British Hypertension Society guidelines for hypertension management 2004 (BHS-IV): summary

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Introduction

Much new evidence has emerged on the importance of blood pressure as a risk factor for cardiovascular disease; the importance of lifestyle measures for the prevention and treatment of hypertension; the efficacy and safety of different drug classes; management of hypertension in groups at higher risk, including people with diabetes; the importance of assessing the total risk of cardiovascular disease; and additional benefits associated with the use of statins.

Concern remains that national surveys continue to show substantial underdiagnosis, undertreatment, and poor rates of blood pressure control in the United Kingdom.[1] A key reason for this is the predominant use of monotherapy by most doctors.[1] To improve this suboptimal treatment, the British Hypertension Society recommends a treatment algorithm based on the AB/CD rule.[2]

Treatment of blood pressure alone will leave many hypertensive patients at unacceptably high risk of cardiovascular complications and death. This guideline reinforces the view that doctors should not focus solely on blood pressure but must also formally assess total risk of cardiovascular disease and use multifactorial interventions, including statins and aspirin, to reduce it. Most management of blood pressure and risk of cardiovascular disease will take place in primary care, and these guidelines are intended for general practitioners, practice nurses, and generalists in hospital practice. Detailed advice on implementation and the implications of the national service frameworks and the general medical services contract are contained in the full document (www.bhsoc.org).[3]

These guidelines have been prepared by the guidelines working party of the British Hypertension Society on behalf of the society. The working party reviewed new data that have become available since the previous guidelines were published[4] and amended the recommendations accordingly. Drafts of the full document were improved by consultation with national stakeholder organisations (appendix 1). The evidence supporting the recommendations contained in BHS-IV is graded by using the criteria of the North of England group (see box on bmj.com).[5]

Objectives of the guidelines

The objectives highlighted and prioritised in the previous guidelines[4] remain relevant and are reiterated.

- To promote the primary prevention of hypertension and cardiovascular disease by changes in the diet and lifestyle of the whole population
- To increase the detection and treatment of undiagnosed hypertension by routine screening and increase awareness of hypertension among the public
- To ensure that patients taking antihypertensive drugs are controlled to optimal blood pressure levels
- To reduce the risk of cardiovascular disease of treated hypertensive patients by non-pharmacological measures, and by appropriate use of statin and aspirin treatment
- To increase the identification and treatment of patients with mild hypertension who are at high risk of cardiovascular disease—for example, elderly patients, patients with ischaemic heart disease, people with diabetes, people with target organ damage, or people with multiple risk factors

Table 1 Classification of blood pressure levels of the British Hypertension Society

Category	Systolic blood pressure (mm Hg)	Diastolic blood pressure (mm Hg)
Blood pressure		
Optimal	<120	<80
Normal	<130	<85
High normal	130-139	85-89
Hypertension		
Grade 1 (mild)	140-159	90-99
Grade 2 (moderate)	160-179	100-109
Grade 3 (severe)	≥180	≥110
Isolated systolic hypertension		
Grade 1	140-159	<90
Grade 2	≥160	<90

This classification equates with those of the European Society of Hypertension[5] and the World Health Organization-International Society of Hypertension[6] and is based on clinic blood pressure and not values for ambulatory blood pressure measurement. Threshold blood pressure levels for the diagnosis of hypertension using self/home monitoring are greater than 135/85 mm Hg. For ambulatory monitoring 24 hour values are greater than 125/80 mm Hg. If systolic blood pressure and diastolic blood pressure fall into different categories the higher value should be taken for classification.

P+ *Categories of strength used in statements are on bmj.com*

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- To promote continued adherence to drug treatment, by optimising the choice and use of drugs, minimising side effects, and increasing information and choice for patients.

Blood pressure measurement

The British Hypertension Society's classifications of blood pressure levels have changed in line with recent European guidelines (table 1).[6]

All adults should have blood pressure measured routinely at least every five years until the age of 80 years. People with "high normal" systolic blood pressure (130-139 mm Hg) or diastolic blood pressure (85-89 mm Hg) and people who have had high blood pressure readings at any time previously should have their blood pressure measured annually. The European recommendations for measuring blood pressure should be followed (box 1).[8] Seated blood pressure recordings are generally sufficient, but standing blood pressure should be measured in elderly or diabetic patients to exclude notable orthostatic hypotension. The average of two readings at each of a number of visits (depending on severity) should be used to guide the decision to treat. Automated or semiautomated devices are increasingly used for home or ambulatory blood pressure measurement. Box 2 shows possible indications for the use of ambulatory blood pressure measurement, and detailed guidance on blood pressure measurement and validated monitors is available at www.bhsoc.org.

Box 1: Blood pressure measurement by standard mercury sphygmomanometer or semiautomated device

- Use a properly maintained, calibrated, and validated device
- Measure sitting blood pressure routinely: standing blood pressure should be recorded at least at the initial estimation in elderly or diabetic patients
- Remove tight clothing, support arm at heart level, ensure arm relaxed and avoid talking during the measurement procedure
- Use cuff of appropriate size (see box 3 in the full guidelines,[3] www.bhsoc.org)
- Lower mercury column slowly (2 mm per second)
- Read blood pressure to the nearest 2 mm Hg
- Measure diastolic blood pressure as disappearance of sounds (phase V)
- Take the mean of at least two readings, more recordings are needed if marked differences between initial measurements are found
- Do not treat on the basis of an isolated reading

For full details of methods see www.bhsoc.org and reference 8

Absolute risk of cardiovascular disease estimation

The treatment of hypertension and the primary prevention of cardiovascular disease should be informed by assessment of total risk of cardiovascular disease. In collaboration with the Joint British Societies' initiative for preventing cardiovascular disease, a new cardiovascular disease chart and risk calculator program have been produced (www.bhsoc.org).[3] The chart and the program assess 10 year risk of cardiovascular disease rather than risk of coronary heart disease, reflecting the treatment objective of reducing all cardiovascular events, including stroke. The new chart has been simplified since 1999 by including only three age strata, to improve the balance of emphasis between relative risk and short term absolute risk. No chart is provided for patients with type 2 diabetes because for the vast majority (people aged >50 years or whose condition has been diagnosed for ≥ 10 years) their risk of cardiovascular disease is equivalent to people who have had a myocardial infarction and therefore should be considered for secondary prevention.[9] The use of this chart or computer program is recommended to aid decisions on treatment for people with grade 1 (mild) hypertension and to help guide the appropriate use of statins and aspirin for primary prevention.

Box 2: Potential indications for the use of ambulatory blood pressure monitoring

- Unusual variability of blood pressure
- Possible white coat hypertension
- Informing equivocal treatment decisions
- Evaluation of nocturnal hypertension
- Evaluation of drug resistant hypertension
- Determining the efficacy of drug treatment over 24 hours
- Diagnosis and treatment of hypertension in pregnancy
- Evaluation of symptomatic hypotension

Evaluation of hypertensive patients

All hypertensive patients should have a thorough history and physical examination but need only a limited number of routine investigations (box 3). The purpose of the evaluation is to assess the cause(s) of the hypertension, associated cardiovascular risk factors, evidence of target organ damage and comorbid diseases, all of which may influence treatment decisions (box 4). More complex investigations may require specialist referral—box 5 shows indications for this.

Thresholds for intervention with drug treatment

Figure 1 shows recommended blood pressure thresholds for intervention with drug treatment. Drug treatment is recommended in patients with sustained grade 2 hypertension ($\geq 160/100$ mm Hg). All patients with grade I hypertension (systolic blood pressure 140-159 or diastolic blood pressure 90-99 mm Hg, or both) should be offered treatment with antihypertensive drugs if there is any complication of hypertension or target organ damage (defined in box 4), or diabetes, or

Box 3: Routine investigations

- Urine strip test for protein and blood
- Serum creatinine and electrolytes
- Blood glucose—ideally fasted
- Blood lipid profile (at least total and high density lipoprotein (HDL) cholesterol)—ideally fasted for consideration of triglycerides
- Electrocardiogram

Box 4: Evaluation of hypertensive patients

Causes of hypertension
- Drugs (non-steroidal anti-inflammatory drugs, oral contraceptives, steroids, liquorice, sympathomimetics, some cold cures)
- Renal disease (present, past, or family history, proteinuria or haematuria: palpable kidney(s)—polycystic, hydronephrosis, or neoplasm)
- Renovascular disease (abdominal or loin bruit)
- Phaeochromocytoma (paroxysmal symptoms)
- Conn's syndrome (tetany, muscle weakness, polyuria, hypokalaemia)
- Coarctation (radio-femoral delay or weak femoral pulses).
- Cushing's (general appearance)

Contributory factors
- Overweight
- Excess alcohol (>3 units/day for men; >2 units/day for women)
- Excess salt intake
- Lack of exercise
- Environmental stress

Complications of hypertension or target organ damage
- Stroke, transient ischaemic attack, dementia, carotid bruits
- Left ventricular hypertrophy or left ventricular strain on electrocardiogram
- Heart failure
- Myocardial infarct, angina, coronary artery bypass graft, or angioplasty
- Peripheral vascular disease
- Fundal haemorrhages or exudates, papillodoema
- Proteinuria
- Renal impairment (raised serum creatinine)

Risk factors for cardiovascular disease
- Smoking
- Diabetes
- Ratio of total cholesterol: HDL cholesterol
- Family history
- Age
- Sex

Drug contraindications
See table 2.

if there is an estimated 10 year risk of cardiovascular disease of ≥20% despite lifestyle advice.

When it is decided not to treat grade I (mild) hypertension with drugs, lifestyle measures should be encouraged and blood pressure and risk of cardiovascular disease should be reassessed annually. The reason for this is that blood pressure will rise within five years to levels requiring treatment in about 10-15% of patients, and risk of cardiovascular disease will rise with age.

Treatment goals or "targets"

Definitive evidence on optimal targets for blood pressure lowering is lacking. The hypertension optimal treatment (HOT) trial was underpowered but to date, still provides the best evidence on optimal targets.[10] It reported, albeit on the basis of an on-treatment analysis, that the optimal blood pressure for reduction of major cardiovascular events was 139/83 mm Hg and that reduction of blood pressure below this value caused no harm. However, patients whose blood pressure was between 139/83 mm Hg and 150/90 mm Hg were also not disadvantaged. In light of these observations we previously recommended a blood pressure target of <150/90 mm Hg as an "audit standard"—the minimal target that all treated patients should attain.[4] This recommendation remains unchanged. Box 6 shows recommendations for "optimal" blood pressure targets during treatment. Evidence from intervention trials in hypertensive people with diabetes, people at high risk of cardiovascular disease, and people who have had a stroke supports a "lower the better" policy for optimal blood pressure.[10–12] Hence, lower targets are recommended for these "higher risk" populations.

Treatment

Lifestyle measures

Recent trial evidence has reinforced recommendations that certain lifestyle measures can lower blood pressure.[13–15] Hence advice on lifestyle modifications should be provided to all people with high blood pressure and people with borderline or high normal blood pressure. This approach can reduce the age associated rise in blood pressure and therefore reduce the large proportion of people with high normal blood pressure who would otherwise eventually require drug therapy. For those with grade 1 (mild) hypertension and no complications of cardiovascular disease or damage to the target organ, lifestyle measures should be evaluated for up to six months. For people who need antihypertensive therapy, lifestyle measures should still be

Box 5: Suggested indications for specialist referral

Urgent treatment needed
- Accelerated hypertension (severe hypertension and grade III-IV retinopathy)
- Particularly severe hypertension (>220/120 mm Hg)
- Impending complications (for example, transient ischaemic attack, left ventricular failure)

Possible underlying cause
- Any clue in history or examination of a secondary cause, such as hypokalaemia with increased or high normal plasma sodium (Conn's syndrome)
- Elevated serum creatinine
- Proteinuria or haematuria
- Sudden onset or worsening of hypertension
- Resistant to multidrug regimen (≥3 drugs)
- Young age (any hypertension <20 years; needing treatment <30 years)

Therapeutic problems
- Multiple drug intolerance
- Multiple drug contraindications
- Persistent non-adherence or non-compliance

Special situations
- Unusual blood pressure variability
- Possible white coat hypertension
- Hypertension in pregnancy

Box 6: Thresholds and treatment targets for antihypertensive drug treatment

- Drug treatment should be started in all patients with sustained systolic blood pressures ≥ 160 mm Hg or sustained diastolic blood pressures ≥ 100 mmHg despite non-pharmacological measures (A)
- Drug treatment is also indicated in patients with sustained systolic blood pressures 140-159 mm Hg or diastolic blood pressures 90-99 mm Hg if target organ damage is present, or there is evidence of established cardiovascular disease or diabetes, or if there is a 10 year cardiovascular disease risk of ≥ 20% (B)
- For most patients a target of ≤ 140 mm Hg systolic blood pressure and ≤ 85 mm Hg diastolic blood pressure is recommended (B). For patients with diabetes, renal impairment or established cardiovascular disease a lower target of ≤ 130/80 mm Hg is recommended
- When using ambulatory blood pressure readings, mean daytime pressures are preferred and this value would be expected to be approximately 10/5 mm Hg lower than the office blood pressure equivalent for both thresholds and targets. Similar adjustments are recommended for averages of home blood pressure readings

recommended as they may complement the blood pressure lowering effects of drugs and thus reduce the dose or number of drugs required to control blood pressure. Box 7 shows lifestyle measures that lower blood pressure and pre-empt the rise of blood pressure with age.

Lifestyle measures that reduce risk of cardiovascular disease include smoking cessation, reducing intake of total and saturated fats, replacement of saturated with monounsaturated fats (such as olive oil, rapeseed oil), and increasing consumption of fish.

Effective implementation of these lifestyle measures requires knowledge, enthusiasm, patience, considerable time spent with patients and other family members, and reinforcement. It is best undertaken by well trained health professionals such as practice or clinic nurses and should be supported by clear written information (www.bpassoc.org.uk).

Choice of antihypertensive drug therapy

For each major class of antihypertensive drug compelling indications exist for use in specific groups of patients and also compelling contraindications. There are also indications, contraindications, and cautions that are less clear cut and that are given different weight by different doctors (table 2). When none of the special considerations apply, initial drug selection should follow step 1 of the AB/CD algorithm (fig 2).[2]

Box 7: Lifestyle measures

- Maintain normal weight for adults (body mass index 20-25 kg/m^2)
- Reduce salt intake to < 100 mmol/day (< 6g NaCl or < 2.4 g Na^+/day)
- Limit alcohol consumption to ≤ 3 units/day for men and ≤ 2 units/day for women
- Engage in regular aerobic physical exercise (brisk walking rather than weightlifting) for ≥ 30 minutes per day, ideally on most of days of the week but at least on three days of the week
- Consume at least five portions/day of fresh fruit and vegetables
- Reduce the intake of total and saturated fat

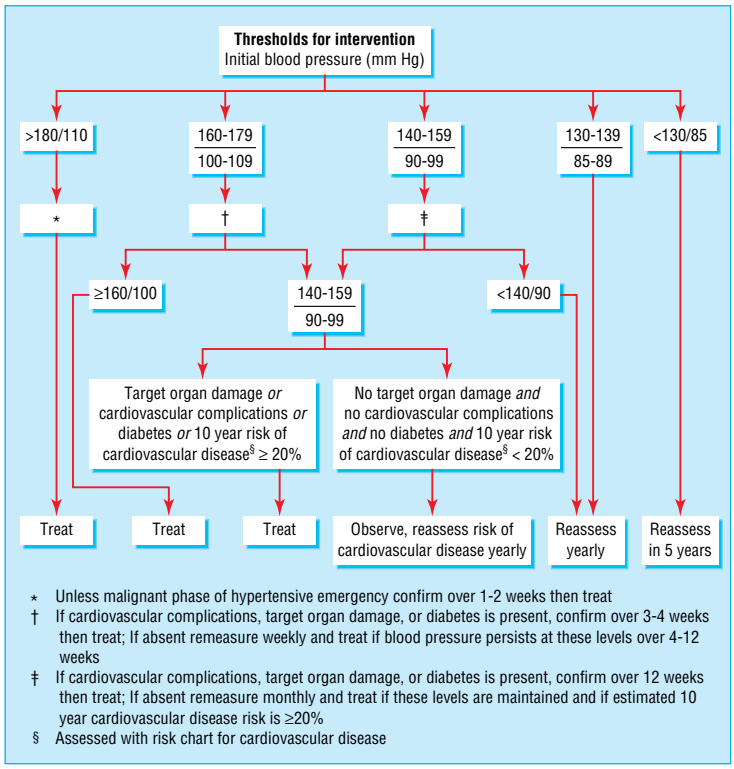

Fig 1 Blood pressure thresholds for intervention

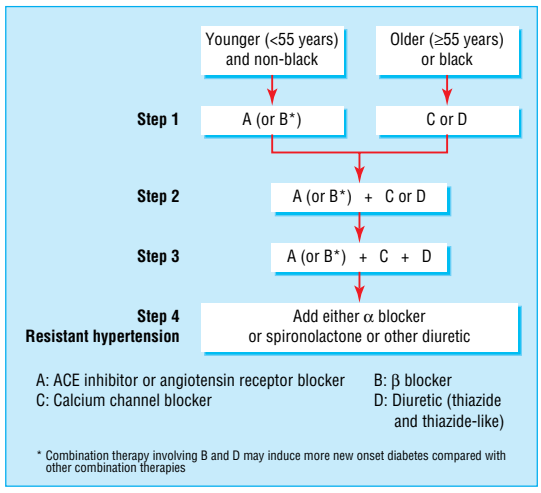

Fig 2 Recommendations for combining blood pressure lowering drugs (AB/CD rule) (adapted from reference 2, Brown et al)

Meta-analyses of blood pressure lowering trials

Since 1999 [4] many large scale morbidity and mortality trials have compared different classes of antihypertensive drugs. The Blood Pressure Lowering Trialists' Collaboration has conducted two major meta-analyses of blood pressure lowering drugs.[16 17] The first compared the effectiveness of "newer therapies," such as treatments based on angiotensin converting enzyme inhibitors or calcium channel blockers, with conventional therapies (based on diuretics or β blockers) and

Table 2 Compelling and possible indications, contraindications, and cautions for the major classes of antihypertensive drugs

Class of drug	Compelling indications	Possible indications	Caution	Compelling contraindications
α blockers	Benign prostatic hypertrophy	—	Postural hypotension, heart failure*	Urinary incontinence
Angiotensin converting enzyme inhibitors	Heart failure Left ventricular dysfunction post-myocardial infarction or established coronary heart disease Type 1 diabetic nephropathy Secondary stroke prevention¶	Chronic renal disease† Type 2 diabetic nephropathy Proteinuric renal disease	Renal impairment† Peripheral vascular disease‡	Pregnancy Renovascular disease§
Angiotensin II receptor blockers	Angiotensin converting enzyme inhibitor intolerance Type 2 diabetic nephropathy Hypertension with left ventricular hypertrophy Heart failure in angiotensin converting enzyme intolerant patients, after myocardial infarction	Left ventricular dysfunction after myocardial infarction Intolerance of other antihypertensive drugs Proteinuric renal disease, chronic renal disease† Heart failure	Renal impairment† Peripheral vascular disease‡	Pregnancy Renovascular disease§
β blockers	Myocardial infarction, angina	Heart failure**	Heart failure** Peripheral vascular disease, Diabetes (except with coronary heart disease)	Asthma or chronic obstructive pulmonary disease, Heart block
Calcium channel blockers (dihydropyridine)	Elderly patient, isolated systolic hypertension	Angina	—	—
Calcium channel blockers (rate limiting)	Angina	Elderly patient	Combination with β blockade	Heart block, heart failure
Thiazides or thiazide-like diuretics	Elderly patient, isolated systolic hypertension, heart failure, secondary stroke prevention	—	—	Gout††

*In heart failure when used as monotherapy.
† Angiotensin converting enzyme inhibitors or angiotensin II receptor blockers may be beneficial in chronic renal failure but should only be used with caution, close supervision, and specialist advice when there is established and significant renal impairment.
‡Caution with angiotensin converting enzyme inhibitors and angiotensin II receptor blockers in peripheral vascular disease because of association with renovascular disease.
§Angiotensin converting enzyme inhibitors and angiotensin II receptor blockers are sometimes used in patients with renovascular disease under specialist supervision.
¶In combination with a thiazide or thiazide-like diuretic.
**β blockers are used increasingly to treat stable heart failure but may worsen heart failure.
††Thiazides or thiazide-like diuretics may sometimes be necessary to control blood pressure in people with a history of gout, ideally used in combination with allopurinol.

concluded, while conceding that insufficient data existed, that newer therapies were as effective as, but no more effective than, conventional therapy at reducing stroke, morbidity or mortality due to coronary heart disease, or all cause mortality.[16] The second meta-analysis included 29 major trials published as of 2003, with over 700 000 years of patient follow up.[17] The findings of this second meta-analysis are largely consistent with the first: the main driver of benefit from blood pressure lowering therapy is blood pressure lowering per se, and little evidence exists of additional benefits specific to a class of drug with regard to major cardiovascular outcomes overall. The caveats to this general conclusion are, firstly, that calcium channel blockers may be less protective than other agents against the development of heart failure. Secondly, previous concerns regarding the safety and efficacy of treatment with calcium channel blockers for prevention of cardiovascular disease are unfounded. Thirdly, therapy based on calcium channel blockers may have small benefits and treatment with angiotensin receptor blockers may have possibly larger benefits with regard to stroke prevention. Fourthly, specific drug classes may have compelling indications (table 2).

The AB/CD algorithm

Most people require more than one drug to control blood pressure. Clinical trials have clearly shown that treatment algorithms deliver better blood pressure control than current clinical practice.[1 17] The British Hypertension Society recommends the use of a treatment algorithm based on the AB/CD rule to inform the better use of logical combinations of drugs.[2] Each letter refers to a blood pressure lowering drug class (fig 2).

The theory underpinning the AB/CD algorithm is that hypertension can be broadly classified as "high renin" or "low renin" and is therefore best treated initially with one of two categories of antihypertensive drug—those that inhibit the renin-angiotensin system (angiotensin converting enzyme inhibitors or angiotensin receptor blockers (A) or β blockers (B)), and those that do not (calcium channel blockers (C) or diuretics (D)). People who are younger than 55 and white tend to have higher renin concentrations than people aged 55 or older or the black population (of African descent). A or B drugs are therefore generally more effective as initial blood pressure lowering treatment in younger white patients than C or D drugs. However, C or D drugs are more effective first line agents for older white people or black people of any age.[18 19] When the first drug is well tolerated but the response is small and insufficient, substitution of an alternative drug is appropriate if hypertension is mild and uncomplicated. In more severe or complicated hypertension it is safer to add drugs stepwise until blood pressure is controlled. Treatment can be stepped down later if blood pressure falls substantially below the optimal level.

If two drugs are required logical combinations are: (A or B)+(C or D). Thereafter, if blood pressure is still insufficiently controlled, the combination of (A or B)+C+D is recommended. When fixed dose combinations replicate the desired treatment plan for a patient and when there is no cost disadvantage to their use, they represent a sensible way of reducing the number of tablets required. When hypertension remains resistant, A+B+C+D or the addition of an α blocker or low dose spironolactone may be effective.

The AB/CD protocol is not restrictive and provides a template that allows the use of all classes of antihypertensive drugs. All things being equal and when there are no compelling indications for treatment with a specific class of drugs (table 2), the least expensive drugs should be used.

The AB/CD algorithm includes B in brackets. This is to emphasise the fact that recent outcome trials have reported an increased incidence of diabetes in patients treated with B or D drugs compared with A or C drugs, especially when B and D are combined.[20] We advise caution when using B+D in patients at especially high risk of developing diabetes—for example, patients with a strong family history of type 2 diabetes, obesity, impaired glucose tolerance, features of the metabolic syndrome, or of South Asian and African-Caribbean descent.

Drug dosage

The drug or formulation used should ideally be effective for 24 hours when taken as a single daily dose. An interval of at least four weeks should be allowed to observe the full response, unless it is necessary to lower blood pressure more urgently. The drug dose (except for thiazides or thiazide-like diuretics, the ideal dose of which is uncertain) should be titrated up according to manufacturers' instructions.

Recommendations for use of aspirin and statins

Aspirin—No new evidence to guide practice regarding the use of aspirin for patients with hypertension has been produced since the 1999 guidelines of the British Hypertension Society.[4] Hence recommendations remain unchanged (box 8).

Statins—Recommendations relating to the use of statins for patients with hypertension have been updated in light of recent trial data[21 22] and are in keeping with recent European guidance.[6] Box 8 shows indications for using statins in the context of primary and secondary prevention. Patients with type 2 diabetes are considered as for secondary prevention in this context. Target lipid concentrations are the same for primary and secondary prevention and have been made more stringent in light of the most recent trial evidence. New ideal targets are to lower total cholesterol by 25% or LDL cholesterol by 30% or to reach <4.0 mmol/l or <2.0 mmol/l respectively, whichever is the greater. However a total cholesterol concentration <5.0 mmol/l or LDL cholesterol <3.0 mmol/l or reductions of 25% or 30%, respectively (whichever is the greater), provides a minimal acceptable "audit" standard.

Box 8: Other medications for hypertensive patients

Primary prevention

(*1*) Aspirin: use 75 mg daily if patient is aged ≥50 years with blood pressure controlled to $<150/90$ mm Hg and; target organ damage, diabetes mellitus, or 10 year risk of cardiovascular disease of ≥20% (measured by using the new Joint British Societies' cardiovascular disease risk chart)

(*2*) Statin: use sufficient doses to reach targets if patient is aged up to at least 80 years, with a 10 year risk of cardiovascular disease of ≥20% (measured by using the new Joint British Societies' cardiovascular disease risk chart) and with total cholesterol concentration ≥3.5mmol/l

(*3*) Vitamins—no benefit shown, do not prescribe

Secondary prevention (including patients with type 2 diabetes)

(*1*) Aspirin: use for all patients unless contraindicated

(*2*) Statin: use sufficient doses to reach targets if patient is aged up to at least 80 years with a total cholesterol concentration ≥3.5 mmol/l

(3) Vitamins—no benefit shown, do not prescribe

Summary points

All people with high blood pressure, borderline or high normal blood pressure should be advised on lifestyle modifications

Initiate antihypertensive drug therapy if sustained systolic blood pressure ≥160 mm Hg or sustained diastolic blood pressure ≥100 mm Hg

If sustained systolic blood pressure is 140-159 mm Hg or sustained diastolic blood pressure 90-99 mm Hg, consider initiating treatment if cardiovascular disease or other target organ damage present, or if estimated 10 year risk of cardiovascular disease is ≥20%

Non-diabetic people: optimal goals for blood pressure treatment are: systolic blood pressure <140 mm Hg and diastolic blood pressure <85 mm Hg. The minimum acceptable level of control (audit standard) recommended is $<150/<90$ mm Hg

In people with diabetes mellitus, initiate antihypertensive drug treatment if systolic blood pressure is sustained ≥140 mm Hg or diastolic blood pressure is sustained ≥90 mm Hg

In hypertensive people with diabetes, chronic renal disease, or established cardiovascular disease optimal blood pressure goals are systolic blood pressure <130 mm Hg and diastolic blood pressure <80 mm Hg. Audit standard $<140/<80$ mm Hg

Most people with high blood pressure will require at least two blood pressure lowering drugs to achieve the recommended goals. When no disadvantages of cost exist, fixed drug combinations are recommended

Low dose aspirin (75 mg/day) is recommended for secondary prevention of ischaemic cardiovascular disease and for primary prevention, in people over the age of 50 who have a 10 year risk of cardiovascular disease of ≥20% and in whom blood pressure is controlled to the audit standard

Statins are recommended for all people with high blood pressure complicated by cardiovascular disease, irrespective of baseline concentrations total cholesterol or low density lipoprotein (LDL) cholesterol. Statins are also recommended for primary prevention in people with high blood pressure who have a 10 year risk of cardiovascular disease of ≥20%

Follow up

The frequency of follow up for treated patients with adequate blood pressure control depends on factors including severity and variability of blood pressure, complexity of the treatment regimen, and compliance. Six monthly review is probably sufficient when treatment and blood pressure are stable. The routine for follow up visits, at which trained nurse practitioners have an important role, should be simple: measure blood pressure and weight, inquire about general health and side effects, reinforce lifestyle advice and adherence to drug therapy, and test for proteinuria annually.

Implementation

These guidelines come at an opportune time. The reduction of cardiovascular events in the population has been given a high priority by the Department of Health, which has introduced several key initiatives through the national service frameworks. The new contract for general medical services has given substantial prominence to the management of hypertension as a key performance target, and primary care trusts across the country participate in redesigning services. To implement this guideline effectively, new systems of healthcare delivery will need to be developed in primary care. Multidisciplinary teams will need to work in a systematic and structured way to advise, educate and support patients. A need exists for an extended role for nurse practitioners, pharmacists, and other healthcare professionals, to provide the foundation for the more widespread and effective detection, monitoring, and treatment of blood pressure and risk of cardiovascular disease.

BW is chairman of the guideline working party; NRP, MJB, MD, GTM, JFP, and PSS are members of the guideline working party; SMcGT is a member of the British Hypertension Society. The British Hypertension Society gratefully acknowledges the work done by the representatives of the many stakeholder organisations who reviewed the full guideline (appendix 1) and whose comments greatly improved the final version. We also acknowledge the outstanding administrative assistance provided by Emma Fluck at the British Hypertension Society's information service.

Competing interests: All authors have received honorariums from a number of pharmaceutical companies for lectures and consultancy, and research grant support for clinical trials from the pharmaceutical industry.

Appendix 1: Stakeholders who reviewed the guidelines

Blood Pressure Association
Nurses' Hypertension Association
Diabetes UK
British Cardiac Association
Renal Association
Heart UK
Primary Care Cardiovascular Society
London Hypertension Society
British Heart Foundation
Royal College of General Practitioners
Friends of the British Hypertension Society
Department of Health

Appendix 2: Contact details

British Hypertension Society Information Service
Blood Pressure Unit, St George's Hospital Medical School, Cranmer Terrace, London SW17 0RE (tel 020 8725 3412; fax 020 8725 2959; bhsis@sghms.ac.uk; www.bhsoc.org)

Blood Pressure Association
60 Cranmer Terrace, London SW17 0QS (tel 020 8772 4994; fax 020 8772 4999; bpassoc.org.uk). To contact the association by email, submit a query form through the website

1 Primatesta P, Brookes M, Poulter NR. Improved hypertension management and control: results from the health survey for England 1998. *Hypertension* 2001;38:827-32.
2 Brown MJ, Cruickshank JK, Dominiczak AF, MacGregor GA, Poulter NR, Russell GI, et al. Executive Committee, British Hypertension Society. Better blood pressure control: how to combine drugs. *J Hum Hypertens* 2003;17:81-6.
3 Ramsay LE, Williams B, Johnston G, MacGregor G, Poston L, Potter J, et al. Guidelines for management of hypertension: report of the third working party of the British Hypertension Society. *J Human Hypertens* 1999;13:569-92.
4 Eccles M, Freemantle N, Mason J. North of England evidence based guidelines development project: methods of developing guidelines for efficient drug use in primary care. *BMJ* 1998;316:1232-5.
5 Guidelines Committee. 2003 European Society of Hypertension-European Society of Cardiology guidelines for the management of arterial hypertension. *J Hypertens* 2003;21:1011-53.
6 Guidelines Subcommittee. 1999 World Health Organization-International Society of Hypertension guidelines for the management of hypertension. *J Hypertens* 1999;17:151-83.
7 O'Brien E, Asmar R, Beilin L, Imai Y, Mallion JM, Mancia G, et al. European Society of Hypertension Working Group on Blood Pressure Monitoring. European Society of Hypertension recommendations for conventional, ambulatory and home blood pressure measurement. *J Hypertens* 2003;21:821-48.
8 Williams B, Poulter NR, Brown MJ, Davis M, McInnes GT, Potter JF, et al. Guidelines for management of hypertension: report of the fourth working party of the British Hypertension Society, 2004—BHS IV. *J Hum Hypertens* 2004;18:139-85.
9 Expert panel on detection, evaluation, and treatment of high blood cholesterol in adults (Adult Treatment Panel III). Executive summary of the third report of the National Cholesterol Education Program (NCEP) *JAMA* 2001;285:2486–2497
10 Hansson L, Zanchetti A, Carruthers SG, Dahlof B, Elmfeldt D, Julius S, et al. for the HOT Study Group. Effects of intensive blood pressure lowering and low-dose aspirin in patients with hypertension: principal results of the hypertension optimal treatment (HOT) randomised trial. *Lancet* 1998;351:1755-62.
11 The Heart Outcomes Prevention Evaluation Study Investigators. Effects of an angiotensin-converting-enzyme inhibitor, ramipril, on cardiovascular events in high-risk patients. *New Eng J Med* 2000;342:145-153
12 PROGRESS Collaborative Group. Randomised trial of a perindopril-based blood-pressure-lowering regimen among 6105 individuals with previous stroke or transient ischaemic attack. *Lancet* 2001;358:1033-41.
13 Whelton PK, He J, Appel LJ, Cutler JA, Havas S, Kotchen TA, et al. National High Blood Pressure Education Program Coordinating Committee. Primary prevention of hypertension. Clinical and public health advisory from the National High Blood Pressure Education Program. *JAMA* 2002;288:1882-8.
14 Sacks FM, Svetkey LP, Vollmer WM, Appel LJ, Bray GA, Harsha D, et al. DASH-Sodium Collaborative Research Group. Effects on blood pressure of reduced dietary sodium and the dietary approaches to stop hypertension (DASH) diet. *N Engl J Med* 2001;344:3-10
15 He J, Whelton PK. Long-term effects of weight loss and dietary sodium restriction on incidence of hypertension. *Hypertension* 2000;35:544-9.
16 Blood Pressure Lowering Treatment Trialists' Collaboration. Effects of ACE inhibitors, calcium antagonists, and other blood-pressure-lowering drugs: results of prospectively designed overviews of randomised trials. *Lancet* 2000;356:1955-64.
17 Blood Pressure Lowering Treatment Trialists' Collaboration. Effects of different blood-pressure-lowering regimens on major cardiovascular events: results of prospectively-designed overviews of randomised trials. *Lancet* 2003;362:1527-1545
18 Dickerson JE, Hingorani AD, Ashby MJ, Palmer CR, Brown MJ. Optimisation of antihypertensive treatment by crossover rotation of four major classes. *Lancet* 1999;353:2008-13.
19 Materson BJ, Reda DJ, Cushman WC. Department of veterans affairs single-drug therapy of hypertension study. Revised figures and new data. Department of Veterans Affairs Cooperative Study Group on Antihypertensive Agents. *Am J Hypertens* 1995;8:189-92.
20 Dahlöf B, Devereux RB, Kjeldsen SE, Julius S, Beevers G, de Faire U, et al. LIFE Study Group. Cardiovascular morbidity and mortality in the Losartan Intervention for Endpoint reduction in hypertension study (LIFE): A randomised trial against atenolol. *Lancet* 2002;359:995-1003.
21 Heart Protection Study Group. MRC/BHF heart protection study of cholesterol lowering with simvastatin in 20,536 high-risk individuals: a randomised placebo-controlled trial. *Lancet* 2002;360:7–22.
22 Sever PS, Dahlof B, Poulter NR, Wedel H, Beevers G, Caulfield M; ASCOT investigators. Prevention of coronary and stroke events with atorvastatin in hypertensive patients who have average or lower-then-average cholesterol concentrations, in the Anglo Scandinavian Cardiac Outcomes Trial-Lipid Lowering Arm (ASCOT-LLA): A multicentre randomised controlled trial. *Lancet* 2003;361:1149-58.