NICE National Institute for Health and Care Excellence

NICE guideline

Hypertension in adults: diagnosis and management

Clinical guideline

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Contents

This guideline replaces CG34 and CG18.

This guideline is the basis of QS28.

Introduction

This guidance updates and replaces NICE clinical guideline 34 (published in 2006). NICE clinical guideline 34 updated and replaced NICE clinical guideline 18 (published in 2004).

High blood pressure (hypertension) is one of the most important preventable causes of premature morbidity and mortality in the UK. Hypertension is a major risk factor for ischaemic and haemorrhagic stroke, myocardial infarction, heart failure, chronic kidney disease, cognitive decline and premature death. Untreated hypertension is usually associated with a progressive rise in blood pressure. The vascular and renal damage that this may cause can culminate in a treatment-resistant state.

Blood pressure is normally distributed in the population and there is no natural cut-off point above which 'hypertension' definitively exists and below which it does not. The risk associated with increasing blood pressure is continuous, with each 2 mmHg rise in systolic blood pressure associated with a 7% increased risk of mortality from ischaemic heart disease and a 10% increased risk of mortality from stroke. Hypertension is remarkably common in the UK and the prevalence is strongly influenced by age. In any individual person, systolic and/or diastolic blood pressures may be elevated. Diastolic pressure is more commonly elevated in people younger than 50. With ageing, systolic hypertension becomes a more significant problem, as a result of progressive stiffening and loss of compliance of larger arteries. At least one quarter of adults (and more than half of those older than 60) have high blood pressure.

The clinical management of hypertension is one of the most common interventions in primary care, accounting for approximately £1 billion in drug costs alone in 2006.

The guideline will assume that prescribers will use a drug's summary of product characteristics to inform decisions made with individual patients.

This guideline recommends drugs for indications for which they do not have a UK marketing authorisation at the date of publication, if there is good evidence to support that use. Where

recommendations have been made for the use of drugs outside their licensed indications ('off-label use'), these drugs are marked with a footnote in the recommendations.

Changes in this update

Recommendations are marked as **[2004]**, **[2004, amended 2011]**, **[2006]**, **[2008]**, **[2009]**, **[2010]** or **[new 2011]**.

- **[2004]** indicates that the evidence has not been updated and reviewed since 2004
- **[2004, amended 2011]** indicates that the evidence has not been updated and reviewed since 2004 but a small amendment has been made to the recommendation
- **[2006]** indicates that the evidence has not been updated and reviewed since 2006
- **[2008]** applies to recommendations from 'Lipid modification' (NICE clinical guideline 67), published in 2008
- **[2009]** applies to recommendations from 'Medicines adherence' (NICE clinical guideline 76), published in 2009
- **[2010]** applies to recommendations from 'Hypertension in pregnancy' (NICE clinical guideline 107), published in 2010
- **[new 2011]** indicates that the evidence has been reviewed and the recommendation has been updated or added.

Person-centred care

This guideline offers best practice advice on the care of adults with hypertension.

Treatment and care should take into account people's needs and preferences. People with hypertension should have the opportunity to make informed decisions about their care and treatment, in partnership with their healthcare professionals. If people do not have the capacity to make decisions, healthcare professionals should follow the Department of Health's advice on consent and the code of practice that accompanies the Mental Capacity Act. In Wales, healthcare professionals should follow advice on consent from the Welsh Government.

Good communication between healthcare professionals and people with hypertension is essential. It should be supported by evidence-based written information tailored to the person's needs. Treatment and care, and the information people 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 person 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

The following recommendations have been identified as priorities for implementation.

Diagnosing hypertension

- If the clinic blood pressure is 140/90 mmHg or higher, offer ambulatory blood pressure monitoring (ABPM) to confirm the diagnosis of hypertension. **[new 2011]**
- When using ABPM to confirm a diagnosis of hypertension, ensure that at least two measurements per hour are taken during the person's usual waking hours (for example, between 08:00 and 22:00).

Use the average value of at least 14 measurements taken during the person's usual waking hours to confirm a diagnosis of hypertension. **[new 2011]**

- When using home blood pressure monitoring (HBPM) to confirm a diagnosis of hypertension, ensure that:
  - for each blood pressure recording, two consecutive measurements are taken, at least 1 minute apart and with the person seated **and**
  - blood pressure is recorded twice daily, ideally in the morning and evening **and**
  - blood pressure recording continues for at least 4 days, ideally for 7 days.

    Discard the measurements taken on the first day and use the average value of all the remaining measurements to confirm a diagnosis of hypertension. **[new 2011]**

Initiating and monitoring antihypertensive drug treatment, including blood pressure targets

Initiating treatment

- Offer antihypertensive drug treatment to people aged under 80 years with stage 1 hypertension who have one or more of the following:
  - target organ damage
  - established cardiovascular disease

  - renal disease
  - diabetes
  - a 10-year cardiovascular risk equivalent to 20% or greater. **[new 2011]**

- Offer antihypertensive drug treatment to people of any age with stage 2 hypertension. **[new 2011]**
- For people aged under 40 years with stage 1 hypertension and no evidence of target organ damage, cardiovascular disease, renal disease or diabetes, consider seeking specialist evaluation of secondary causes of hypertension and a more detailed assessment of potential target organ damage. This is because 10-year cardiovascular risk assessments can underestimate the lifetime risk of cardiovascular events in these people. **[new 2011]**

Monitoring treatment and blood pressure targets

- For people identified as having a 'white-coat effect'[1], consider ABPM or HBPM as an adjunct to clinic blood pressure measurements to monitor the response to antihypertensive treatment with lifestyle modification or drugs. **[new 2011]**

Choosing antihypertensive drug treatment

- Offer people aged 80 years and over the same antihypertensive drug treatment as people aged 55–80 years, taking into account any comorbidities. **[new 2011]**

Step 1 treatment

- Offer step 1 antihypertensive treatment with a calcium-channel blocker (CCB) to people aged over 55 years and to black people of African or Caribbean family origin of any age. If a CCB is not suitable, for example because of oedema or intolerance, or if there is evidence of heart failure or a high risk of heart failure, offer a thiazide-like diuretic. **[new 2011]**
- If diuretic treatment is to be initiated or changed, offer a thiazide-like diuretic, such as chlortalidone (12.5–25.0 mg once daily) or indapamide (1.5 mg modified-release or 2.5 mg once daily) in preference to a conventional thiazide diuretic such as bendroflumethiazide or hydrochlorothiazide. **[new 2011]**
- For people who are already having treatment with bendroflumethiazide or hydrochlorothiazide and whose blood pressure is stable and well controlled, continue treatment with the bendroflumethiazide or hydrochlorothiazide. **[new 2011]**

Step 4 treatment

- For treatment of resistant hypertension at step 4:
  - Consider further diuretic therapy with low-dose spironolactone (25 mg once daily)[2] if the blood potassium level is 4.5 mmol/l or lower. Use particular caution in people with a reduced estimated glomerular filtration rate because they have an increased risk of hyperkalaemia.
  - Consider higher-dose thiazide-like diuretic treatment if the blood potassium level is higher than 4.5 mmol/l. **[new 2011]**

[1] A discrepancy of more than 20/10 mmHg between clinic and average daytime ABPM or average HBPM blood pressure measurements at the time of diagnosis.

[2] At the time of publication (August 2011), spironolactone did not have UK marketing authorisation for this indication. Informed consent should be obtained and documented.

1 Guidance

The following guidance is based on the best available evidence. The full guideline gives details of the methods and the evidence used to develop the guidance.

Definitions

In this guideline the following definitions are used.

- **Stage 1 hypertension** Clinic blood pressure is 140/90 mmHg or higher **and** subsequent ambulatory blood pressure monitoring (ABPM) daytime average or home blood pressure monitoring (HBPM) average blood pressure is 135/85 mmHg or higher.
- **Stage 2 hypertension** Clinic blood pressure is 160/100 mmHg or higher **and** subsequent ABPM daytime average or HBPM average blood pressure is 150/95 mmHg or higher.
- **Severe hypertension** Clinic systolic blood pressure is 180 mmHg or higher **or** clinic diastolic blood pressure is 110 mmHg or higher.

1.1 Measuring blood pressure

1.1.1 Healthcare professionals taking blood pressure measurements need adequate initial training and periodic review of their performance. [2004]

1.1.2 Because automated devices may not measure blood pressure accurately if there is pulse irregularity (for example, due to atrial fibrillation), palpate the radial or brachial pulse before measuring blood pressure. If pulse irregularity is present, measure blood pressure manually using direct auscultation over the brachial artery. [new 2011]

1.1.3 Healthcare providers must ensure that devices for measuring blood pressure are properly validated, maintained and regularly recalibrated according to manufacturers' instructions. [2004]

1.1.4 When measuring blood pressure in the clinic or in the home, standardise the environment and provide a relaxed, temperate setting, with the person quiet and seated, and their arm outstretched and supported. [new 2011]

1.1.5 If using an automated blood pressure monitoring device, ensure that the device is validated[3] and an appropriate cuff size for the person's arm is used. **[new 2011]**

1.1.6 In people with symptoms of postural hypotension (falls or postural dizziness):

- measure blood pressure with the person either supine or seated
- measure blood pressure again with the person standing for at least 1 minute prior to measurement. **[2004, amended 2011]**

1.1.7 If the systolic blood pressure falls by 20 mmHg or more when the person is standing:

- review medication
- measure subsequent blood pressures with the person standing
- consider referral to specialist care if symptoms of postural hypotension persist. **[2004, amended 2011]**

1.2 Diagnosing hypertension

1.2.1 When considering a diagnosis of hypertension, measure blood pressure in both arms.

- If the difference in readings between arms is more than 20 mmHg, repeat the measurements.
- If the difference in readings between arms remains more than 20 mmHg on the second measurement, measure subsequent blood pressures in the arm with the higher reading. **[new 2011]**

1.2.2 If blood pressure measured in the clinic is 140/90 mmHg or higher:

- Take a second measurement during the consultation.
- If the second measurement is substantially different from the first, take a third measurement.

Record the lower of the last two measurements as the clinic blood pressure. **[new 2011]**

1.2.3 If the clinic blood pressure is 140/90 mmHg or higher, offer ambulatory blood pressure monitoring (ABPM) to confirm the diagnosis of hypertension. **[new 2011]**

1.2.4 If a person is unable to tolerate ABPM, home blood pressure monitoring (HBPM) is a suitable alternative to confirm the diagnosis of hypertension. **[new 2011]**

1.2.5 If the person has severe hypertension, consider starting antihypertensive drug treatment immediately, without waiting for the results of ABPM or HBPM. **[new 2011]**

1.2.6 While waiting for confirmation of a diagnosis of hypertension, carry out investigations for target organ damage (such as left ventricular hypertrophy, chronic kidney disease and hypertensive retinopathy) (see recommendation 1.3.3) and a formal assessment of cardiovascular risk using a cardiovascular risk assessment tool (see recommendation 1.3.2). **[new 2011]**

1.2.7 If hypertension is not diagnosed but there is evidence of target organ damage such as left ventricular hypertrophy, albuminuria or proteinuria, consider carrying out investigations for alternative causes of the target organ damage. **[new 2011]**

1.2.8 If hypertension is not diagnosed, measure the person's clinic blood pressure at least every 5 years subsequently, and consider measuring it more frequently if the person's clinic blood pressure is close to 140/90 mmHg. **[new 2011]**

1.2.9 When using ABPM to confirm a diagnosis of hypertension, ensure that at least two measurements per hour are taken during the person's usual waking hours (for example, between 08:00 and 22:00).Use the average value of at least 14 measurements taken during the person's usual waking hours to confirm a diagnosis of hypertension. **[new 2011]**

1.2.10 When using HBPM to confirm a diagnosis of hypertension, ensure that:

- for each blood pressure recording, two consecutive measurements are taken, at least 1 minute apart and with the person seated **and**
- blood pressure is recorded twice daily, ideally in the morning and evening **and**
- blood pressure recording continues for at least 4 days, ideally for 7 days.

  Discard the measurements taken on the first day and use the average value of all the remaining measurements to confirm a diagnosis of hypertension. **[new 2011]**

1.2.11 Refer the person to specialist care the same day if they have:

- accelerated hypertension, that is, blood pressure usually higher than 180/110 mmHg with signs of papilloedema and/or retinal haemorrhage **or**
- suspected phaeochromocytoma (labile or postural hypotension, headache, palpitations, pallor and diaphoresis). **[2004, amended 2011]**

1.2.12 Consider the need for specialist investigations in people with signs and symptoms suggesting a secondary cause of hypertension. **[2004, amended 2011]**

1.3 Assessing cardiovascular risk and target organ damage

For NICE guidance on the early identification and management of chronic kidney disease see 'Chronic kidney disease' (NICE clinical guideline 73, 2008).

1.3.1 Use a formal estimation of cardiovascular risk to discuss prognosis and healthcare options with people with hypertension, both for raised blood pressure and other modifiable risk factors. **[2004]**

1.3.2 Estimate cardiovascular risk in line with the recommendations on Identification and assessment of CVD risk in 'Lipid modification' (NICE clinical guideline 67)[4]. **[2008]**

1.3.3 For all people with hypertension offer to:

- test for the presence of protein in the urine by sending a urine sample for estimation of the albumin:creatinine ratio and test for haematuria using a reagent strip

- take a blood sample to measure plasma glucose, electrolytes, creatinine, estimated glomerular filtration rate, serum total cholesterol and HDL cholesterol
- examine the fundi for the presence of hypertensive retinopathy
- arrange for a 12-lead electrocardiograph to be performed. **[2004, amended 2011]**

1.4 Lifestyle interventions

For NICE guidance on the prevention of obesity and cardiovascular disease see 'Obesity' (NICE clinical guideline 43, 2006) and 'Prevention of cardiovascular disease at population level' (NICE public health guidance 25, 2010).

1.4.1 Lifestyle advice should be offered initially and then periodically to people undergoing assessment or treatment for hypertension. **[2004]**

1.4.2 Ascertain people's diet and exercise patterns because a healthy diet and regular exercise can reduce blood pressure. Offer appropriate guidance and written or audiovisual materials to promote lifestyle changes. **[2004]**

1.4.3 Relaxation therapies can reduce blood pressure and people may wish to pursue these as part of their treatment. However, routine provision by primary care teams is not currently recommended. **[2004]**

1.4.4 Ascertain people's alcohol consumption and encourage a reduced intake if they drink excessively, because this can reduce blood pressure and has broader health benefits. **[2004]**

1.4.5 Discourage excessive consumption of coffee and other caffeine-rich products. **[2004]**

1.4.6 Encourage people to keep their dietary sodium intake low, either by reducing or substituting sodium salt, as this can reduce blood pressure. **[2004]**

1.4.7 Do not offer calcium, magnesium or potassium supplements as a method for reducing blood pressure. **[2004]**

1.4.8 Offer advice and help to smokers to stop smoking. **[2004]**

1.4.9 A common aspect of studies for motivating lifestyle change is the use of group working. Inform people about local initiatives by, for example, healthcare teams or patient organisations that provide support and promote healthy lifestyle change. **[2004]**

1.5 Initiating and monitoring antihypertensive drug treatment, including blood pressure targets

Initiating treatment

1.5.1 Offer antihypertensive drug treatment to people aged under 80 years with stage 1 hypertension who have one or more of the following:

- target organ damage
- established cardiovascular disease
- renal disease
- diabetes
- a 10-year cardiovascular risk equivalent to 20% or greater. **[new 2011]**

1.5.2 Offer antihypertensive drug treatment to people of any age with stage 2 hypertension. **[new 2011]**

1.5.3 For people aged under 40 years with stage 1 hypertension and no evidence of target organ damage, cardiovascular disease, renal disease or diabetes, consider seeking specialist evaluation of secondary causes of hypertension and a more detailed assessment of potential target organ damage. This is because 10-year cardiovascular risk assessments can underestimate the lifetime risk of cardiovascular events in these people. **[new 2011]**

Monitoring treatment and blood pressure targets

1.5.4 Use clinic blood pressure measurements to monitor the response to antihypertensive treatment with lifestyle modifications or drugs. **[new 2011]**

1.5.5 Aim for a target clinic blood pressure below 140/90 mmHg in people aged under 80 years with treated hypertension. **[new 2011]**

1.5.6 Aim for a target clinic blood pressure below 150/90 mmHg in people aged 80 years and over, with treated hypertension. **[new 2011]**

1.5.7 For people identified as having a 'white-coat effect'[5], consider ABPM or HBPM as an adjunct to clinic blood pressure measurements to monitor the response to antihypertensive treatment with lifestyle modification or drugs. **[new 2011]**

1.5.8 When using ABPM or HBPM to monitor response to treatment (for example, in people identified as having a 'white coat effect'[5] and people who choose to monitor their blood pressure at home), aim for a target average blood pressure during the person's usual waking hours of:

- below 135/85 mmHg for people aged under 80 years
- below 145/85 mmHg for people aged 80 years and over. **[new 2011]**

1.6 Choosing antihypertensive drug treatment

1.6.1 Where possible, recommend treatment with drugs taken only once a day. **[2004]**

1.6.2 Prescribe non-proprietary drugs where these are appropriate and minimise cost. **[2004]**

1.6.3 Offer people with isolated systolic hypertension (systolic blood pressure 160 mmHg or more) the same treatment as people with both raised systolic and diastolic blood pressure. **[2004]**

1.6.4 Offer people aged 80 years and over the same antihypertensive drug treatment as people aged 55–80 years, taking into account any comorbidities. **[new 2011]**

1.6.5 Offer antihypertensive drug treatment to women of child-bearing potential in line with the recommendations on Management of pregnancy with chronic hypertension and Breastfeeding in 'Hypertension in pregnancy' (NICE clinical guideline 107). **[2010]**

Step 1 treatment

1.6.6 Offer people aged under 55 years step 1 antihypertensive treatment with an angiotensin-converting enzyme (ACE) inhibitor or a low-cost angiotensin-II

receptor blocker (ARB). If an ACE inhibitor is prescribed and is not tolerated (for example, because of cough), offer a low-cost ARB. **[new 2011]**

1.6.7 Do not combine an ACE inhibitor with an ARB to treat hypertension. **[new 2011]**

1.6.8 Offer step 1 antihypertensive treatment with a calcium-channel blocker (CCB) to people aged over 55 years and to black people of African or Caribbean family origin of any age. If a CCB is not suitable, for example because of oedema or intolerance, or if there is evidence of heart failure or a high risk of heart failure, offer a thiazide-like diuretic. **[new 2011]**

1.6.9 If diuretic treatment is to be initiated or changed, offer a thiazide-like diuretic, such as chlortalidone (12.5–25.0 mg once daily) or indapamide (1.5 mg modified-release once daily or 2.5 mg once daily) in preference to a conventional thiazide diuretic such as bendroflumethiazide or hydrochlorothiazide. **[new 2011]**

1.6.10 For people who are already having treatment with bendroflumethiazide or hydrochlorothiazide and whose blood pressure is stable and well controlled, continue treatment with the bendroflumethiazide or hydrochlorothiazide. **[new 2011]**

1.6.11 Beta-blockers are not a preferred initial therapy for hypertension. However, beta-blockers may be considered in younger people, particularly:

- those with an intolerance or contraindication to ACE inhibitors and angiotensin II receptor antagonists **or**
- women of child-bearing potential **or**
- people with evidence of increased sympathetic drive. **[2006]**

1.6.12 If therapy is initiated with a beta-blocker and a second drug is required, add a calcium-channel blocker rather than a thiazide-like diuretic to reduce the person's risk of developing diabetes. **[2006]**

Step 2 treatment

1.6.13 If blood pressure is not controlled by step 1 treatment, offer step 2 treatment with a CCB in combination with either an ACE inhibitor or an ARB[6]. **[new 2011]**

1.6.14 If a CCB is not suitable for step 2 treatment, for example because of oedema or intolerance, or if there is evidence of heart failure or a high risk of heart failure, offer a thiazide-like diuretic. **[new 2011]**

1.6.15 For black people of African or Caribbean family origin, consider an ARB[6] in preference to an ACE inhibitor, in combination with a CCB. **[new 2011]**

Step 3 treatment

1.6.16 Before considering step 3 treatment, review medication to ensure step 2 treatment is at optimal or best tolerated doses. **[new 2011]**

1.6.17 If treatment with three drugs is required, the combination of ACE inhibitor or angiotensin II receptor blocker, calcium-channel blocker and thiazide-like diuretic should be used. **[2006]**

Step 4 treatment

1.6.18 Regard clinic blood pressure that remains higher than 140/90 mmHg after treatment with the optimal or best tolerated doses of an ACE inhibitor or an ARB plus a CCB plus a diuretic as resistant hypertension, and consider adding a fourth antihypertensive drug and/or seeking expert advice. **[new 2011]**

1.6.19 For treatment of resistant hypertension at step 4:

- Consider further diuretic therapy with low-dose spironolactone (25 mg once daily)[7] if the blood potassium level is 4.5 mmol/l or lower. Use particular caution in people with a reduced estimated glomerular filtration rate because they have an increased risk of hyperkalaemia.
- Consider higher-dose thiazide-like diuretic treatment if the blood potassium level is higher than 4.5 mmol/l. **[new 2011]**

1.6.20 When using further diuretic therapy for resistant hypertension at step 4, monitor blood sodium and potassium and renal function within 1 month and repeat as required thereafter. **[new 2011]**

1.6.21 If further diuretic therapy for resistant hypertension at step 4 is not tolerated, or is contraindicated or ineffective, consider an alpha- or beta-blocker. **[new 2011]**

1.6.22 If blood pressure remains uncontrolled with the optimal or maximum tolerated doses of four drugs, seek expert advice if it has not yet been obtained. **[new 2011]**

1.7 Patient education and adherence to treatment

1.7.1 Provide appropriate guidance and materials about the benefits of drugs and the unwanted side effects sometimes experienced in order to help people make informed choices. **[2004]**

1.7.2 People vary in their attitudes to their hypertension and their experience of treatment. It may be helpful to provide details of patient organisations that provide useful forums to share views and information. **[2004]**

1.7.3 Provide an annual review of care to monitor blood pressure, provide people with support and discuss their lifestyle, symptoms and medication. **[2004]**

1.7.4 Because evidence supporting interventions to increase adherence is inconclusive, only use interventions to overcome practical problems associated with non-adherence if a specific need is identified. Target the intervention to the need. Interventions might include:

- suggesting that patients record their medicine-taking
- encouraging patients to monitor their condition
- simplifying the dosing regimen
- using alternative packaging for the medicine
- using a multi-compartment medicines system.

(This recommendation is taken from Medicines adherence [NICE clinical guideline 76].) **[2009]**

[3] A list of validated blood pressure monitoring devices is available on the British Hypertension Society's website. The British Hypertension Society is an independent reviewer of published work. This does not imply any endorsement by NICE.

[4] Clinic blood pressure measurements must be used in the calculation of cardiovascular risk.

[5] A discrepancy of more than 20/10 mmHg between clinic and average daytime ABPM or average HBPM blood pressure measurements at the time of diagnosis.

[6] Choose a low-cost ARB.

[7] At the time of publication (August 2011), spironolactone did not have UK marketing authorisation for this indication. Informed consent should be obtained and documented.

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.

Groups that will be covered

- Adults with hypertension (18 years and older). Particular consideration will be given to the needs of black people of African and Caribbean family origin and minority ethnic groups where these differ from the needs of the general population.
- People aged 80 years or older.

Groups that will not be covered

- People with diabetes.
- Children and young people (younger than 18 years).
- Pregnant women.
- Secondary causes of hypertension (for example, Conn's adenoma, phaeochromocytoma and renovascular hypertension).
- People with accelerated hypertension (that is, severe acute hypertension associated grade III retinopathy and encephalopathy).
- People with acute hypertension or high blood pressure in emergency care settings.

How this guideline was developed

NICE commissioned the National Clinical Guideline Centre to update this guideline. The Centre established a Guideline Development Group (see appendix A), which reviewed the evidence and updated the recommendations. An independent Guideline Review Panel oversaw the updating of the guideline (see appendix B).

- There is more information about how NICE clinical guidelines are developed on the NICE website. A booklet, 'How NICE clinical guidelines are developed: an overview for stakeholders, the public and the NHS' is available.

3 Implementation

NICE has developed tools to help organisations implement this guidance.

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.

4.1 Out-of-office monitoring

In adults with primary hypertension, does the use of out-of-office monitoring (HBPM or ABPM) improve response to treatment?

Why this is important

There is likely to be increasing use of HBPM and for the diagnosis of hypertension as a consequence of this guideline update. There are, however, very few data regarding the utility of HBPM or ABPM as means of monitoring blood pressure control or as indicators of clinical outcome in treated hypertension, compared with clinic blood pressure monitoring. Studies should incorporate HBPM and/or ABPM to monitor blood pressure responses to treatment and their usefulness as indicators of clinical outcomes.

4.2 Intervention thresholds for people aged under 40 with hypertension

In people aged under 40 years with hypertension, what are the appropriate thresholds for intervention?

Why this is important

There is uncertainty about how to assess the impact of blood pressure treatment in people aged under 40 years with stage 1 hypertension and no overt target organ damage or cardiovascular disease (CVD). In particular, it is not known whether those with untreated hypertension are more likely to develop target organ damage and, if so, whether such damage is reversible. Target organ damage and CVD as surrogate or intermediate disease markers are the only indicators that are likely to be feasible in younger people because traditional clinical outcomes are unlikely to occur in sufficient numbers over the timescale of a typical clinical trial. The data will be important to inform treatment decisions for younger people with stage 1 hypertension who do not have overt target organ damage.

4.3 Methods of assessing lifetime cardiovascular risk in people aged under 40 years with hypertension

In people aged under 40 years with hypertension, what is the most accurate method of assessing the lifetime risk of cardiovascular events and the impact of therapeutic intervention on this risk?

Why this is important

Current short-term (10-year) risk estimates are likely to substantially underestimate the lifetime cardiovascular risk of younger people (aged under 40 years) with hypertension, because short-term risk assessment is powerfully influenced by age. Nevertheless, the lifetime risk associated with untreated stage 1 hypertension in this age group could be substantial. Lifetime risk assessments may be a better way to inform treatment decisions and evaluate the cost effectiveness of earlier intervention with pharmacological therapy.

4.4 Optimal systolic blood pressure

In people with treated hypertension, what is the optimal systolic blood pressure?

Why this is important

Data on optimal blood pressure treatment targets, particularly for systolic blood pressure, are inadequate. Current guidance is largely based on the blood pressure targets adopted in clinical trials but there have been no large trials that have randomised people with hypertension to different systolic blood pressure targets and that have had sufficient power to examine clinical outcomes.

4.5 Step 4 antihypertensive treatment

In adults with hypertension, which drug treatment (diuretic therapy versus other step 4 treatments) is the most clinically and cost effective for step 4 antihypertensive treatment?

Why this is important

Although this guideline provides recommendations on the use of further diuretic therapy for treatment at step 4 (resistant hypertension), they are largely based on post-hoc observational data from clinical trials. More data are needed to compare further diuretic therapies, for example a potassium-sparing diuretic with a higher-dose thiazide-like diuretic, and to compare diuretic

therapy with alternative treatment options at step 4 to define whether further diuretic therapy is the best option.

4.6 Automated blood pressure monitoring in people with atrial fibrillation

Which automated blood pressure monitors are suitable for people with hypertension and atrial fibrillation?

Why this is important

Atrial fibrillation may prevent accurate blood pressure measurement with automated devices. It would be valuable to know if this can be overcome.

5 Other versions of this guideline

5.1 Full guideline

The full guideline, Hypertension: the clinical management of primary hypertension in adults, contains details of the methods and evidence used to develop the guideline. It is published by the National Clinical Guideline Centre.

5.2 NICE pathway

The recommendations from this guideline have been incorporated into a NICE pathway.

5.3 Information for the public

NICE has produced information for the public explaining this guideline.

We encourage NHS and voluntary sector organisations to use text from this information in their own materials about primary hypertension.

6 Related NICE guidance

Published

- Chronic heart failure. NICE clinical guideline 108 (2010).
- Hypertension in pregnancy. NICE clinical guideline 107 (2010).
- Prevention of cardiovascular disease at population level. NICE public health guidance 25 (2010).
- Type 2 diabetes. NICE clinical guideline 87 (2009).
- Medicines adherence. NICE clinical guideline 76 (2009).
- Chronic kidney disease. NICE clinical guideline 73 (2008).
- Stroke. NICE clinical guideline 68 (2008).
- Lipid modification. NICE clinical guideline 67 (2008).
- Continuous positive airway pressure for the treatment of obstructive sleep apnoea/ hypopnoea syndrome. NICE technology appraisal guidance 139 (2008).
- MI: secondary prevention. NICE clinical guideline 48 (2007).
- Obesity. NICE clinical guideline 43 (2006).
- Atrial fibrillation. NICE clinical guideline 36 (2006).

Under development

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

- Patient experience in adult NHS services: improving the experience of care for people using adult NHS services. NICE clinical guideline. Publication date to be confirmed.
- Percutaneous transluminal radiofrequency sympathetic denervation of the renal artery for resistant hypertension. NICE interventional procedure guidance. Publication date to be confirmed.

7 Updating the guideline

NICE clinical guidelines are updated so that recommendations take into account important new information. New evidence is checked 3 years after publication, and healthcare professionals and patients are asked for their views; we use this information to decide whether all or part of a guideline needs updating. If important new evidence is published at other times, we may decide to do a more rapid update of some recommendations. Please see our website for information about updating the guideline.

Appendix A: The Guideline Development Groups, National Collaborating Centres and NICE project team

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Guideline Development Group (2006 update)

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Dr Mark Davis General Practitioner, West Yorkshire; Primary Care Cardiovascular Society

Professor Gary Ford Consultant Stroke Physician, University of Newcastle and Freeman Hospital; Royal College of Physicians

Mr Colin Penney Patient and carer representative

Ms Jan Procter-King Nurse Practitioner, West Yorkshire; Primary Care Cardiovascular Society

Mrs Jean Thurston Patient and carer representative

Professor Bryan Williams Clinical Adviser; Professor of Medicine, University of Leicester School of Medicine and University Hospitals Leicester NHS Trust

National Collaborating Centre for Chronic Conditions (2006 update)

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Dr Ian Lockhart Health Services Research Fellow in Guideline Development

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Guideline Development Group (2004 guideline)

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Dr William Cunningham General Practitioner, Northumberland

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Professor James Mason Methodologist and Technical Support, Newcastle upon Tyne

Mr Colin Penney Patient representative

Dr Wendy Ross General Practitioner, Newcastle upon Tyne

Mrs Jean Thurston Patient representative

Professor Bryan Williams Professor of Medicine and Director, Cardiovascular Research Unit, Leicester

Appendix B: The Guideline Review Panels

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.

Guideline Review Panel (2011 update)

Dr John Hyslop (Chair) Consultant Radiologist, Royal Cornwall Hospital Trust

Mrs Sarah Fishburn Lay member

Mr Kieran Murphy Health Economics and Reimbursement Manager, Johnson & Johnson Medical Devices & Diagnostics

Dr Ash Paul Deputy Medical Director, Health Commission Wales

Guideline Review Panel (2006 update)

Dr Peter Rutherford (Chair) Senior Lecturer in Nephrology, University of Wales College of Medicine

Dr John Harley General Practitioner, North Tees PCT

Dr Rob Higgins Consultant in Renal and General Medicine, University Hospitals Coventry and Warwickshire NHS Trust, Coventry

Dr Kevork Hopayian General Practitioner, Suffolk

Dr Robert Walker Clinical Director, West Cumbria Primary Care Trust

Guideline Review Panel (2004 guideline)

Professor Mike Drummond (Chair) Director, Centre for Health Economics (CHE), University of York

Dr Kevork Hopayian General Practitioner, Suffolk

Mr Barry Stables Patient/Lay representative

Dr Imogen Stephens Joint Director of Public Health, Western Sussex Primary Care Trust

Dr Robert Walker Clinical Director, West Cumbria Primary Care Trust

Appendix C: The algorithms

The recommendations from this guideline have been incorporated into a NICE pathway. The algorithms for the management of hypertension can also be found on pages 37–38 of the full guideline.

About this guideline

NICE clinical guidelines are recommendations about the treatment and care of people with specific diseases and conditions in the NHS in England and Wales.

The guideline was developed by the Newcastle Guideline Development and Research Unit. The guideline was updated by the National Clinical Guideline Centre in collaboration with the British Hypertension Society. The developers worked with a group of healthcare professionals (including consultants, GPs and nurses), patients and carers, and technical staff, who reviewed the evidence and drafted the recommendations. The recommendations were finalised after public consultation.

The methods and processes for developing NICE clinical guidelines are described in The guidelines manual.

This guideline updates and replaces NICE clinical guideline 34 (published June 2006). This guidance updates and replaces NICE clinical guideline 34 (published in 2006). NICE clinical guideline 34 updated and replaced NICE clinical guideline 18 (published in 2004). Recommendations are marked as **[2004]**, **[2004, amended 2011]**, **[2006]**, **[2008]**, **[2009]**, **[2010]** or **[new 2011]**.

- **[2004]** indicates that the evidence has not been updated and reviewed since 2004
- **[2004, amended 2011]** indicates that the evidence has not been updated and reviewed since 2004 but a small amendment has been made to the recommendation
- **[2006]** indicates that the evidence has not been updated and reviewed since 2006
- **[2008]** applies to recommendations from 'Lipid modification' (NICE clinical guideline 67), published in 2008
- **[2009]** applies to recommendations from 'Medicines adherence' (NICE clinical guideline 76), published in 2009
- **[2010]** applies to recommendations from 'Hypertension in pregnancy' (NICE clinical guideline 107), published in 2010
- **[new 2011]** indicates that the evidence has been reviewed and the recommendation has been updated or added.

The recommendations from this guideline have been incorporated into a NICE pathway. We have produced information for the public explaining this guideline. Tools to help you put the guideline into practice and information about the evidence it is based on are also available.

Changes after publication

January 2012: minor maintenance

October 2012: minor maintenance

November 2012: minor maintenance

January 2013: minor maintenance

October 2013: minor maintenance

Your responsibility

This guidance represents the view of NICE, which was arrived at after careful consideration of the evidence available. Healthcare professionals are expected to take it fully into account when exercising their clinical judgement. However, the guidance does not override the individual responsibility of healthcare professionals to make decisions appropriate to the circumstances of the individual patient, in consultation with the patient and/or guardian or carer, and informed by the summary of product characteristics of any drugs they are considering.

Implementation of this guidance is the responsibility of local commissioners and/or providers. Commissioners and providers are reminded that it is their responsibility to implement the guidance, in their local context, in light of their duties to avoid unlawful discrimination and to have regard to promoting equality of opportunity. Nothing in this guidance should be interpreted in a way that would be inconsistent with compliance with those duties.

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