NATIONAL INSTITUTE FOR HEALTH AND CARE EXCELLENCE

Guideline

Hypertension in adults: diagnosis and management

Draft for consultation, March 2019

This guideline covers identifying and treating primary hypertension (high blood pressure) in people aged 18 and over, including people with type 2 diabetes. It aims to reduce the risk of cardiovascular problems such as heart attacks and strokes by helping healthcare professionals to diagnose hypertension accurately and treat it effectively.

Who is it for?

- Healthcare professionals
- Commissioners, and providers
- People who have or may have high blood pressure, their families and carers

This guideline will update NICE guideline CG127 (published 2011). It will also update and replace the section on blood pressure management in the NICE guideline on type 2 diabetes in adults (NG28).

We have reviewed the evidence on diagnosis, monitoring, drug treatment and relaxation therapies for hypertension, and referral for suspected accelerated hypertension. You are invited to comment on the new and updated recommendations. These are marked as **[2019]**.

You are also invited to comment on recommendations that NICE proposes to delete from the 2011 guideline.

We have not reviewed the evidence for the recommendations shaded in grey, and cannot accept comments on them. In some cases, we have made minor wording changes for clarification.

See update information for a full explanation of what is being updated.

This draft guideline contains:

- the draft recommendations
- recommendations for research
- rationale and impact sections that explain why the committee made the 2019 recommendations and how they might affect practice
- the guideline context.

Information about how the guideline was developed is on the guideline's page on the NICE website. This includes the evidence reviews, the scope, and details of the committee and any declarations of interest.

Full details of the evidence and the committee's discussion on the 2019 recommendations are in the evidence reviews. Evidence for the 2011 recommendations (and earlier recommendations from guidelines that the 2011 guideline replaced) is in the full version of the 2011 guideline.

Contents

Recommendations

People have the right to be involved in discussions and make informed decisions about their care, as described in your care.

Making decisions using NICE guidelines explains how we use words to show the strength (or certainty) of our recommendations, and has information about prescribing medicines (including off-label use), professional guidelines, standards and laws (including on consent and mental capacity), and safeguarding.

The recommendations in this guideline apply to people with suspected or diagnosed hypertension, including those with type 2 diabetes, unless otherwise stated. For managing hypertension in people with chronic kidney disease, see the NICE guideline on chronic kidney disease in adults.

1.1 Measuring blood pressure

1.1.1 Ensure that healthcare professionals taking blood pressure measurements have 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. **[2011]**

1.1.3 Healthcare providers must ensure that devices for measuring blood pressure are properly validated[1], 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

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

quiet and seated, and their arm outstretched and supported. Use an appropriate cuff size for the person's arm. **[2011, amended 2019]**

1.1.5 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 before measurement. **[2004, amended 2011]**

1.1.6 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 15 mmHg, repeat the measurements.
- If the difference in readings between arms remains more than 15 mmHg on the second measurement, measure subsequent blood pressures in the arm with the higher reading. **[2019]**

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 2 measurements as the clinic blood pressure. **[2019]**

1.2.3 If clinic blood pressure is between 140/90 mmHg and 180/110 mmHg, offer ambulatory blood pressure monitoring (ABPM) to confirm the diagnosis of hypertension. See section 1.5 for people with a clinic blood pressure 180/110 mmHg or higher. **[2019]**

1.2.4 If ABPM is unsuitable or the person is unable to tolerate it, offer home blood pressure monitoring (HBPM) to confirm the diagnosis of hypertension. **[2019]**

1.2.5 While waiting for confirmation of a diagnosis of hypertension, carry out:

- investigations for Target organ damage (see recommendation 1.3.3), followed by
- formal assessment of cardiovascular risk using a cardiovascular risk assessment tool (see the section on full formal risk assessment in the NICE guideline on cardiovascular disease). **[2019]**

1.2.6 When using ABPM to confirm a diagnosis of hypertension, ensure that at least 2 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. **[2011]**

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

- for each blood pressure recording, 2 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. **[2011]**

1.2.8 Confirm diagnosis of hypertension in people with a:

- clinic blood pressure of 140/90 mmHg or higher **and**
- ABPM daytime average or HBPM average of 135/85 mmHg or higher.

[2019]

1.2.9 If hypertension is not diagnosed but there is evidence of target organ damage, consider carrying out investigations for alternative causes of the target organ damage (for information on investigations, see the NICE guidelines on chronic kidney disease and chronic heart failure). **[2011]**

1.2.10 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. **[2011]**

1.2.11 Measure blood pressure at least annually in an adult with type 2 diabetes without previously diagnosed hypertension or renal disease. Offer and reinforce preventive lifestyle advice. **[2009]** [This recommendation is from type 2 diabetes in adults (NICE guideline NG28)]

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

To find out why the committee made the 2019 recommendations on diagnosing hypertension and how they might affect practice, see rationale and impact.

1.3 Assessing cardiovascular risk and target organ damage

For guidance on the early identification and management of chronic kidney disease, see NICE's guideline on chronic kidney disease in adults.

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 identifying and assessing cardiovascular disease risk in NICE's guideline on cardiovascular disease: risk assessment and reduction, including lipid modification. Use clinic blood pressure measurements to calculate cardiovascular risk. **[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 glycated haemoglobin (HbA1C), electrolytes, creatinine, estimated glomerular filtration rate, total cholesterol and HDL-cholesterol
- examine the fundi for the presence of hypertensive retinopathy
- arrange for a 12-lead electrocardiograph to be performed. **[2011, amended 2019]**

1.4 Treating and monitoring hypertension

Lifestyle interventions

For guidance on the prevention of obesity and cardiovascular disease, see NICE's guidelines on obesity prevention and cardiovascular disease prevention.

1.4.1 Offer lifestyle advice to people with suspected or diagnosed hypertension, and continue to offer it periodically. **[2004]**

1.4.2 Ask about 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 Ask about 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]**

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

1.4.5 Encourage people to keep their dietary sodium intake low by reducing sodium salt, as this can reduce blood pressure. **[2004, amended 2019]**

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

1.4.7 Offer advice and help to smokers to stop smoking. See the NICE guideline on stop smoking interventions and services. **[2004]**

1.4.8 Inform people about local initiatives by, for example, healthcare teams or patient organisations that provide support and promote healthy lifestyle change, especially those that include group work for motivating lifestyle change. **[2004]**

To find out why the committee deleted the recommendation on relaxation therapies and how this might affect practice, see rationale and impact.

Starting antihypertensive drug treatment

For advice on shared decision-making for medicines, see the information on patient decision aids in NICE's guideline on medicines optimisation. To support adherence and ensure that people with hypertension make the most effective use of their medicines, see NICE's guideline on medicines adherence.

1.4.9 Discuss with the person their preferences for treatment before starting antihypertensive drug treatment. Continue to offer lifestyle advice and support them to make lifestyle changes whether or not they choose to start antihypertensive drug treatment. **[2019]**

1.4.10 Offer antihypertensive drug treatment in addition to lifestyle advice (see recommendation 1.4.1) to adults aged under 80 with persistent stage 1 hypertension who have 1 or more of the following:

- target organ damage

- Established cardiovascular disease
- renal disease
- diabetes
- an estimated 10-year risk of cardiovascular disease of 10% or more.

[2019]

1.4.11 Offer antihypertensive drug treatment to adults of any age with persistent stage 2 hypertension. Use clinical judgement for people with frailty or multimorbidity (see also NICE's guideline on multimorbidity). **[2019]**

1.4.12 Consider antihypertensive drug treatment in addition to lifestyle advice for younger adults with stage 1 hypertension and an estimated 10-year risk below 10%. Bear in mind that 10-year cardiovascular risk may underestimate the lifetime probability of developing cardiovascular disease. **[2019]**

1.4.13 Consider starting antihypertensive drug treatment for people aged over 80 with stage 1 hypertension. Use clinical judgement for people with frailty or multimorbidity (see also NICE's guideline on multimorbidity). **[2019]**

1.4.14 For adults aged under 40 with hypertension, consider seeking specialist evaluation of secondary causes of hypertension and a more detailed assessment of the long-term balance of treatment benefit and risks. **[2019]**

To find out why the committee made the 2019 recommendations on starting antihypertensive drug treatment and how they might affect practice, see rationale and impact.

Monitoring treatment and blood pressure targets

For guidance on blood pressure control in people with chronic kidney disease (with or without type 2 diabetes), see NICE's guideline on chronic kidney disease in adults.

1.4.15 Use clinic blood pressure measurements to monitor the response to lifestyle changes or drug treatment in adults with hypertension. **[2019]**

1.4.16 Consider HBPM for adults with hypertension who choose to self-monitor their blood pressure. **[2019]**

1.4.17 Consider ABPM or HBPM, in addition to clinic blood pressure measurements, for adults with hypertension identified as having a white-coat effect or masked hypertension (in which clinic and non-clinic blood pressure results are conflicting). Be aware that the corresponding measurements for ABPM and HBPM are 5 mmHg lower than for clinic measurements (see recommendation 1.2.8 for diagnostic thresholds). **[2019]**

1.4.18 For people who choose to use HBPM, provide:

- training and advice on using home blood pressure monitors
- information about what to do if they are not achieving their target blood pressure.

Be aware that the corresponding measurements for HBPM are 5 mmHg lower than for clinic measurements (see recommendation 1.2.8 for diagnostic thresholds). **[2019]**

1.4.19 Reduce clinic blood pressure to below 140/90 mmHg and maintain that level in adults with hypertension aged under 80. **[2019]**

1.4.20 Reduce clinic blood pressure to below 150/90 mmHg and maintain that level in adults with hypertension aged 80 and over. Use clinical judgement for people with frailty or multimorbidity (see also NICE's guideline on multimorbidity). **[2019]**

1.4.21 Measure standing blood pressure (see recommendation 1.1.6) in adults with hypertension:

- with type 2 diabetes **or**
- with symptoms of postural hypotension **or**

- aged 80 and over.

In people with a significant postural drop or symptoms of postural hypotension, treat to a blood pressure target based on standing blood pressure. **[2019]**

1.4.22 When using ABPM or HBPM to monitor the response to treatment in adults with hypertension, use the average blood pressure level taken during the person's usual waking hours (see recommendations 1.2.6 and 1.2.7). Reduce and maintain blood pressure at the following levels:

- below 135/85 mmHg for adults aged under 80
- below 145/85 mmHg for adults aged 80 and over.

Use clinical judgement for people with frailty or multimorbidity (see also NICE's guideline on multimorbidity). **[2019]**

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

1.4.24 For an adult with type 2 diabetes on antihypertensive drug treatment when diabetes is diagnosed, review blood pressure control and medications used. Make changes only if there is poor control or if current drug treatment is not appropriate because of microvascular complications or metabolic problems. **[2009]** [This recommendation is from type 2 diabetes in adults (NICE guideline NG28)]

To find out why the committee made the 2019 recommendations on monitoring treatment and blood pressure targets and how they might affect practice, see rationale and impact.

Choosing antihypertensive drug treatment (for people with or without type 2 diabetes)

The recommendations in this section apply to people with hypertension with or without type 2 diabetes. They will replace the recommendations on blood pressure management in the NICE guideline on type 2 diabetes in adults.

1.4.25 For guidance on choice of hypertensive agent in people with chronic kidney disease, see NICE's guideline on chronic kidney disease in adults. If possible, offer treatment with drugs taken only once a day. **[2004]**

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

1.4.27 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]**

1.4.28 Offer antihypertensive drug treatment to women of childbearing potential with diagnosed hypertension in line with the recommendations in this guideline. For women considering pregnancy or who are pregnant or breastfeeding, manage hypertension in line with the recommendations on management of pregnancy with chronic hypertension and breastfeeding in NICE's guideline on hypertension in pregnancy. **[2010, amended 2019]**

1.4.29 Discuss with the person if they are taking their medicine as prescribed and support adherence in line with NICE's guideline on medicines adherence. **[2019]**

Step 1 treatment

1.4.30 Offer an angiotensin-converting enzyme (ACE) inhibitor or an angiotensin II receptor blocker (ARB)[2] to adults starting step 1 antihypertensive treatment who:

[2] In 2007, the MHRA issued a drug safety update on ACE inhibitors and angiotensin II receptor antagonists: not for use in pregnancy that states 'Use in women who are planning pregnancy should be avoided unless absolutely necessary, in which case the potential risks and benefits should be discussed'. There is also a 2009 MHRA safety update for ACE inhibitors and angiotensin II receptor

- have type 2 diabetes (of any age or family origin) **or**
- are aged under 55 but not of African or Caribbean family origin.

[2019]

1.4.31 Offer a calcium-channel blocker (CCB) to adults starting step 1 antihypertensive treatment who:

- are aged 55 or over and do not have type 2 diabetes **or**
- are of African or Caribbean family origin and do not have type 2 diabetes (of any age). **[2019]**

1.4.32 If an ACE inhibitor is not tolerated for example, because of cough, offer an ARB[3] to treat hypertension. **[2019]**

1.4.33 Do not combine an ACE inhibitor with an ARB to treat hypertension. **[2019]**

1.4.34 If a CCB is not tolerated, for example because of oedema, offer a thiazide-like diuretic to treat hypertension. **[2019]**

1.4.35 If there is evidence of heart failure, offer a thiazide-like diuretic and follow the NICE guideline on chronic heart failure. **[2019]**

1.4.36 If starting or changing diuretic treatment for hypertension, offer a thiazide-like diuretic, such as indapamide or chlorthalidone in preference to a conventional thiazide diuretic such as bendroflumethiazide or hydrochlorothiazide. **[2019]**

1.4.37 For adults with hypertension already having treatment with bendroflumethiazide or hydrochlorothiazide, who have stable, well-controlled blood pressure, continue with their current treatment. **[2019]**

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antagonists: use during breastfeeding and related clarification: ACE inhibitors and angiotensin II receptor antagonists.

[3] In 2007, the MHRA issued a drug safety update on ACE inhibitors and angiotensin II receptor antagonists: not for use in pregnancy that states 'Use in women who are planning pregnancy should be avoided unless absolutely necessary, in which case the potential risks and benefits should be discussed'. There is also a 2009 MHRA safety update for ACE inhibitors and angiotensin II receptor antagonists: use during breast feeding and related clarification: ACE inhibitors and angiotensin II receptor antagonists.

To find out why the committee made the 2019 recommendations on step 1 treatment and how they might affect practice, see rationale and impact.

Step 2 treatment

1.4.38 If hypertension is not controlled in adults taking step 1 treatment of an ACE inhibitor or ARB, offer the choice of 1 of the following drugs in addition to step 1 treatment:

- a CCB **or**
- a thiazide-like diuretic. **[2019]**

1.4.39 If hypertension is not controlled in adults taking step 1 treatment of a CCB, offer the choice of 1 of the following drugs in addition to step 1 treatment:

- an ACE inhibitor **or**
- an ARB **or**
- a thiazide-like diuretic. **[2019]**

1.4.40 If hypertension is not controlled in adults of African and Caribbean family origin who do not have type 2 diabetes taking step 1 treatment, consider an ARB, in preference to an ACE inhibitor, in addition to step 1 treatment. **[2019]**

Step 3 treatment

1.4.41 Before considering next step treatment for hypertension:

- review the person's medications to ensure they are being taken at the optimal tolerated doses **and**
- discuss adherence (see recommendation 1.4.29). **[2019]**

1.4.42 If hypertension is not controlled in adults taking step 2 treatment, offer a combination of:

- an ACE inhibitor or ARB, **and**
- a CCB **and**

- a thiazide-like diuretic. **[2019]**

To find out why the committee made the 2019 recommendations on step 2 and 3 treatment and how they might affect practice, see rationale and impact.

Step 4 treatment

1.4.43 If hypertension is not controlled in adults taking the optimal tolerated doses of an ACE inhibitor or an ARB plus a CCB and a thiazide-like diuretic, regard them as having resistant hypertension. **[2019]**

1.4.44 Before considering further treatment for a person with resistant hypertension:

- Confirm elevated clinic blood pressure measurements using ambulatory or home blood pressure recordings.
- Assess for postural hypotension.
- Discuss adherence (see recommendation 1.4.29). **[2019]**

1.4.45 For people with confirmed resistant hypertension, consider adding a fourth antihypertensive drug as step 4 treatment (see recommendations 1.4.46 to 1.4.48) or seeking expert advice.[4] **[2019]**

1.4.46 Consider further diuretic therapy with low-dose spironolactone[5] for adults with resistant hypertension starting step 4 treatment who have a blood potassium level of 4.5 mmol/l or less. Use particular caution in people with a reduced estimated glomerular filtration rate because they have an increased risk of hyperkalaemia. **[2019]**

[4] In 2007, the MHRA issued a drug safety update on ACE inhibitors and angiotensin II receptor antagonists: not for use in pregnancy that states 'Use in women who are planning pregnancy should be avoided unless absolutely necessary, in which case the potential risks and benefits should be discussed'. There is also a 2009 MHRA safety update for ACE inhibitors and angiotensin II receptor antagonists: use during breastfeeding and related clarification: ACE inhibitors and angiotensin II receptor antagonists.

[5] At the time of consultation (March 2019), spironolactone did not have a UK marketing authorisation for this indication. The prescriber should follow relevant professional guidance, taking full responsibility for the decision. Informed consent should be obtained and documented. See the General Medical Council's Prescribing guidance: prescribing unlicensed medicines for further information.

1.4.47 When using further diuretic therapy for step 4 treatment of resistant hypertension, monitor blood sodium and potassium and renal function within 1 month of starting treatment and repeat as needed thereafter. **[2019]**

1.4.48 Consider an alpha-blocker or beta-blocker for adults with resistant hypertension starting step 4 treatment who have a blood potassium level of more than 4.5 mmol/l. **[2019]**

1.4.49 If blood pressure remains uncontrolled in people with resistant hypertension taking the optimal tolerated doses of 4 drugs, seek expert advice. **[2019]**

To find out why the committee made the 2019 recommendations on step 4 treatment and how they might affect practice, see rationale and impact.

1.5 Identifying who to refer for same-day specialist review

1.5.1 If a person has severe hypertension (clinic blood pressure of 180/110 mmHg or higher), but no symptoms or signs indicating same-day referral (see recommendation 1.5.2), carry out investigations for target organ damage (see recommendation 1.3.3) as soon as possible:

- If target organ damage is identified, consider starting antihypertensive drug treatment immediately, without waiting for the results of ABPM or HBPM.
- If no target organ damage is identified, repeat clinic blood pressure measurement within 7 days. **[2019]**

1.5.2 Refer people for specialist assessment, carried out on the same day, if they have:

- accelerated hypertension, that is, clinic blood pressure 180/120 mmHg or higher with signs of retinal haemorrhage or papilloedema **or**
- suspected phaeochromocytoma (labile or postural hypotension, headache, palpitations, pallor, abdominal pain or and diaphoresis) **or**

- life-threatening symptoms such as new onset confusion, chest pain, signs of heart failure, or acute renal impairment. **[2019]**

To find out why the committee made the 2019 recommendations on identifying who to refer for same-day specialist review and how they might affect practice, see rationale and impact.

Terms used in this guideline

This section defines terms that have been used in a particular way for this guideline. For other definitions see the NICE glossary.

Accelerated hypertension

A severe increase in blood pressure to levels over 180/120 mmHg (and often over 220/120 mmHg), associated with new or progressive target organ damage, usually with signs of papilloedema (swelling of the optic nerve) or retinal haemorrhage. Also known as malignant hypertension.

Established cardiovascular disease

Past medical history of stroke or transient ischemic attack (TIA), heart attack, narrowed peripheral arteries or an interventional procedure. Cardiovascular disease (CVD) is a general term for conditions affecting the heart or blood vessels. It is usually associated with a build-up of fatty deposits inside the arteries (atherosclerosis) and an increased risk of blood clots. It can also be associated with damage to arteries in organs such as the brain, heart, kidneys and eyes through deposition of glassy material within the artery walls (arteriosclerosis). CVD is one of the main causes of death and disability in the UK, but it can often largely be prevented by leading a healthy lifestyle.

Masked hypertension

Clinic blood pressure measurements are normal (less than 140/90 mmHg), but blood pressure measurements are higher when taken outside the clinic using average daytime ABPM or average HBPM blood pressure measurements.

Stage 1 hypertension

Clinic blood pressure ranging from 140/90 mmHg to 159/99 mmHg and subsequent ambulatory blood pressure monitoring (ABPM) daytime average or home blood pressure monitoring (HBPM) average blood pressure ranging from 135/85 mmHg to 149/94 mmHg.

Stage 2 hypertension

Clinic blood pressure of 160/100 mmHg or higher but less than 180/110 mmHg and subsequent ABPM daytime average or HBPM average blood pressure of 150/95 mmHg or higher.

Stage 3 or severe hypertension

Clinic systolic blood pressure of 180 mmHg or higher or clinic diastolic blood pressure of 110 mmHg or higher.

Target organ damage

Damage to organs such as the heart, brain, kidneys and eyes. Examples are left ventricular hypertrophy, chronic kidney disease, hypertensive retinopathy or increased urine albumin:creatinine ratio.

White-coat effect

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.

Recommendations for research

The guideline committee has made the following recommendations for research.

As part of the 2019 update, the guideline committee retained the research recommendations on automated blood pressure monitoring for people with atrial fibrillation and thresholds for interventions in adults aged under 40 from the previous guideline. The committee made additional research recommendations on blood pressure targets for people aged over 80, step 1 treatment, relaxation therapies and accelerated hypertension.

Key recommendations for research

1 Automated blood pressure monitoring in people with atrial fibrillation

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

To find out why the committee made the research recommendation on automated blood pressure monitoring see rationale and impact.

2 Thresholds for interventions in adults aged under 40

In adults aged under 40 with hypertension (with or without type 2 diabetes), what are the appropriate risk and blood pressure thresholds for starting treatment?

To find out why the committee made the research recommendation on thresholds for interventions in adults aged under 40 see rationale and impact.

3 Blood pressure targets for people aged over 80

What is the optimum blood pressure target for people aged over 80 with treated primary hypertension?

To find out why the committee made the research recommendation on blood pressure targets for people aged over 80 see rationale and impact.

4 Step 1 treatment

Are there subgroups of people with hypertension who should start on dual therapy?

To find out why the committee made the research recommendation on step 1 treatment see rationale and impact.

5 Relaxation therapies

What is the clinical and cost effectiveness of relaxation therapies for managing primary hypertension in adults in terms of reducing cardiovascular events and improving quality of life?

To find out why the committee made the research recommendation on relaxation therapies see rationale and impact.

6 Same-day hospital specialist assessment

Which people with extreme hypertension (220/120 mmHg or higher) or emergency symptoms should be referred for same-day hospital specialist assessment?

To find out why the committee made the research recommendation on accelerated hypertension see rationale and impact.

Rationale and impact

These sections briefly explain why the committee made the recommendations and how they might affect practice. They link to details of the evidence and a full description of the committee's discussion.

Diagnosing hypertension

Recommendations 1.2.1 to 1.2.5 and 1.2.8

Why the committee made the recommendations

Overall, there was limited new evidence on the accuracy of different methods of measuring blood pressure. Most of the studies identified were small, and the populations and protocols for measurement varied making interpretation difficult. However, the committee agreed that it was important to focus on the evidence from these more recent studies (post-2000) because the evidence should reflect the current use of electronic sphygmomanometers, which have replaced mercury-based sphygmomanometers.

The evidence did not show that changing the current blood pressure thresholds for clinic measurement or HBPM would improve diagnostic accuracy compared with ABPM, so the committee agreed the 2011 thresholds for diagnosis should be retained. The committee noted that these are in line with most international guidance.

Limited evidence suggested that clinic blood pressure measurement is less accurate than home blood pressure measuremnt (HBPM) or ambulatory measurement (ABPM) when used to diagnose hypertension. The committee members acknowledged that these findings were in line with their clinical experience and

agreed that clinic blood pressure measurement alone would not be an adequate method to diagnose hypertension.

The committee discussed repeat clinic blood pressure measurements when there is a difference in blood pressure between arms and noted that clinical practice varied. Based on their experience and knowledge, the committee members agreed that a cut-off of 15 mmHg would be more suitable than 20 mmHg, which was specified in the 2011 recommendations. This is in line with recent evidence that suggests a small difference in arm blood pressure is associated with an increased risk of cardiovascular events, possibly due to vascular damage.

ABPM correlates well with invasive blood pressure measurement and can identify both white-coat and masked hypertension. Based on the evidence in the previous guideline and the committee's experience and knowledge, it was agreed that ABPM remains the gold standard for the accurate measurement of blood pressure in primary care. ABPM has therefore been retained as the preferred method for the diagnosis of hypertension. In addition, economic evidence obtained by updating the health economic model for the 2011 guideline confirmed that ABPM is still likely to be the most cost-effective method for diagnosis, even with the inclusion of new data for improved accuracy of home and clinic measurement.

The evidence showed that validated HBPM is an accurate method of diagnosing hypertension for people in sinus rhythm. The committee's experience in clinical practice supported this, and the committee agreed that it is a suitable alternative when ABPM is unsuitable or not tolerated. The committee noted that the British and Irish Hypertension Society maintains a list of validated blood pressure devices for home use.

The evidence did not suggest that there were any benefits of adding telemonitoring to HBPM. Therefore, the committee agreed that it could not make a recommendation on telemonitoring for the diagnosis of hypertension.

How the recommendations might affect practice

The recommendations reinforce current good practice. However, the committee noted that implementation of the 2011 recommendations on ABPM has been challenging and that there is still variation in practice. A change in practice and

additional resources and training will be needed in areas where there is currently no access to ABPM devices. However, ABPM was found to be the most cost-effective method of diagnosis, and it is anticipated that the long-term benefits of accurate diagnosis and treatment (such as avoiding over diagnosis and unnecessary treatment) will outweigh any initial costs.

Full details of the evidence and the committee's discussion are in evidence review A: diagnosis.

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Relaxation therapies

Why the committee deleted the recommendation on relaxation therapies

The evidence on relaxation therapies was limited to a single small study. The study suggested some benefit in reducing angina and myocardial infarction, but it also suggested an increase in stroke. The committee agreed that the study was not adequate to assess the effectiveness of these therapies or to make a recommendation.

The 2011 guideline stated that relaxation therapies could reduce blood pressure, but it did not recommend their routine use in practice. The committee noted that this was based on evidence for reducing blood pressure only, and there was no evidence of a direct benefit to people with hypertension, such as improving quality of life or reducing cardiovascular events. The committee agreed there was insufficient evidence of benefit to recommend that people pursue this option themselves and agreed to remove this recommendation. It is not the intention of the committee to stop people from trying relaxation therapies if they wish to, but to make people aware that there is less evidence for benefit of this intervention compared with other lifestyle interventions or pharmacological treatment. The committee agreed that the clinical focus for non-pharmacological treatment of hypertension should be on encouraging people to make lifestyle changes, such as taking regular exercise and maintaining a healthy weight.

The committee agreed that further research would be useful to determine whether relaxation therapies are a clinically effective treatment for hypertension in terms of

reducing cardiovascular events or improving quality of life (see research recommendations). They also noted that a larger study would be needed to obtain meaningful results.

How this might affect practice

Relaxation therapies were not recommended for routine use in the 2011 guideline, and they are not used in current practice for the management of primary hypertension in adults. The 2011 recommendation advised that people may try them as part of their treatment to reduce blood pressure but committee consensus was that uptake has been low. Therefore, current practice will not be affected by the removal of the 2011 recommendation.

Full details of the evidence and the committee's discussion are in evidence review H: relaxation therapies.

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Starting antihypertensive drug treatment

Recommendations 1.4.9 to 1.4.14

Why the committee made the recommendations

The evidence suggested that antihypertensive drug treatment was effective at reducing cardiovascular events in people with a clinic blood pressure of 160/100 mmHg or more (stage 2 hypertension). The evidence also showed a minimal benefit of treating people with a clinic blood pressure below 140/90 mmHg. The committee agreed that the area of most uncertainty was in treating stage 1 hypertension, particularly for people with a lower cardiovascular risk. Although the evidence suggested some benefit of treating people with stage 1 hypertension, it was unclear if the benefit would encompass all people with stage 1 hypertension equally, because no clinical evidence was identified that compared treatment at different cardiovascular risk thresholds using UK-validated tools.

An economic model was developed to compare the cost effectiveness of antihypertensive treatment with no treatment in people with stage 1 hypertension, without target organ damage, established cardiovascular disease, renal disease or

diabetes, at different levels of cardiovascular risk. For people aged 60, the model showed that treatment was cost effective at a 10-year cardiovascular risk level of 10%, but there was some uncertainty at around 5% risk. Further analysis using different age groups showed that it was cost effective to offer antihypertensive therapy to people with stage 1 hypertension at 5% risk in younger age groups (40 and 50 years), and at 10% or 15% for older age groups (70 and 75 years) depending on sex. Note that QRISK2 was specified as the risk tool as it is recommended by NICE for risk calculation, and it was assumed it was most likely to be used to assess risk in practice

The committee discussed the results of the model and took into account evidence suggesting some variation between the advice in the 2011 guideline and current clinical practice, with treatment often starting at a lower risk level than the recommended 20% threshold for 10-year cardiovascular risk. The committee members were mindful of the additional population that would be affected by lowering the threshold and aware that the decision to start drug treatment is person-specific. However, they agreed that drug treatment would only be started after information is given to the person about the implications of a cardiovascular risk measurement and any potential interventions. Opportunities for lifestyle modification should be discussed in detail. If this is unsuccessful or inappropriate, then the benefits and the risks of drug treatment should be discussed.

Some studies investigated the benefits of treating hypertension in people with lower cardiovascular risk or people with blood pressure below 140/90 mmHg. However, some of these studies were not directly relevant because they included a high proportion of participants with chronic kidney disease and previous cardiovascular events. For this reason, several studies could not be used to inform the recommendations. For details of these studies see evidence review C.

The committee decided to lower the treatment threshold to 10% risk in people aged under 80 with stage 1 hypertension and include the option to consider treatment at below the 10% threshold, to capture that in younger people, individual preferences and circumstances are likely to have the biggest impact on the treatment decision. They agreed that this was a reasonable and well-thought out compromise given the results of the model and uncertainty of the effectiveness of treatment in lower risk

individuals. They also highlighted the importance of discussing the person's preferences and encouraging lifestyle changes before starting treatment.

Guidance on treating stage 1 hypertension in people with target organ damage and established cardiometabolic or renal disease was retained, because people with these complications would have a cardiovascular risk greater than 10% (and indeed greater than 20%).

The committee discussed the lack of evidence to inform a threshold for starting treatment in people younger than 40. A consensus recommendation, based on the committee's expertise and experience, was included for specialist evaluation to consider secondary causes of hypertension and to discuss risks and benefits of treatment, but this was also agreed as an important area for future research (see research recommendations).

The committee agreed that there was no evidence to suggest that thresholds for starting treatment should be different in people with type 2 diabetes. Evidence for lower treatment thresholds in people with type 2 diabetes was limited, with the committee aware of some evidence to suggest that lower blood pressure thresholds did not reduce the rate of cardiovascular events in people without additional risk factors. The previous recommendations for people with type 2 diabetes (in NICE's guideline on type 2 diabetes in adults) suggested that medication should be started if blood pressure was not reduced with lifestyle changes alone, to below 140/80 mmHg or 130/80 mmHg in people with end organ damage. However, this was based on evidence from 2 small studies in which the participants did not have hypertension. The committee therefore agreed that there was insufficient evidence to recommend a different blood pressure treatment threshold for this subgroup.

The committee also discussed the additional risks of starting treatment in people aged over 80, particularly those who are frail or have multiple comorbidities. Based on their expertise and experience, they agreed that this should be highlighted in the recommendations to ensure that clinical judgement is used when making treatment decisions with people with frailty and multimorbidity. The committee agreed that a number of factors should be considered when discussing treatment options in this

group and noted that healthcare professionals should refer to the NICE guideline on multimorbidity for further advice.

How the recommendations might affect practice

The recommendations will have a significant impact on practice because more people will now be eligible for treatment. It is difficult to predict the extent of the impact because there is variability in how the 2011 recommendation with a threshold of 20% is being implemented in practice. However, it is believed, based on some recently published UK data , that potentially around 50% of people with stage 1 hypertension and risk below 20% are already being treated with antihypertensive drugs (Sheppard JP, et al. 2018).

People with stage 1 hypertension should already be monitored every year, but reducing the threshold will increase the number of people being prescribed antihypertensive drugs and increase staff time and consultations involved in starting and monitoring their drug treatment.

Full details of the evidence and the committee's discussion are in evidence review C: thresholds for starting antihypertensive drug treatment.

Return to recommendations

Monitoring treatment and blood pressure targets

Recommendations 1.4.15 to 1.4.22

Monitoring treatment

Why the committee made the recommendations

The committee agreed that there was not enough evidence to strongly recommend HBPM for monitoring treatment in adults with hypertension. The evidence on monitoring was limited, with relatively small studies comparing different combinations of HBPM (with or without telemonitoring and with or without pharmacist input), pharmacy monitoring and clinic monitoring. It suggested that people had improved blood pressure control with HBPM with telemonitoring, with or without pharmacy input, compared with clinic monitoring, and the greatest blood pressure reduction

was achieved with pharmacist input. However the evidence was insufficient for the committee to make a recommendation.

The committee decided to retain the 2011 recommendation on using clinic blood pressure, but also agreed that the updated guideline should support home monitoring for people who wish to use it. The committee discussed the importance of patient choice and agreed that home monitoring should be an option, if it is suitable and the person is willing and motivated to use it. HBPM is already widely used in practice, especially for people with a white-coat effect. The committee agreed this would be reflected in the recommendation supported by the evidence and consensus opinion. Based on their experience, the committee agreed that training and advice would be needed for people using HBPM to ensure that people take measurements correctly and know when to contact their healthcare professional if they are not achieving their target blood pressure.

The 2011 guideline included a recommendation for further research for the best method of monitoring hypertension in people with atrial fibrillation. No evidence was identified in the updated reviews to inform recommendations for this group and therefore the committee agreed that this research recommendation should be retained to inform future updates of the guideline (see research recommendations).

The committee agreed they could not make a recommendation on telemonitoring because the evidence was not sufficient to show a clear benefit and the studies were inconsistent in the telemonitoring methods used.

How the recommendations might affect practice

The recommendations reflect current practice, so there should be no change in practice. They will encourage appropriate and suitable training to be given so that both people with hypertension and their healthcare professionals are confident that blood pressure is being measured properly using home monitoring devices.

Full details of the evidence and the committee's discussion are in evidence review B: monitoring the response to treatment.

Return to recommendations

Blood pressure targets

Why the committee made the recommendations

No evidence was identified to determine whether cardiovascular risk or blood pressure targets should be used. The committee agreed that in the absence of evidence the focus should be on blood pressure targets, based on their expertise and experience of current practice.

The evidence for blood pressure targets showed that there were both benefits and harms associated with a lower clinic systolic blood pressure target of 120 mmHg compared with 140 mmHg in people with primary hypertension without type 2 diabetes. Although the evidence suggested some benefit in reducing mortality and cardiovascular events, the lower blood pressure target was associated with a greater risk of harms, such as injury from falls and acute kidney injury. The committee agreed that the long-term implications of these adverse events were unclear and that further research is needed.

This evidence came from the SPRINT trial, which was a large study undertaken in the US. The committee discussed concerns about the population included in the study and the applicability to UK practice of the methods used. The study used automated blood pressure devices with a time delay and an isolated rest period, which is not common practice in the UK. The committee considered that the use of these devices would lead to lower blood pressure readings than in routine UK clinical practice. They also had concerns that some medicines were stopped when blood pressure targets were achieved, which may have had an impact on the results. The committee also discussed concerns about applicability of the population, for example, the participants had high cardiovascular risk levels including many with pre-existing cardiovascular disease or renal impairment and were already receiving treatment before the study started. These concerns made the evidence difficult to interpret and use to inform the recommendations. Further details of the committee's discussion of this study is included in evidence review D.

Evidence from a smaller study also showed some benefit of lowering clinic systolic blood pressure targets to 130 mmHg. However, the committee noted that the study

was based on people already receiving treatment and that it lacked information on adverse events.

Evidence for lower targets in people with type 2 diabetes was also limited, with some evidence to suggest that lower blood pressure targets did not reduce the rate of cardiovascular events. The previous recommendations for people with type 2 diabetes (in NICE's guideline on type 2 diabetes in adults) suggested a blood pressure target below 130/80 mmHg in the presence of target organ damage such as kidney, cerebrovascular or eye disease. The committee noted that the evidence behind this recommendation was based on 2 small studies in people without hypertension. They also had concerns about the relevance of the study design. The committee were aware of trial data showing less benefit in populations with type 2 diabetes with fewer additional risk factors. The committee therefore agreed that there was insufficient evidence to recommend a different blood pressure target for this subgroup. It was noted that people with later-stage chronic kidney disease are covered by other NICE guidelines.

Overall, the committee agreed that the evidence was unclear and insufficient to determine whether a lower target would be beneficial and whether it would outweigh the associated harms. Therefore, the 2011 clinic blood pressure target of 140/90 mmHg for adults under 80 years was retained and applies to people with or without type 2 diabetes. The corresponding HBPM and ABPM targets were also retained at 135/85 mmHg. The recommendations emphasise the importance of achieving and maintaining a level consistently below the person's blood pressure target, whether this target be based on clinic, HBPM or ABPM.

Based on their experience, the committee members felt that people with postural hypotension are at risk of adverse events if a sitting or lying blood pressure is used for monitoring, because this measurement would overestimate daytime blood pressure and result in overtreatment. For example, a patient with a sitting systolic blood pressure of 140 mmHg might have a much lower blood pressure when standing and be at an increased risk of falls if treated based on their sitting blood pressure. The committee decided to recommend that 3 groups who are at risk of postural hypotension (people over 80 years, with type 2 diabetes and with symptoms of postural hypotension) should have their standing blood pressure measured, and

their treatment modified accordingly if they have postural hypotension. The standing blood pressure should be used for future monitoring.

The committee noted that there was a lack of evidence for blood pressure targets in people aged over 80 years. Based on their experience the committee members agreed to retain the recommendation from the 2011 guideline, which was based on the only large, outcome-based randomised controlled trial in this age group. The committee also agreed that different blood pressure targets might be needed for people who are frail or have other conditions because they may have an increased risk of adverse events and less to gain from the long-term benefits of stricter targets. The committee decided it was not possible to define a blood pressure target for all possible clinical scenarios, and so recommended that clinical judgement should be used to agree an achievable target for each individual after a discussion about the possible risks and benefits. The committee agreed that further research in this area would be helpful and developed a research recommendation to inform future guidance for older people.

How the recommendations might affect practice

The recommendations should reinforce current good practice. However, the new recommendations place more emphasis on maintaining blood pressure consistently below the blood pressure targets. As a result this could lead to a higher use of antihypertensive drugs and an increase in consultations to maintain target blood pressure. For people with type 2 diabetes and target organ damage (not covered by other guidelines), the slightly higher target blood pressure compared to that recommended previously may reduce adverse events and may lead to fewer appointments and reduced drug use.

Full details of the evidence and the committee's discussion are in evidence review D: targets.

Return to recommendations

Step 1 treatment

Recommendations 1.4.29 to 1.4.37

Why the committee made the recommendations

The committee reviewed the evidence for starting treatment for primary hypertension with a single antihypertensive medicine compared with starting with 2 antihypertensive medicines at once (dual therapy). Additionally, the committee reviewed the evidence on whether specific subgroups of people with hypertension might benefit from starting on dual therapy, for example people with type 2 diabetes, older people, or those of particular family origins.

Some limited evidence from a single study showed that initial dual therapy may reduce cardiovascular events in people with hypertension and type 2 diabetes, but the committee members were disappointed that more comprehensive data were not available. The committee discussed the benefits of optimising treatment for hypertension early and agreed that this can substantially improve quality of life. However, there was not enough evidence to determine confidently the benefits or harms of starting treatment with dual therapy. In response to the lack of available evidence, the committee developed a research recommendation to determine if particular subgroups would benefit from starting dual therapy, to inform future guidance.

In the absence of compelling new evidence on step 1 dual therapy, the committee agreed that the previous recommendations for step 1 treatment should be retained (with minor changes for clarity), because they were based on robust clinical and cost-effectiveness evidence. One exception to this was the 2006 recommendation for considering beta-blockers in certain groups of younger people. The committee discussed this recommendation and agreed that beta-blockers are rarely used as step 1 antihypertensive treatment in current practice and there is no established relationship between beta-blocker use in primary hypertension and a reduction in cardiovascular events. For these reasons, the committee decided that the recommendation should not be retained. The committee noted that this is consistent with most international guidelines.

This update of the guideline also updates and replaces the section on blood pressure management from the NICE guideline on type 2 diabetes in adults. That guideline recommended that adults with type 2 diabetes of any age should start on an ACE inhibitor as step 1 treatment (except people of African or Caribbean family

origin or women with a possibility of becoming pregnant). The committee discussed the evidence for this and agreed that it was sufficient to support and retain this recommendation. The committee considered the evidence for these recommendations alongside the new dual therapy evidence review and concluded that there was insufficient evidence to recommend starting dual therapy in any subgroup of people with type 2 diabetes. The committee noted that people with type 2 diabetes who are older or are of black African or Caribbean family origin may not achieve their target blood pressure on ACE inhibitor monotherapy and may need to start step 2 drug therapy in the short-term.

How the recommendations might affect practice

Overall, the recommendations for step 1 treatment reflect current practice for people who do not have type 2 diabetes. For people of African or Caribbean family origin who have type 2 diabetes, the recommendation to start antihypertensive monotherapy rather than dual therapy may result in an extra clinical appointment if medication titration is needed. However, it may also reduce potential harms from initial overtreatment of blood pressure.

Full details of the evidence and the committee's discussion are in evidence review E: step 1 treatment.

Return to recommendations

Step 2 and 3 treatment

Recommendations 1.4.38 to 1.4.42

Why the committee made the recommendations

No evidence for step 2 or step 3 treatment was identified that was relevant to determining the best sequence for step 2 and step 3 antihypertensive treatment. Some of the studies available on drug treatments for hypertension were not included in this review because they were designed to inform step 1 treatment. Others did not reflect UK clinical practice. For details of these studies see evidence review F.

Based on evidence from the previous version of the guideline and their clinical expertise, the committee members agreed to retain the same choice of drugs from

the 2011 guideline, which reflect current best practice. The committee agreed that, in the absence of evidence of which treatment(s) are most effective for step 2 or step 3, the recommendation should be to offer any of these treatments based on an individualised approach informed by risks and benefits of each treatment and the person with hypertension's preference.

The committee noted that the changes to the step 1 recommendations for some people with type 2 diabetes do not necessitate a change in the step 2 recommendations since the same options for combination treatment at step 2 are available.

The committee agreed that the choice of drug should be discussed and agreed with the person, based on the person's step 1 treatment, the risks and benefits of each treatment option, and taking into account the person's preferences and other clinical factors. The updated recommendations reflect this, giving the choice of possible treatment options. To help inform these decisions, the committee agreed that a patient decision aid should be developed and published alongside the guideline. This will support healthcare professionals and people with hypertension to discuss their treatment options and make informed decisions.

How the recommendations might affect practice

The recommendations are unlikely to alter current practice. The options for drug treatment remain the same and most step 2 or 3 treatment decisions are already based on an individualised approach.

Full details of the evidence and the committee's discussion are in evidence review F: step 2 and 3 treatment.

Return to recommendations

Step 4 treatment

Recommendations 1.4.43 to 1.4.49

Why the committee made the recommendations

No evidence on step 4 treatment was identified that could be used to formulate new recommendations. However, the committee reviewed the 2011 recommendations and agreed that they should be retained and updated to reflect current best practice.

The committee discussed the importance of confirming resistant hypertension before starting step 4 treatment. Based on their clinical experience and knowledge of best current practice, the committee members agreed that a recommendation to highlight this would help prevent overtreatment and ensure that people receive the right care.

Despite the lack of evidence formally reviewed, the committee discussed the recommendation based on their clinical experience, taking the 2011 recommendations into account. The committee agreed that although the evidence for spironolactone did not meet the criteria for inclusion in the updated review for the guideline because the key study had a very short follow up and did not report any of the cardiovascular outcomes specified in this review protocol, the use of an aldosterone antagonist is now common clinical practice. Therefore there was no reason to suggest that this recommendation should be changed.

In the 2011 guideline, high-dose thiazide diuretics were recommended as a potential step 4 treatment in people with high blood potassium levels. The committee felt that there was a lack of evidence for this approach and noted that the studies did not show an improvement in cardiovascular outcomes at higher doses, albeit in people without resistant hypertension. The committee agreed that the recommendation for considering alpha- or beta-blockers should be retained based on significant clinical experience of their safe and effective use and because adding a further drug is likely to have a greater effect on blood pressure than increasing the thiazide diuretic dose. Details of the committee's discussion, including information on key studies from the 2011 guideline that were not included in this update, are included in evidence review G.

How the recommendations might affect practice

The recommendations represent current good practice and so should not change practice. High-dose thiazide diuretics are not commonly used as step 4 therapy and so removing this should not change practice.

There might be a small reduction in step 4 treatment with more thorough checks to confirm resistant hypertension. However, this may also result in an increase in blood pressure measurements to appropriately confirm resistant hypertension where this is not already being done.

Full details of the evidence and the committee's discussion are in evidence review G: step 4 treatment.

Return to recommendations

Identifying who to refer for same-day specialist review

Recommendations 1.5.1 to 1.5.2

Why the committee made the recommendations

There was no evidence identified to inform recommendations on this topic. The committee reviewed the 2011 recommendations and agreed that they should be updated by consensus based on their clinical expertise. In particular they agreed it would be helpful to clarify which features warranted same-day referral, which would need further investigation and when repeat blood pressure measurement should be taken.

The committee noted that it can be difficult to differentiate between accelerated hypertension and severe hypertension. They discussed the advantages and disadvantages of broader criteria for same-day referral, which would increase referrals to hospital but reduce the risk of missing people who need urgent treatment. The committee decided it would be beneficial to add some emergency symptoms to the existing recommendation, which will help healthcare professionals to decide when to refer.

Based on their experience, the committee members agreed that some people with severe hypertension could be receiving unnecessary treatment because the 2011 guideline recommended treatment based on severe hypertension alone. The committee agreed that this could be prevented if investigations for target organ damage were carried out quickly before offering treatment in people with severely raised blood pressure and no other symptoms of concern. The committee also agreed that checking blood pressure again within 7 days in people with no target

organ damage would ensure that people with severe hypertension are followed up and offered suitable treatment.

The committee agreed that further research is needed in this area, particularly for people with extreme hypertension (220/120 mmHg or higher) or emergency symptoms. The committee members developed a research recommendation to help inform future recommendations on same-day specialist assessment.

How the recommendations might affect practice

The emergency symptoms listed in the recommendation may lead to more referrals to hospital. However, people with emergency symptoms will benefit from urgent treatment because accelerated hypertension can be fatal if untreated.

There may be some additional resource use from doing target organ damage tests more quickly and re-measuring blood pressure within 7 days. However, the number of people started on treatment immediately may be reduced as a consequence of undertaking investigations first.

The population with severe hypertension is very small, and the proportion with severe hypertension and additional symptoms that suggest accelerated hypertension is even smaller; therefore, resource impact is unlikely to be substantial.

Full details of the evidence and the committee's discussion are in evidence review I: same-day specialist review.

Return to recommendations

Context

High blood pressure (hypertension) is one of the most important treatable causes of premature morbidity and mortality in the world. It is a major risk factor for stroke, myocardial infarction, heart failure, chronic kidney disease, cognitive decline and premature death. In 2015, it was reported that high blood pressure affected more than 1 in 4 adults in England (31% of men; 26% of women) – around 13.5 million people – and contributed to 75,000 deaths. The clinical management of hypertension accounts for 12% of visits to primary care and up to £2.1 billion of healthcare expenditure.

Over the last decade progress has been made to improve the diagnosis and management of hypertension: the population average blood pressure in England has fallen by about 3 mmHg systolic and the proportion of adults with untreated high blood pressure has decreased. However, the Public Health England Blood Pressure Action Plan called for further action to reduce the population average blood pressure by 5 mmHg through improved prevention, detection and management (Public Health England Tackling high blood pressure: from evidence into action, 2015 and Tackling high blood pressure: an update, 2018).

Since the publication of the 2011 NICE guideline on hypertension, new studies have been published in the key areas. In particular, the optimal method and threshold for diagnosis of hypertension, managing blood pressure in lower risk populations and reducing blood pressure to lower targets in people with hypertension (including those with type 2 diabetes). The updated guideline makes new recommendations in these areas, based on the evidence, that aim to improve care and reduce variation in current practice.

Treating resistant hypertension (when more than 3 drugs are needed to treat hypertension) remains challenging. New data was also reviewed in this area and the recommendations updated.

There is uncertainty in current practice about which people with symptomatic very high blood pressure (accelerated hypertension) to refer for immediate assessment. The available evidence was reviewed and new recommendations made to provide guidance for primary care on when to refer.

The guideline covers adults (over 18 years) with suspected or diagnosed hypertension, including those with type 2 diabetes.

Finding more information and resources

To find out what NICE has said on topics related to this guideline, see our web page on hypertension.

Update information

August 2019

This guideline is an update of NICE guideline CG127 (published August 2011) and will replace it. It will also update and replace the section on blood pressure management in the NICE guideline on type 2 diabetes in adults (NG28).

We have reviewed the evidence on diagnosis, monitoring, drug treatment and relaxation therapies for hypertension, and identifying who to refer for same-day specialist review. You are invited to comment on the new and updated recommendations. These are marked as **[2019]**.

Recommendations that have been deleted or changed

We propose to delete some recommendations from the 2011 guideline. Table 1 sets out these recommendations and includes details of replacement recommendations. If there is no replacement recommendation, an explanation for the proposed deletion is given.

In recommendations shaded in grey and ending **[2011, amended 2019]**, we have made changes that could affect the intent without reviewing the evidence. Yellow shading is used to highlight these changes, and reasons for the changes are given in table 2.

In recommendations shaded in grey and ending **[2004], [2009] or [2011]** we have not reviewed the evidence. In some cases minor changes have been made – for example, to update links, or bring the language and style up to date – without changing the intent of the recommendation. Minor changes are listed in table 3.

See also the previous NICE guideline and supporting documents.

Table 1 Recommendations that have been deleted

Recommendation in 2011 guideline	Comment
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]**	This recommendation has been deleted because in the update of the review insufficient evidence was identified to support this recommendation. The previous recommendation was based on a small reduction in blood pressure, and

	this update found that evidence for a reduction in cardiovascular events was inconclusive. A research recommendation was made to inform future updates of the guideline.
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. **[2011]**	This recommendation has been deleted in order to remove conflicting recommendations within the guideline. People aged over 80 years should not always receive the same antihypertensive drug choices; some specific recommendations have been made relating to choice of treatment based on age.
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 (ARBs) **or** • women of child-bearing potential **or** • people with evidence of increased sympathetic drive. **[2006]**	This recommendation has been deleted because the committee agreed these were not used regularly in clinical practice and consensus was that there is no evidence supporting this recommendation.
1.6.12 If therapy is initiated with a beta-blocker and a second drug is required, add a calcium-channel blocker (CCB) rather than a thiazide-like diuretic to reduce the person's risk of developing diabetes. **[2006]**	This recommendation has been deleted because the recommendation for step 1 beta-blocker therapy was deleted, and this recommendation carries on from this.
Type 2 diabetes in adults: management (NG28)	
1.4.3 Repeat blood pressure measurements within: • 1 month if blood pressure is higher than 150/90 mmHg • 2 months if blood pressure is higher than 140/80 mmHg • 2 months if blood pressure is higher than 130/80 mmHg and there is kidney, eye or cerebrovascular damage. Provide lifestyle advice (diet and exercise) at the same time. **[2009]**	This recommendation will be deleted. The updated reviews for monitoring included people with and without type 2 diabetes, the committee did not believe there was any reason monitoring should be different in people with type 2 diabetes compared to those without.
1.4.4 Provide lifestyle advice (see section 1.3 in this guideline and the lifestyle interventions section in hypertension in adults [NICE guideline CG127]) if blood pressure is confirmed as being consistently above	This recommendation will be deleted because this update now incorporates the recommendations for blood pressure management for people with type 2 diabetes, so the cross reference is now irrelevant. The recommendations for

140/80 mmHg (or above 130/80 mmHg if there is kidney, eye or cerebrovascular damage). **[2009]**	lifestyle advice still stand within this guideline.
1.4.5 Add medications if lifestyle advice does not reduce blood pressure to below 140/80 mmHg (below 130/80 mmHg if there is kidney, eye or cerebrovascular damage). **[2009]**	This recommendation will be replaced by the updated recommendations on threshold for initiating treatment and blood pressure targets. There was limited evidence for people with type 2 diabetes, but the committee were aware of some evidence to suggest that starting treatment at lower blood pressure thresholds did not reduce the rate of cardiovascular events and no evidence for people with hypertension and target organ damage.
1.4.6 Monitor blood pressure every 1–2 months, and intensify therapy if the person is already on antihypertensive drug treatment, until the blood pressure is consistently below 140/80 mmHg (below 130/80 mmHg if there is kidney, eye or cerebrovascular damage). **[2009]**	This recommendation will be deleted and replaced by the review and recommendations on blood pressure targets. There was limited evidence for people with type 2 diabetes, but the committee were aware of some evidence to suggest that starting treatment at lower blood pressure thresholds did not reduce the rate of cardiovascular events and no evidence for people with hypertension and target organ damage.
1.4.14 Monitor the blood pressure of a person who has attained and consistently remained at his or her blood pressure target every 4–6 months. Check for possible adverse effects of antihypertensive drug treatment – including the risks from unnecessarily low blood pressure. **[2009]**	This recommendation will be deleted as it is now covered by the recommendation to provide an annual review for adults with hypertension (recommendation 1.5.14)

Table 2 Amended recommendation wording (change to intent) without an evidence review

Recommendation in 2011 guideline	Recommendation in current guideline	Reason for change
1.1.5 If using an automated blood pressure monitoring device, ensure that the device is validated[6] and an appropriate cuff size for the person's arm is used. **[2011]**	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.	This has been merged with recommendation 1.1.4 to reduce duplication in recommendations.

[6] 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.

	Use an appropriate cuff size for the person's arm. **[2011, amended 2019]**	
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]**	1.3.3 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 glycated haemoglobin (HbA1C), 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. **[2011, amended 2019]**	The committee noted that tests available in practice have changed, the recommendation has therefore been altered to reflect this. Plasma glucose tests are now plasma glucose glycated haemoglobin tests.

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]**	1.4.27 Offer antihypertensive drug treatment to women of childbearing potential with diagnosed hypertension in line with the recommendations in this guideline. For women considering pregnancy or who are pregnant or breastfeeding, manage hypertension in line with the recommendations on management of pregnancy with chronic hypertension and breastfeeding in NICE's guideline on hypertension in pregnancy. [2010, amended 2019]	Recommendation altered for clarity, the meaning has not changed. Not all women of child-bearing potential should be treated based on the hypertension pregnancy guideline, only those already receiving treatment for hypertension who are already pregnant or planning to be pregnant.
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]	1.4.5 Encourage people to keep their dietary sodium intake low by reducing sodium salt, as this can reduce blood pressure. [2004, amended 2019]	Recommendation amended to remove 'substituting sodium salt' because of concerns about the risks of salt substitutes.

1

Table 3 Minor changes to recommendation wording (no change to intent)

Recommendation numbers in current guideline	Comment
1.1.5	The recommendation was edited in line with current NICE style.
1.2.6	The term ‘target organ damage’ is explained in the ‘Terms used in this guideline’ section and the examples of this have been moved from the recommendation into this section.
1.3.2	The link to NICE’s guideline on cardiovascular disease risk assessment has been updated and the footnote moved to the recommendation.
1.4.1	The recommendation was edited for clarity and consistency with current NICE direct style for recommendations.
1.4.2, 1.4.3	The wording was changed from ‘ascertain’ to ‘ask about’ in line with current NICE style for clear, patient-focused language.
1.4.7	A new cross reference and link was added to the NICE guideline on stop smoking interventions and services.
1.4.8	The recommendation was edited for clarity and consistency with current NICE style.
1.4.24, 1.4.25	The recommendation was edited for clarity and consistency with current NICE style.