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

Bryan Williams, Neil R Poulter, Morris J Brown, Mark Davis, Gordon T McInnes, John F Potter, Peter S Sever and Simon McG Thom

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Education and debate

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

Bryan Williams, Neil R Poulter, Morris J Brown, Mark Davis, Gordon T McInnes, John F Potter, Peter S Sever, Simon McG Thom; the BHS guidelines working party, for the British Hypertension Society

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. A key reason for this is the predominant use of monotherapy by most doctors. To improve this suboptimal treatment, the British Hypertension Society recommends a treatment algorithm based on the AB/CD rule.

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).

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 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).

Objectives of the guidelines

The objectives highlighted and prioritised in the previous guidelines 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>
<thead>
<tr>
<th>Category</th>
<th>Systolic blood pressure (mm Hg)</th>
<th>Diastolic blood pressure (mm Hg)</th>
</tr>
</thead>
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<tr>
<td>Blood pressure</td>
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<tr>
<td>Optimal</td>
<td>&lt;120</td>
<td>&lt;80</td>
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<tr>
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<td>&lt;130</td>
<td>&lt;85</td>
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<tr>
<td>High normal</td>
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<td>85-89</td>
</tr>
<tr>
<td>Hypertension</td>
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<td></td>
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<tr>
<td>Grade 1 (mild)</td>
<td>140-159</td>
<td>90-99</td>
</tr>
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<td>Grade 3 (severe)</td>
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<td>≥110</td>
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<td>Isolated systolic hypertension</td>
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<tr>
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<td>&lt;80</td>
</tr>
<tr>
<td>Grade 2</td>
<td>≥160</td>
<td>&lt;80</td>
</tr>
</tbody>
</table>

This classification equates with those of the European Society of Hypertension and the World Health Organization-International Society of Hypertension 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.
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).\(^7\)

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).\(^4\) 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, 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).\(^1\) 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.\(^7\) 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.

**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 (≥160/100 mm Hg). All patients with grade 1 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 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

**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
Education and debate

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 bruise)
- Phaeochromocytoma (paroxysmal symptoms)
- Curr’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 bruises
- 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, papillodema
- 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. It reported, albeit on the basis of an on-treatment analy-

sis, 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. 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. Hence, lower targets are recommended for these “higher risk” populations.

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.

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

Box 7: Lifestyle measures

- Maintain normal weight for adults (body mass index 20-25 kg/m²).
- Reduce salt intake to < 100 mmol/day (<6 g 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.

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).

Fig 1 Blood pressure thresholds for intervention

- Unless malignant phase of hypertensive emergency confirm over 1-2 weeks then treat.
- If cardiovascular complications, target organ damage, or diabetes is present, confirm over 3-4 weeks then treat. If absent remeasure weekly and treat if blood pressure persists at these levels over 4-12 weeks.
- If cardiovascular complications, target organ damage, or diabetes is present, confirm over 12 weeks then treat. If absent remeasure monthly and treat if these levels are maintained and if estimated 10 year cardiovascular disease risk is ≥ 20%.
- Assessed with risk chart for cardiovascular disease.

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 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. 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
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. The second meta-analysis included 29 major trials published as of 2003, with over 700 000 years of patient follow up. 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 effective 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. 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. 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 those who are 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. When the first drug is well tolerated but the response is small and insufficient, substitution of an antihypertensive drug (either A or B) may be effective. 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.

<table>
<thead>
<tr>
<th>Class of drug</th>
<th>Compelling indications</th>
<th>Possible indications</th>
<th>Caution</th>
<th>Compelling contraindications</th>
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<tr>
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<td>Heart failure</td>
<td>Chronic renal disease†</td>
<td>Renal impairment†</td>
<td>Pregnancy Renovascular disease§</td>
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<td>Angiotensin II receptor blockers</td>
<td>Angiotensin converting enzyme inhibitor intolerance</td>
<td>Left ventricular dysfunction after myocardial infarction</td>
<td>Renal impairment†</td>
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<td>β blockers</td>
<td>Myocardial infarction, angina</td>
<td>Heart failure**</td>
<td>Heart failure**</td>
<td>Atrial fibrillation, heart block</td>
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<td>Calcium channel blockers (rate limiting)</td>
<td>Elderly patient, isolated systolic hypertension</td>
<td>Angina</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Thiazides or thiazide-like diuretics</td>
<td>Elderly patient, isolated systolic hypertension, heart failure, secondary stroke prevention</td>
<td>—</td>
<td>—</td>
<td>Gout††</td>
</tr>
</tbody>
</table>

*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. ††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.
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.\textsuperscript{18} 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.\textsuperscript{1} Hence recommendations remain unchanged (box 8).\textsuperscript{6}

**Statins**—Recommendations relating to the use of statins for patients with hypertension have been updated in light of recent trial data\textsuperscript{11} and are in keeping with recent European guidance.\textsuperscript{7} 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.

### 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 ≥ 3.5 mmol/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%

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.
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.

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.

### Papers

#### Odds ratios with 95% confidence intervals for outcome variables according to pertussis vaccination status

<table>
<thead>
<tr>
<th>Outcome variable</th>
<th>Non-vaccinated*</th>
<th>Partially vaccinated†</th>
<th>Fully vaccinated‡</th>
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<td>15.4 (8/59)</td>
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<td>1.18 (0.98 to 1.40)</td>
<td>0.8</td>
</tr>
</tbody>
</table>

*No primary vaccinations, including pertussis.
†Diphtheria and tetanus ≥3 doses and no pertussis.
‡Triple (diphtheria, tetanus, and pertussis) vaccine ≥3 doses.

#### Comment

These findings confirm and extend our previous observations of the lack of an independent association between pertussis vaccination in infancy and inactivated, whole cell vaccine and the subsequent development of asthma or atopy during later childhood.

Acknowledgments: We thank the mothers and children who took part and the midwives for their cooperation and help in recruitment. The whole ALSPAC study team comprises interviewers, computer technicians, laboratory technicians, clerical workers, research scientists, volunteers, and managers who continue to make the study possible. The ALSPAC study is part of the European Longitudinal Study of Parents and Children initiated by the World Health Organization.

Contributors: MG had the original idea. AM, AS, JH did the analysis. All authors contributed to the interpretation of the data. AM wrote the paper. JH will act as guarantor.

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**Corrections and clarifications**

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

An error occurred in the order of the reference list in this Education and Debate article by Bryan Williams et al (13 March, pp 634-40). Reference 8 in the published version (Williams et al) should have been reference 3, and the references published as 3 (Ramsay et al) to 7 (O'Brien et al) in the reference list should then have been renumbered and become references 4 to 8. The two references cited in the footnote to table 1 should be renumbered as 6 (European Society of Hypertension-European Society of Cardiology) and 7 (WHO-International Society of Hypertension); but the other references cited in the text of the article are correct. The pdf (but not the HTML) version on bmj.com has been amended.

**Recent developments in secondary prevention and cardiac rehabilitation after acute myocardial infarction**

As a result of technology problems, some amendments to the authors did not make it into this clinical review by Hasnain Dalal and colleagues (20 March, pp 693-7). In box 2, we should have added the website address for SEARCH (the study of additional reductions in cholesterol and homocysteine): www.ctsu.ox.ac.uk/projects/search.shtml. And the penultimate sentence of the subsection “Angiotensin converting enzyme inhibitors” should have said that rates of revascularisation (not rates of readmission for heart failure) were reduced in patients who took ramipril.

**Obituary: Leonard (“Johnny”) Walker**

Our weekly quest to squeeze in as many obituaries as possible led to the last minute deletion of an important sentence from this obituary (BMJ 2003;327:1291). We omitted to say “Christianity was an abiding passion and his faith directed his life.” We have apologised to Dr Walker’s wife.

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**Is Dad mad, doctor?**

I had just put away the pleural aspiration kit and labelled the samples, and had returned to the patient, whose family had now arrived, to check that he was comfortable.

One of the adult children greeted me with the question, “Do you think Dad’s mad, doctor?”

“Mad?” I was a little bemused as to where this had come from. “Yes, he said you are going to send off the fluid from his lungs for psychology.”

After a few puzzled moments, the penny dropped: “No, not psychology, cytology.”

James S Dawson senior house officer, Queen’s Medical Centre, Nottingham.

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**REFERENCES**