKD stage 1-3B.

1.11.3 Vitamin D supplementation in people with CKD

- 1.11.3.1 When Vitamin D supplementation is indicated in people with CKD

- colecalciferol or ergocalciferol should be used in people with stage 1, 2, 3A and 3B CKD
- 1α hydroxycholecalciferol and 1,25-dihydroxycholecalciferol should be reserved for people with stage 4 and 5 CKD.

1.11.3.2 Serum calcium concentrations should be monitored in people receiving 1α hydroxycholecalciferol or 1,25-dihydroxycholecalciferol supplementation.

1.12 Specific complications of CKD - anaemia

1.12.1 Anaemia identification in people with CKD

1.12.1.1 If not already measured people with stage 3B, 4 & 5 CKD should have their haemoglobin level checked to identify anaemia (Hb <11 g/dL – see NICE clinical guideline 39: Anaemia management in people with chronic kidney disease).

1.13 Information needs

1.13.1 Information, education and support for people with CKD and their carers

1.13.1.1 People with CKD should be offered education and information tailored to the stage and cause of CKD, the associated complications and the risk of progression. When information or education programmes are being developed people with CKD should be involved in their development from the outset. Suggested topics are:

- What is CKD and how does it affect people?
- What questions people should ask about their kidneys when they attend clinic
- What treatments are available for CKD, what are their advantages and disadvantages and what complications or side effects may occur as a result of treatment/ medication

- What people can do to manage and influence their own condition.
- Information about the ways in which CKD and the treatment may affect peoples' daily life, social activities, work opportunities and financial situation, including benefits and allowances available.
- Information about how to cope with and adjust to CKD and sources of psychological support.
- When appropriate, information about the renal replacement therapy (such as the frequency and length of time of dialysis treatment sessions or exchanges and pre-emptive transplantation), and the preparation required (such as having a fistula, or peritoneal catheter).

1.13.1.2 People with CKD need to be offered high quality education at appropriate stages of their condition to allow time for them to fully understand and make informed choices about their treatment.

1.13.1.3 Health professionals providing information and education programmes should ensure that they have the necessary skills to facilitate learning in addition to specialist knowledge about CKD.

1.13.1.4 Health professionals working with people with CKD should take account of the psychological aspects of coping with the condition and offer access to appropriate support.

1.13.2 Available tools to aid identification and maximise effectiveness of treatment and management of CKD

1.13.2.1 No recommendations were made by the group.

2 Notes on the scope of the guidance

NICE guidelines are developed in accordance with a scope that defines what the guideline will and will not cover. The scope of this guideline is available from <http://www.nice.org.uk/guidance/index.jsp?action=download&o=34402>.

Groups that will be covered

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- a) The guideline will offer best practice advice on the care of adults with a diagnosis of CKD and their referral to specialist nephrology services.
- b) The guideline will cover the general management of CKD resulting from a variety of causes including:
- Diabetes
 - Hypertension and cardiovascular disease
 - Glomerulonephritis
 - Renovascular disease
 - Genetic causes
 - Obstructive uropathy
 - Drug-induced renal disease.

Groups that will not be covered

- a) Children (aged <16 years).
- b) People receiving RRT (management of end-stage renal failure by dialysis or kidney transplant)
- c) People with acute kidney injury and rapidly progressive glomerulonephritis.

How this guideline was developed

NICE commissioned the National Collaborating Centre for [add full name] to develop this guideline. The Centre established a Guideline Development Group (see appendix A), which reviewed the evidence and developed the recommendations. An independent Guideline Review Panel oversaw the development of the guideline (see appendix B).

There is more information in the booklet: 'The guideline development process: an overview for stakeholders, the public and the NHS' (third edition, published April 2007), which is available from www.nice.org.uk/guidelinesprocess or by telephoning 0870 1555 455 (quote reference N1233).

3 Implementation

The Healthcare Commission assesses the performance of NHS organisations in meeting core and developmental standards set by the Department of Health in 'Standards for better health', issued in July 2004. Implementation of clinical guidelines forms part of the developmental standard D2. Core standard C5 says that national agreed guidance should be taken into account when NHS organisations are planning and delivering care.

NICE has developed tools to help organisations implement this guidance (listed below). These are available on our website (www.nice.org.uk/CGXXX).

[NICE to amend list as needed at time of publication]

- Slides highlighting key messages for local discussion.
- Costing tools:
 - costing report to estimate the national savings and costs associated with implementation
 - costing template to estimate the local costs and savings involved.
- Implementation advice on how to put the guidance into practice and national initiatives that support this locally.
- Audit criteria to monitor local practice.

4 Research recommendations

The Guideline Development Group has made the following recommendations for research, based on its review of evidence, to improve NICE guidance and patient care in the future. The Guideline Development Group's full set of research recommendations is detailed in the full guideline (see section 5).

4.1 *Measurement of kidney function*

It is recommended that research is undertaken to identify more accurate and cost effective methods of monitoring kidney function, especially in patients with GFR >60 ml/min/1.73m²

Why this is important

Although the use of prediction equations to estimate GFR from measurement of serum creatinine has proved to be a simple and cheap method to detect abnormal kidney function the limitations of serum creatinine as a marker of kidney disease are well known. The major advantages of creatinine are that it is an endogenous marker of kidney disease and it fulfils some, but not all, of the essential criteria for assessment of kidney function. We know that there are a number of other endogenous markers, for example cystatin C, that can be potentially used as measures of kidney function. Research needs to be directed towards finding an endogenous marker that reliably and accurately reflects underlying GFR, is simple and cheap to assay, but crucially also has low biological and analytical variability.

4.2 *Cardiovascular risk in people with CKD*

Evidence is required to better elucidate the mechanisms leading to increased risk of CVD in patients with CKD and to thus enable calculation of CVD risk in people with CKD

Why this is important

We know that people with CKD have an increased prevalence of cardiovascular disease and that they are far more likely to die from a CVD-related cause than they are to progress to established kidney failure. The mechanisms driving this increased cardiovascular risk are still poorly understood. Whilst some traditional CVD risk factors such as hypertension clearly play a role the prediction of cardiovascular risk using existing risk prediction models developed in people without CKD is flawed. Research is urgently required to elucidate the mechanisms that increase CVD risk in people with CKD and to determine the relative contribution of the key factors.

4.3 *ACEi/ARB therapy for low levels of proteinuria*

There is an urgent need to clarify the benefits of treatment with ACEi/ARB in non-diabetic CKD patients with lower levels of proteinuria.

Why this is important

The benefits of ACEI/ARB therapy for people with diabetes with microalbuminuria and all levels of macroalbuminuria are well established. It is also established that ACEI/ARB therapy for people with significant proteinuria (ACR>30 mg/mmol, equivalent to proteinuria >0.5g/day) without diabetes is beneficial. We do not yet know whether ACEI/ARB therapy in people without diabetes and with lower levels of proteinuria in the absence of cardiovascular indications is of additional benefit over and above good blood pressure control. It is also possible that use of ACEI/ARB therapy in this group of people with CKD may have an overall detrimental effect. There is a need for well conducted RCTs to establish the risk:benefit ratio in this group.

4.4 *Does age matter in CKD?*

Further research is required to determine the impact of age and gender on outcomes stratified by level of GFR and presence or absence of proteinuria.

Why this is important

We know that CKD is increasingly prevalent with increased age, and that the female gender is predominant in older age groups with CKD. Some suggest that this is largely a function of ageing and an epiphenomenon of the use of the MDRD equation to estimate GFR, whilst others maintain that this is a true effect. Studies are required to clearly determine the impact of age and gender on adverse outcomes in people with CKD. These studies should include stratification by level of GFR and presence or absence of proteinuria in their design.

4.5 *Validation of estimating equations in differing CKD populations*

There is a need to validate eGFR equations in ethnic groups other than Caucasians and African-Caribbeans and amongst older people.

Why this is important

Although the use of the MDRD equation is recommended and indeed already widely applied the population it was developed in is not representative of all

those with CKD. The same criticism may be levied for other prediction equations used to estimate GFR. There is therefore a need to validate these estimating equations in all populations with CKD, in particular those not represented in the MDRD study, such as the older population.

5 Other versions of this guideline

5.1 Full guideline

The full guideline, ['Full guideline title' (in quotes, no italics)] contains details of the methods and evidence used to develop the guideline. It is published by the National Collaborating Centre for Chronic Conditions, and is available from www.rcplondon.ac.uk/college/NCC-CC, our website (www.nice.org.uk/CGXXXfullguideline) and the National Library for Health (www.nlh.nhs.uk). **[Note: these details will apply to the published full guideline.]**

5.2 Quick reference guide

A quick reference guide for healthcare professionals is available from www.nice.org.uk/CGXXXquickrefguide

For printed copies, phone the NHS Response Line on 0870 1555 455 (quote reference number N1XXX). **[Note: these details will apply when the guideline is published.]**

5.3 'Understanding NICE guidance'

Information for patients and carers ('Understanding NICE guidance') is available from www.nice.org.uk/CGXXXpublicinfo

For printed copies, phone the NHS Response Line on 0870 1555 455 (quote reference number N1XXX). **[Note: these details will apply when the guideline is published.]**

We encourage NHS and voluntary sector organisations to use text from this booklet in their own information about chronic kidney disease.

6 Related NICE guidance

Published

Anaemia management in chronic kidney disease. NICE clinical guideline 39 (2006). Available from www.nice.org.uk/CG39

Hypertension: management of hypertension in adults in primary care. NICE clinical guideline 34 (2006). Available from www.nice.org.uk/CG34

Brief interventions and referral for smoking cessation in primary care and other settings. NICE public health intervention guidance 001 (2006). Available from www.nice.org.uk/PHI001

Under development

NICE is developing the following guidance (details available from www.nice.org.uk):

- Type 2 diabetes: management of type 2 diabetes (update). NICE clinical guideline (publication expected May 2008).
- Lipid Modification: Cardiovascular risk assessment: the modification of blood lipids for the primary and secondary prevention of cardiovascular disease. NICE clinical guidance (publication expected May 2008).
- Osteoporosis: assessment of fracture risk and the prevention of osteoporotic fractures in individuals at high risk. NICE clinical guideline (publication date to be confirmed)

7 Updating the guideline

NICE clinical guidelines are updated as needed so that recommendations take into account important new information. We check for new evidence 2 and 4 years after publication, to decide whether all or part of the guideline should be updated. If important new evidence is published at other times, we may decide to do a more rapid update of some recommendations.

Appendix A: The Guideline Development Group

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Dr David Stephens

General Practitioner, Royal College of General Practitioners

Dr Ivan Benett

General Practitioner, Royal College of General Practitioners

Dr Indranil Dasgupta

Invited to contribute at a specific meeting as an expert representing the Type 2 Diabetes Guideline but was not a full member of the GDG.

Dr Marta Lapsley

Acted as a deputy for Dr Edmund Lamb at a GDG meeting, representing the The Association for Clinical Biochemistry.

Dr Claire Beeson

Acted as a deputy for Dr Shelagh O'Riordan at a GDG meeting, representing the The British Geriatrics Society.

Dr Kanchana Imrapur

Acted as a deputy for Dr David Stephens at a GDG meeting, representing the Royal College of General Practitioners.

Dr Patrick Fitzgerald

Acted as a deputy for Dr Ivan Bennett at a GDG meeting, representing the Royal College of General Practitioners.

Ms Nicola Thomas

Acted as a deputy for Ms Natasha McIntyre at a GDG meeting, representing the The British Renal Society/ CKD Forum.

Dr Neil Iggo

Acted as a deputy for Dr Lawrence Goldberg at a GDG meeting, representing The Renal Association.

Appendix B: The Guideline Review Panel

The Guideline Review Panel is an independent panel that oversees the development of the guideline and takes responsibility for monitoring adherence to NICE guideline development processes. In particular, the panel ensures that stakeholder comments have been adequately considered and responded to. The panel includes members from the following perspectives: primary care, secondary care, lay, public health and industry.

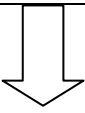
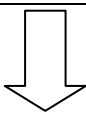
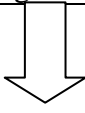
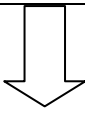
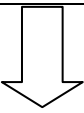
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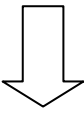
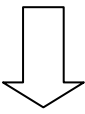
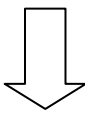
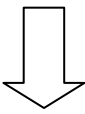
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Appendix C: The algorithms

Algorithm A: Management of chronic kidney disease by stages

Stage 1 & 2	Stage 3a	Stage 3b	Stage 4	Stage 5
				
Early identification	Delay progression	Delay progression	Delay progression	Delay progression
Prevent/delay progression	Prevent cardiovascular disease	Prevent cardiovascular disease	Modify comorbidities	Modify comorbidities
Prevent cardiovascular disease	Modify comorbidities	Modify comorbidities	Prevent uraemic complications	Prevent uraemic complications
Modify comorbidities	Psychosocial support	Prevent uraemic complications	Education	Prepare for RRT
		Psychosocial support	Psychosocial support	Psychosocial support

Delay Progression	Modify comorbidities	Prevent/manage uraemic complications	Prepare for RRT
			
ACEI/ARBs	Cardiovascular disease	Cardiovascular disease	Education
BP control	Lipid control	Anaemia	Informed choice Timely access placement
Reduction of proteinuria	Exercise Smoking cessation	Malnutrition Acidosis	
Glucose control	Anti-platelet agents	Bone disease	Timely RRT

DRAFT FOR CONSULTATION

See separate documents for;

Algorithm B - Diagnosis and referral of patients with chronic kidney disease and without diabetes

Algorithm C - Diagnosis and referral of patients with diabetes and chronic kidney disease

These are available on the NICE website