

British Hypertension Society guidelines for hypertension management 1999: summary

Lawrence E Ramsay, Bryan Williams, G Dennis Johnston, Graham A MacGregor, Lucilla Poston, John F Potter, Neil R Poulter, Gavin Russell

University of
Sheffield, Sheffield
S10 2TN

Lawrence E Ramsay
*professor of clinical
pharmacology and
therapeutics*

University of
Leicester School of
Medicine, Leicester
Royal Infirmary,
Leicester LE2 7LX

Bryan Williams
professor of medicine
John F Potter
*professor of medicine
for the elderly*

Queen's University
of Belfast, Belfast
BT7 1NN

G Dennis Johnston
*professor of clinical
pharmacology*

Department of
Medicine, St
George's Hospital,
London SW17 0RE

Graham A
MacGregor
*professor of
cardiovascular
medicine*

Department of
Obstetrics and
Gynaecology, St
Thomas's Hospital,
London SE1 7EH
Lucilla Poston
*professor of fetal
medicine*

Imperial College
School of Medicine,
London W2 1NY

Neil R Poulter
*director,
cardiovascular studies
unit*

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This article summarises the new British Hypertension Society guidelines for management of hypertension, which have been published in full.¹ Since the previous guidelines²⁻³ much new evidence has emerged on optimal blood pressure targets⁴; management of hypertension in diabetic patients⁴⁻⁷; treatment of isolated systolic hypertension⁸; comparison of the antihypertensive efficacy and tolerability of different drug classes⁹⁻¹¹; the role of non-pharmacological measures for prevention¹²⁻¹³ and treatment of hypertension¹⁴; and additional benefits associated with the use of aspirin and statins.

Of concern is that national surveys continue to reveal incomplete detection, treatment, and control of hypertension.¹⁵ Furthermore, treated hypertensive patients still die prematurely from cardiovascular disease.¹⁶ These guidelines aim to present the best currently available evidence on hypertension management and their implementation.

Blood pressure measurement

All adults should have their blood pressure measured routinely at least every five years until the age of 80 years. Those with high-normal values (135-139/85-89 mm Hg) and those who have had high readings at any time previously should have their blood pressure remeasured annually. The British Hypertension Society's recommendations for measuring blood pressure should be followed (box 1).¹⁷ Seated blood pressure recordings are generally sufficient, but standing blood pressure should be measured in elderly or diabetic patients to exclude orthostatic hypotension. Ambulatory blood pressure monitoring may be helpful (box 2).

Estimating risk of coronary heart disease or cardiovascular disease

Formal estimation of coronary heart disease risk has been proposed as an aid to treatment decisions in hypertension.¹⁸ Mindful of the strong relation between blood pressure and stroke risk, the British Hypertension Society acknowledges that targeting cardiovascular disease risk rather than coronary heart disease risk is preferable. However, to be consistent with three existing national guideline recommendations,¹⁹⁻²¹ we recommend formal estimation of 10 year coronary heart disease risk using the Cardiac Risk Assessor

Summary points

Use non-pharmacological measures in all hypertensive and borderline hypertensive people

Initiate antihypertensive drug treatment in people with sustained systolic blood pressure ≥ 160 mm Hg or sustained diastolic blood pressure ≥ 100 mm Hg

Decide on treatment in people with sustained systolic blood pressure between 140 and 159 mm Hg or sustained diastolic blood pressure between 90 and 99 mm Hg according to the presence or absence of target organ damage, cardiovascular disease, diabetes, or a 10 year coronary heart disease risk $\geq 15\%$ according to the Joint British Societies coronary heart disease risk assessment programme or risk chart

Optimal blood pressure treatment targets 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 the absence of contraindications or compelling indications for other antihypertensive agents, low dose thiazide diuretics or β blockers are preferred as first line treatment for the majority of hypertensive people; compelling indications and contraindications for all antihypertensive drug classes are specified

Other drugs that reduce cardiovascular risk must also be considered; these include aspirin and statins

computer program or the coronary heart disease risk chart issued by the Joint British Societies in their recommendations for coronary heart disease prevention.¹⁹ This pragmatic recommendation is reasonable because coronary heart disease risk is a good predictor of cardiovascular disease risk, which can be estimated by multiplying the coronary heart disease risk level by

Box 1: Blood pressure measurement

- Use the British Hypertension Society's recommendations
- Use a device with validated accuracy that is properly maintained and calibrated
- Patient should be seated with the arm at the level of the heart. The bladder size should be adjusted for the arm circumference, the cuff deflated at 2 mm/s and the blood pressure measured to the nearest 2 mm Hg. Diastolic pressure is recorded as disappearance of the sounds (phase V)
- At least two measurements should be made at each of several visits to determine blood pressure thresholds (see figure).

Box 2: Indications for ambulatory blood pressure monitoring (ABPM)

- When clinic blood pressure shows unusual variability
- Hypertension is resistant to drug treatment (three or more drugs)
- When symptoms suggest the possibility of hypotension
- To diagnose "white coat hypertension"

Box 3: Routine investigation of hypertensive people

- Urine strip test for blood and protein
- Blood electrolytes and creatinine
- Blood glucose
- Serum total:HDL cholesterol ratio
- 12 lead electrocardiograph

4/3 (for example, 30% coronary heart disease risk = 40% cardiovascular disease risk). Moreover, estimates of 10 year stroke risk as well as coronary heart disease risk are provided by the Joint British Societies' Cardiac Risk Assessor computer program.¹⁹ The levels of coronary heart disease risk quoted in these guidelines will appropriately precipitate intervention for patients at higher risk of cardiovascular disease.

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 of the hypertension, associated cardiovascular risk factors, evidence of target organ damage, and comorbid diseases, all of which may influence treatment decisions. More complex investigations may require specialist referral (box 4).

Non-pharmacological measures

Non-pharmacological advice should be offered to all hypertensive people and those with a strong family history of hypertension. Such measures may obviate

the need for drug treatment or reduce the dose or number of drugs required to control blood pressure.¹²⁻¹⁴ In patients with mild hypertension but no cardiovascular complications or target organ damage, the response to these measures should be observed during the initial 4-6 month period of evaluation. When drug treatment has to be introduced more quickly, non-pharmacological measures should be instituted in parallel with drug treatment.

Good evidence from trials shows that several lifestyle modifications lower blood pressure: weight reduction to achieve an ideal body weight via reduced fat and total calorie intake¹²; regular physical exercise designed to improve fitness—this should be predominantly dynamic (brisk walking, for example) rather than isometric (weight training); limiting alcohol consumption to <21 units per week for men and <14 units per week for women; reduced use of salt when preparing food and elimination of excessively salty foods from the diet¹⁴; increased consumption of fruit and vegetables.¹² Lifestyle modifications that further reduce cardiovascular disease risk are stopping smoking; reducing total intake of saturated fat, replacing it with polyunsaturated or monounsaturated fats; increased intake of oily fish; and regular physical exercise.

Effective implementation of these non-pharmacological measures requires enthusiasm, knowledge, patience, and time spent with patients and their families. It is best undertaken by well trained health professionals—for example, a practice or clinic nurse—and should be backed up by simple clear written information.

Thresholds for intervention with drug treatment

Systolic blood pressure is at least as important as diastolic blood pressure as a predictor of cardiovascular disease. Systolic and diastolic blood pressure thresholds are thus provided to guide intervention with drug treatment in people with hypertension (figure).

Treatment goals or "targets"

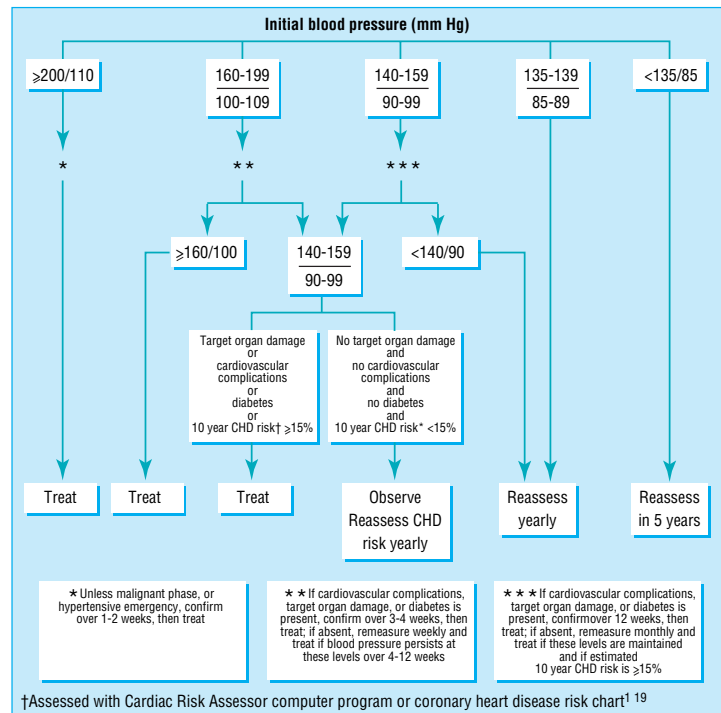
The hypertension optimal treatment (HOT) trial was underpowered but provides the best evidence to date on optimal blood pressure targets.¹ Optimal blood pressure for reduction of major cardiovascular events (based on an analysis of patients receiving treatment) was reported to be 139/83 mm Hg and reduction of blood pressure below this level caused no harm. However, patients whose blood pressure was below 150/90 mm Hg were not apparently disadvantaged.

Box 4: Indications for specialist referral

- Urgent treatment indicated: malignant hypertension, impending complications
- To investigate potential underlying causes of hypertension when initial evaluation suggests this possibility
- To evaluate therapeutic problems or failures
- Special circumstances: unusually variable blood pressure, possible white coat hypertension, pregnancy

North Staffordshire
Royal Infirmary,
Stoke on Trent
ST4 7LN
Gavin Russell
*consultant renal
physician*

Correspondence to:
B Williams
bw17@leicester.
ac.uk



Blood pressure thresholds and drug treatment in hypertension

An intention to treat analysis in hypertensive patients with diabetes showed that lowering blood pressure to below 80 mm Hg rather than below 90 mm Hg was advantageous. Recommendations for target pressures during treatment are shown in table 1. It is emphasised that even with best practice, these targets will not be achieved in all hypertensive people.

Table 1 Suggested target blood pressures during antihypertensive treatment. Both systolic and diastolic values should be attained—for example, <140/85 mmHg means less than 140 systolic and less than 85 diastolic

Blood pressure	Measured in clinic		Mean daytime ambulatory measurement or home measurement	
	No diabetes	Diabetes	No diabetes	Diabetes
Optimal	<140/85	<140/80	<130/80	<130/75
Audit standard	<150/90	<140/85	<140/85	<140/80

The audit standard reflects the minimum recommended levels of blood pressure control. Despite best practice, it may not be achievable in some treated hypertensive patients.

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

Class of drug	Indication		Contraindications	
	Compelling	Possible	Possible	Compelling
α blockers	Prostatism	Dyslipidaemia	Postural hypotension	Urinary incontinence
ACE inhibitors	Heart failure Left ventricular dysfunction Type I diabetic nephropathy	Chronic renal disease* Type II diabetic nephropathy	Renal impairment* Peripheral vascular disease†	Pregnancy Renovascular disease
Angiotensin II receptor antagonists	Cough induced by ACE inhibitor‡	Heart failure Intolerance of other antihypertensive drugs	Peripheral vascular disease‡	Pregnancy Renovascular disease
β blockers	Myocardial infarction Angina	Heart failure§	Heart failure§ Dyslipidaemia Peripheral vascular disease	Asthma or chronic obstructive pulmonary disease Heart block
Calcium antagonists (dihydropyridine)	Isolated systolic hypertension in elderly patients	Angina Elderly patients	—	—
Calcium antagonists (rate limiting)	Angina	Myocardial infarction	Combination with β blockade	Heart block Heart failure
Thiazides	Elderly patients	—	Dyslipidaemia	Gout

*Angiotensin converting enzyme (ACE) inhibitors may be beneficial in chronic renal failure but should be used with caution. Close supervision and specialist advice are needed when there is established and significant renal impairment.

†Caution with ACE inhibitors and angiotensin II receptor antagonists in peripheral vascular disease because of association with renovascular disease.

‡If ACE inhibitor indicated.

§β Blockers may worsen heart failure, but in specialist hands may be used to treat heart failure.

Choice of antihypertensive drug

For each class of antihypertensive drug there are compelling indications based on sound randomised controlled trial data for use in specific patient groups, and also compelling contraindications. There are also indications and contraindications that are less clear-cut, and which are given different weight by different doctors (possible indications/contraindications). These indications and contraindications for each drug class are summarised in table 2. When none of the special considerations apply, the least expensive drug, with the most supportive trial evidence—a low dose of a thiazide diuretic—should be preferred.

Since publication of the previous guidelines,³ three long term, double blind studies have compared the major classes of antihypertensive drugs (thiazide, β blocker, calcium antagonist, angiotensin converting enzyme inhibitor, and α blocker) and overall showed no consistent or important differences as regards antihypertensive efficacy, side effects, or quality of life.⁹⁻¹¹ Differences in average response between drug classes are, however, related to age and ethnic group.¹⁰ Few trials have compared different classes of drugs directly as regards reduction in cardiovascular events,²² and none is entirely satisfactory, but they have shown no consistent differences between regimens based on different drug classes. With the exception of the systolic hypertension-Europe and systolic hypertension-China trials and the captopril prevention project study,^{8, 23, 24} most evidence from outcome trials is for treatment based on thiazide or β blockers. Indirect comparison between the systolic hypertension in the elderly program,²⁵ based on diuretic treatment, and the systolic hypertension-Europe trial,⁸ based on a

dihydropyridine calcium antagonist, found that the outcome with these regimens was similar.

Controlled trials of dihydropyridine calcium antagonists have not supported earlier concerns about the safety of these drugs,⁸⁻²³ although nifedipine in capsule form should no longer be prescribed.

Dosage and combination therapy

The drug or formulation used should ideally be effective when taken as a single daily dose. An interval of at least four weeks to observe the full response should be allowed, unless it is necessary to lower blood pressure more urgently. The dose of drug (except thiazide diuretics) should be increased according to manufacturers' instructions. If the first drug is well tolerated but the response is small and insufficient, substitution of an alternative drug is appropriate when hypertension is mild and uncomplicated. In more severe or complicated hypertension it is safer to add drugs stepwise until blood pressure control is attained. Treatment can be stepped down later if blood pressure falls substantially below the optimal level.

Most hypertensive people will require combinations of antihypertensive therapy to achieve optimal control.⁴⁻⁶ Drugs from different classes generally have additive effects on blood pressure when they are prescribed together. Submaximal doses of two drugs result in larger responses of blood pressure and fewer side effects than maximal doses of a single drug. Rational drug combinations combine drugs with different modes of action that are additive—for example, diuretic with β blocker, diuretic with angiotensin converting enzyme inhibitor, β blocker with calcium antagonist, calcium antagonist with angiotensin converting enzyme inhibitor. Fixed dose combinations may be convenient for patients and are acceptable when monotherapy is ineffective, individual drug components are appropriate, and there are no major cost implications.

Elderly people with hypertension

Hypertension, including isolated systolic hypertension ($\geq 160/ < 90$ mm Hg), is found in more than half of all people aged over 60.¹⁵ These people have a higher risk of cardiovascular complications, including heart failure and dementia, than do younger people with hypertension, and antihypertensive treatment of diastolic hypertension²⁶ and isolated systolic hypertension reduces this risk.⁸⁻²⁵ Antihypertensive treatment is beneficial until at least age 80, and regular screening of blood pressure should continue until this age. Once treatment is started, it should be continued after the age of 80. When hypertension is first diagnosed in people over 80, there is limited evidence to guide policy but treatment decisions should probably be based on biological rather than chronological age. Low dose thiazides are the accepted first line treatment for elderly people. β Blockers are less effective than thiazides as first line treatment; in a meta-analysis they were shown to reduce only stroke events.²⁷ Dihydropyridine calcium antagonists are suitable alternatives for elderly patients when thiazides are ineffective, contraindicated, or not tolerated.⁸

Box 5: Other measures to reduce cardiovascular risk

Patients with established cardiovascular disease or at high risk according to the Joint British Societies' Cardiac Risk Assessor computer program or coronary heart disease risk chart should be considered for aspirin and statin therapy as follows:

- For primary prevention, 75 mg aspirin is recommended for hypertensive patients aged 50 years or older who have satisfactory control of their blood pressure ($< 150/90$ mm Hg) and either target organ damage or diabetes or a 10 year coronary heart disease risk ≥ 15
- For primary prevention, statin therapy is indicated up to age 70 when serum total cholesterol is ≥ 5.0 mmol/l and the 10 year coronary heart disease risk is ≥ 30
- For secondary prevention (when there is evidence of cardiovascular disease (angina or myocardial infarction)), statin therapy is indicated up to age 75 when total serum cholesterol is ≥ 5.0 mmol/l

The full version of the guidelines includes other special groups of patients: those with type I and type II diabetes; those with renal disease; pregnant women; users of oral contraceptives; users of hormone replacement therapy; and ethnic subgroups.¹

Aspirin and hypertension

In the hypertension optimal treatment trial, 75 mg aspirin daily reduced major cardiovascular events in hypertensive patients by 15%, but not fatal events.¹ Similar effects were observed in the hypertensive cohort within the thrombosis prevention trial of aspirin.²⁸ In both trials, however, the number of major bleeding episodes due to aspirin was similar to the number of cardiovascular events saved. Hence for primary prevention, aspirin should be considered only for hypertensive people who meet the criteria set out in box 5.

Treatment with statins

Several trials have shown that statin treatment reduces coronary events and all cause mortality and is safe, simple, and well tolerated in both secondary and primary prevention.¹⁹ Statin treatment also reduces stroke risk substantially in patients who have coronary heart disease.¹⁹ In subgroup analyses, benefits were similar in hypertensive patients. Given the persistent high cardiovascular risk in treated hypertensive patients, and the relation of this risk to serum cholesterol,¹⁶ these trials have large implications for hypertension management. Statin treatment could now be justified at a 10 year coronary heart disease risk of 6%,²⁹ but this would entail treating over half of all hypertensive patients. The main constraint on statin treatment at present is its cost.

The British Hypertension Society's recommendations for statin therapy are designed to be consistent with three recent sets of UK guidelines.¹⁹⁻²¹ These are

conservative recommendations and represent minimum acceptable levels of treatment. Statin treatment should be prioritised by using the criteria set out in box 5.

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, compliance, and the need for non-pharmacological advice. Three monthly review is sufficient when treatment and blood pressure are stable; the interval should not generally exceed six months. The routine for follow up visits, at which trained nurses have an important role, should be simple: measure blood pressure and weight; inquire about general health and side effects; reinforce non-pharmacological advice; and test urine for proteinuria annually.

Objectives of the guidelines

- To promote the primary prevention of hypertension and cardiovascular disease by encouraging changes in the diet and lifestyle of the whole population
- To increase detection and treatment of undiagnosed hypertension (particularly among those at high risk) by routine screening and increasing awareness of hypertension among the public
- To increase the proportion of patients on antihypertensive treatment who have optimal blood pressure levels
- To reduce the cardiovascular risk of treated hypertensive patients by non-pharmacological measures and by appropriate use of aspirin and statin treatment
- To promote continuation of and compliance with treatment by optimising the choice and use of drugs, minimising side effects, and increasing information and choice for patients.

Implementation of guidelines

Realisation of these objectives will depend largely on the efforts of doctors and nurses in general practice. Surveys revealing incomplete detection, treatment, and control of hypertension indicate a serious failure to implement the knowledge we have, although there has been some improvement in recent years.¹³ Ideally, all practices or primary care groups should develop a protocol for hypertension management that covers screening policy; initial evaluation and investigation; estimation of cardiovascular risk; non-pharmacological measures; use of antihypertensive drugs, aspirin, and statins; treatment targets; follow up strategy; and methods for identifying and recalling patients who drop out of follow up. Written information should be available for patients about hypertension and its treatment. The protocol should detail those aspects of management that are in the province of the practice nurse and of the doctor, and the implementation of the practice policy should be audited periodically.

The authors of this manuscript were members of the executive committee of the British Hypertension Society who formed the

third working party for the production of these guidelines. LER chaired the working party and produced the first draft after receiving written sections from each member. This draft was reviewed by the membership of the British Hypertension Society and their comments were used by BW to modify subsequent drafts. BW coordinated the final writing and preparation of the manuscript which was reviewed and approved at each draft stage by all members of the working party.

Competing interests: None declared.

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Appendix

Material for patients

- Patient information booklet: "Understanding High Blood Pressure"
- Fact sheets:
 - Selfhelp measures
 - Antihypertensive drugs

Blood pressure measurement
Reducing dietary salt
Blood pressure and kidney disease

- Diet sheet: "Healthy Eating"

Available from the British Hypertension Society Information Service, Blood Pressure Unit, St George's Hospital Medical School, Cranmer Terrace, London SW17 0RE (tel: 0181 725 3412; fax: 0181 725 2959; www.bhsinfo.hyp.ac.uk (for information service); website: www.bhs.hyp.ac.uk)

Material for doctors

- *Blood Pressure Measurement—Recommendations of the British Hypertension Society*. 3rd edition, 1997. (Edited by E O'Brien et al; price £4.95.)
- BHS/BMJ. *Recommendations for Blood Pressure Measurement*. CD Rom, price £58.75.
Available from BMJ Publications or the BMJ Bookshop, BMA House, London WC1H 9JR (tel: 0171 383 6244; fax: 0171 383 6455; orders@bmjbookshop.com).
- The Joint British Societies' Cardiac Risk Assessor computer program and copies of the Joint British Societies coronary heart disease risk assessment chart can be downloaded from the British Hypertension Society website (www.bhs.hyp.ac.uk).

Methods in health service research

Handling uncertainty in economic evaluations of healthcare interventions

Andrew H Briggs, Alastair M Gray

The constant introduction of new health technologies, coupled with limited healthcare resources, has engendered a growing interest in economic evaluation as a way of guiding decision makers towards interventions that are likely to offer maximum health gain. In particular, cost effectiveness analyses—which compare interventions in terms of the extra or incremental cost per unit of health outcome obtained—have become increasingly familiar in many medical and health service journals.

Considerable uncertainty exists in regard to valid economic evaluations. Firstly, several aspects of the underlying methodological framework are still being debated among health economists. Secondly, there is often considerable uncertainty surrounding the data, the assumptions that may have been used, and how to handle and express this uncertainty. In the absence of data at the patient level sensitivity analysis is commonly used; however, a number of alternative methods of sensitivity analysis exist, with different implications for the interval estimates generated (see box). Finally, there is a substantial amount of subjectivity in presenting and interpreting the results of economic evaluations.

The aim of this paper is to give an overview of the handling of uncertainty in economic evaluations of healthcare interventions.³ It examines how analysts have handled uncertainty in economic evalua-

Summary points

Economic evaluations are beset by uncertainty concerning methodology and data

A review of 492 articles published up to December 1996 found that a fifth did not attempt any analysis to examine uncertainty

Only 5% of these studies reported some measure of cost variance

Closer adherence to published guidelines would greatly improve the current position

Use of a methodological reference case will improve comparability

This is the last of four articles

Health Economics Research Centre, Institute of Health Sciences, University of Oxford, Oxford OX3 7LF

Andrew H Briggs
training fellow
Alastair M Gray
reader

Correspondence to:
A H Briggs
andrewbriggs@his.ox.ac.uk
Series editor:
Nick Black

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tion, assembled data on the distribution and variance of healthcare costs, and proposed guidelines to improve current practice. It is intended as a contribution towards the development of agreed guidelines for analysts, reviewers, editors, and decision makers.⁴⁻⁷