SIGN

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Scottish Intercollegiate Guidelines Network

Hypertension in Older People

A National Clinical Guideline

January 2001

KEY TO EVIDENCE STATEMENTS AND GRADES OF RECOMMENDATIONS

The definitions of the types of evidence and the grading of recommendations used in this guideline originate from the US Agency for Health Care Policy and Research[1] and are set out in the following tables.

STATEMENTS OF EVIDENCE

Ia	Evidence obtained from meta-analysis of randomised controlled trials.
Ib	Evidence obtained from at least one randomised controlled trial.
IIa	Evidence obtained from at least one well-designed controlled study without randomisation.
IIb	Evidence obtained from at least one other type of well-designed quasi-experimental study.
III	Evidence obtained from well-designed non-experimental descriptive studies, such as comparative studies, correlation studies and case studies.
IV	Evidence obtained from expert committee reports or opinions and/or clinical experiences of respected authorities.

GRADES OF RECOMMENDATIONS

A **Requires at least one randomised controlled trial as part of a body of literature of overall good quality and consistency addressing the specific recommendation.**
(Evidence levels Ia, Ib)

B **Requires the availability of well conducted clinical studies but no randomised clinical trials on the topic of recommendation.**
(Evidence levels IIa, IIb, III)

C **Requires evidence obtained from expert committee reports or opinions and/or clinical experiences of respected authorities. Indicates an absence of directly applicable clinical studies of good quality.**
(Evidence level IV)

GOOD PRACTICE POINTS

☑ Recommended best practice based on the clinical experience of the guideline development group.

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GUIDELINE DEVELOPMENT GROUP

Dr Ronald MacWalter *(Chairman from 1998)*	*Consultant Physician, General & Acute Stroke Medicine, Ninewells Hospital, Dundee*
Professor Graham Watt *(Chairman until 1998)*	*Professor of General Practice, University of Glasgow*
Dr Philip Cotton *(Methodologist)*	*General Practitioner, Glasgow*
Dr Hugh Edwards *(Methodologist)*	*General Practitioner, Edinburgh*
Dr Suzanne Burns *(Secretary)*	*Specialist Registrar in Medicine for the Elderly, Perth Royal Infirmary*
Dr Keith Beard	*Consultant Physician in Geriatric Medicine, Victoria Infirmary, Glasgow*
Dr Cyril Cohen	*Age Concern, Scotland*
Dr Barclay Goudie	*General Practitioner, Dundee*
Dr Iain McIntosh	*General Practitioner, St Ninians & Trustee, Dementia Services Development Centre*
Mrs Kathy McShane	*Practice Nurse, Glasgow*
Ms Kirsten Major	*Health Economist, Ayrshire and Arran Health Board*
Ms Angela Munday	*Chief Pharmacist, Inverclyde Royal Hospital, Greenock*
Professor Cairns Smith	*Consultant in Public Health, University of Aberdeen*
Dr Paul Syme	*Consultant Physician, Borders General Hospital, Melrose*
Professor David Webb	*Consultant Physician, Western General Hospital, Edinburgh*
Dr John Webster	*Consultant Physician, Aberdeen Royal Infirmary*

Declarations of interests were made by all members of the guideline development group.
Details are available on request from the SIGN Executive.

SPECIALIST REVIEWERS

Professor Chris Bulpitt	*Professor of Geriatric Medicine, Imperial School of Medicine, London*
Dr Clare Campbell	*General Practitioner, Broxburn, West Lothian*
Dr John Coope	*General Practitioner, Bollington, Cheshire*
Professor Robert Fagard	*Head of Hypertension and Cardiovascular Rehabilitation Unit, University of Leuven*
Professor Charles Forbes	*Head of Department of Medicine, University of Dundee*
Dr Andrew Harrower	*Consultant Physician, Monklands Hospital, Airdrie*
Dr Christopher Isles	*Consultant Physician, Dumfries & Galloway Royal Infirmary*
Dr George Kassianos	*General Practitioner, Berkshire*
Dr Lesley MacDonald	*Director of Public Health, Fife Health Board*
Dr Gordon McInnes	*Senior Lecturer in Medicine & Therapeutics, Western Infirmary, Glasgow*
Dr Allan Merry	*General Practitioner, Ardrossan*
Professor Eoin O'Brien	*Director of Blood Pressure Unit, Beaumont Hospital, Dublin*
Dr Paul Padfield	*Associate Medical Director, Lothian University Hospitals NHS Trust*
Professor Neil Poulter	*Director, Cardiovascular Studies Unit, Imperial College School of Medicine, London*
Professor Larry Ramsay	*Professor of Clinical Pharmacology & Therapeutics, Royal Hallamshire Hospital*
Professor John Reid	*Regius Professor of Medicine & Therapeutics, University of Glasgow*
Dr Andrew Scott	*Consultant Physician in Geriatric Medicine, Arrowe Park Hospital, Wirral*
Professor Peter Sleight	*Professor Emeritus of Cardiovascular Medicine, John Radcliffe Hospital, Oxford*
Dr Blair Smith	*Lecturer, Department of General Practice & Primary Care, University of Aberdeen*
Dr Jan Staessen	*Leuven University, Belgium*
Professor John Swailes	*Professor of Medicine, University of Leicester (deceased)*
Dr Alex Watson	*General Practitioner, Dundee*
Dr Brian Williams	*Consultant in Medicine for the Elderly, Gartnavel General Hospital, Glasgow*
Professor Robert Wilkinson	*Professor of Renal Medicine, Freeman Hospital, Newcastle upon Tyne*

Notes for users of the guideline

DEVELOPMENT OF LOCAL GUIDELINES

It is intended that this guideline will be adopted after local discussion involving clinical staff and management. The Area Clinical Audit Committee should be fully involved. Local arrangements may then be made for the derivation of specific local guidelines to implement the national guideline in individual hospitals, units and practices and for securing compliance with them. This may be done by a variety of means, including patient-specific reminders, continuing education and training, and clinical audit.

SIGN consents to the copying of this guideline for the purpose of producing local guidelines for use in Scotland. For details of how to order additional copies of this or other SIGN publications, see inside back cover.

STATEMENT OF INTENT

This report is not intended to be construed or to serve as a standard of medical care. Standards of medical care are determined on the basis of all clinical data available for an individual case and are subject to change as scientific knowledge and technology advance and patterns of care evolve.

These parameters of practice should be considered guidelines only. Adherence to them will not ensure a successful outcome in every case, nor should they be construed as including all proper methods of care or excluding other acceptable methods of care aimed at the same results. The ultimate judgement regarding a particular clinical procedure or treatment plan must be made by the doctor in light of the clinical data presented by the patient and the diagnostic and treatment options available.

Significant departures from the national guideline as expressed in the local guideline should be fully documented and the reasons for the differences explained. Significant departures from the local guideline should be fully documented in the patient's case notes at the time the relevant decision is taken.

A background paper on the legal implications of guidelines is available from the SIGN Executive.

REVIEW OF THE GUIDELINE

This guideline was issued in January 2001 and will be reviewed in 2003, or sooner if new evidence becomes available. Any amendments to the guideline in the interim period will be noted on the SIGN website. Comments are invited to assist the review process. All correspondence and requests for background information regarding the guideline should be sent to:

SIGN Executive
Royal College of Physicians
9 Queen Street
Edinburgh EH2 1JQ

Tel: 0131 225 7324
Fax: 0131 225 1769

e-mail: sign@rcpe.ac.uk
www.sign.ac.uk

Abbreviations

ABMP	Ambulatory blood pressure monitoring
ACC	Associated clinical conditions
ACE	Angiotensin converting enzyme
ALLHAT	Antihypertensive and Lipid-Lowering Treatment to Prevent Heart Attack Trial
BHS	British Hypertension Society
BMI	Body mass index
BP	Blood pressure
CAPPP	CAPtopril Prevention Project
CHD	Coronary heart disease
CVD	Cardiovascular disease
DBP	Diastolic blood pressure
ECG	Electrocardiograph
EWPHE	European Working Party on High Blood Pressure in the Elderly
FACET	Fosinopril Amlodipine Cardiovascular Events Trial
GP	General practitioner
HDL	High density lipoprotein
HMG CoA	Hydroxymethylglutaryl coenzyme A
HOPE	Heart Outcomes Prevention Evaluation study
HOT	Hypertension Optimal Treatment study
HYVET	Hypertension in the Very Elderly Trial
IDDM	Insulin dependent diabetes mellitus
ISH	Isolated systolic hypertension
	International Society of Hypertension
JNC	US Joint National Committee on Prevention, Detection, Evaluation and Treatment of High Blood Pressure
LDL	Low density lipoprotein
LVH	Left ventricular hypertrophy
MMSE	Mini Mental State Examination
NNT	Number needed to treat
PVD	Peripheral vascular disease
SBP	Systolic blood pressure
SHEP	Systolic Hypertension in the Elderly Program
SIGN	Scottish Intercollegiate Guidelines Network
STOP	Swedish Trial in Old Patients with Hypertension
TC	Total cholesterol
TIA	Transient ischaemic attack
TOD	Target organ damage
TSH	Thyroid stimulating hormone
UKPDS	UK Prospective Study of Diabetes
WHO	World Health Organisation
γGT	Gamma glutamyl transpeptidase

Summary of recommendations

DIAGNOSIS AND ASSESSMENT

C A full assessment of cardiovascular risk should be carried out for all hypertensive patients.

C Blood pressure measurement is critical to the management of hypertension. Validated equipment should be used and the recommendations of the British Hypertension Society on blood pressure measurement should be followed.

C The normal range for home blood pressure measurements and ambulatory blood pressure monitoring is lower than "normal" surgery or clinic values.

C Accelerated phase (malignant) hypertension requires urgent hospital admission for investigation and treatment.

THRESHOLDS AND TARGETS FOR TREATING HYPERTENSION IN OLDER PEOPLE

C Both systolic and diastolic hypertension require treatment.

C Thresholds for antihypertensive therapy and targets for treatment should be set.

C Thresholds for antihypertensive therapy should take into account both the level of blood pressure and other risk factors.

C The decision to start treatment should be based on a structured assessment of cardiovascular risk.

☑ For risk assessment in primary prevention of cardiovascular disease, use the Joint British chart. Note that the charts are only valid for patients aged 32-74 and with no pre-existing atherosclerotic disease.

☑ For risk assessment in patients aged ≥75 or with pre-existing vascular disease, use the WHO tables. Although these patients will almost certainly require blood pressure therapy, other aspects of cardiovascular risk should be assessed and modified where possible.

A A target blood pressure of <140/90 mm Hg is recommended for older hypertensive patients.

A Even a small reduction in blood pressure is worthwhile if absolute targets prove difficult to achieve.

C Hypertensive patients with diabetes or with renal disease should be considered for specialist referral. Some patients may require further investigation and lower target blood pressures may be desirable.

LIFESTYLE MODIFICATION

C Lifestyle measures aimed at controlling hypertension should be recommended in all cases.

A Overweight and obese hypertensive patients (BMI ≥25.0) should be encouraged to lose weight.

B Alcohol intake should be reduced when it exceeds 21 units per week for men and 14 units per week for women.

A Sodium intake should be reduced towards a target of < 5 g/day.

A Fruit and vegetable consumption should be increased to five portions/day, total and saturated fat consumption reduced.

A Increase physical activity by taking regular exercise.

B All patients should be actively discouraged from smoking.

DRUG TREATMENT

A **Thiazide diuretics** are recommended as first line therapy for drug treatment of hypertension in older patients.

A Low doses of thiazide should be used as there is clear evidence that this minimises potential adverse biochemical and metabolic disturbance.

A **β-blockers** can be used as alternative or supplementary therapy to thiazide diuretics in older patients.

A **Long-acting dihydropyridine calcium antagonists** can be used as alternative therapy to thiazide diuretics or supplementary to other therapy, particularly in patients with isolated systolic hypertension.

B Short-acting dihydropyridine calcium antagonists should be avoided.

A **ACE inhibitors** are specifically indicated as first line therapy for hypertension in patients with type 1 diabetes, proteinuria, or left ventricular dysfunction.

A In most other hypertensive patients, ACE inhibitors are recommended as alternative or supplementary therapy in the absence of renal artery stenosis.

C α-blockers may be used as supplementary therapy.

A Aspirin 75 mg daily is recommended for older hypertensive patients who have:

- no contraindication to aspirin
- blood pressure controlled to < 150/90 mm Hg

and any of the following:

- cardiovascular complications
- target organ damage
- cardiovascular event risk ≥2% per year (20% over 10 years)
- coronary event risk ≥1.5% per year (15% over 10 years).

C Single daily dosing of drugs (or, when this is not available, twice daily) should be encouraged.

TREATMENT OF SPECIAL GROUPS OF OLDER PEOPLE

TYPE 2 DIABETES

A The **threshold** blood pressure for starting antihypertensive treatment in type 2 diabetes with cardiovascular complications, hypertensive target organ damage, or diabetes-specific microvascular disease (including microalbuminuria or proteinuria) is ≥140/90 mm Hg.

C In the absence of these complications, formal estimation of cardiovascular risk should guide the treatment decision.

B Tight control of blood pressure in type 2 diabetes is recommended.

TYPE 1 DIABETES

A The **threshold** for antihypertensive treatment in type 1 diabetes is ≥140/90 mm Hg.

A The **target** blood pressure in type 1 diabetes is <130/80 mm Hg.

B In patients with proteinuria >1 g/24 hours, the target is <125/75 mm Hg.

A ACE inhibitors are recommended as first line therapy for control of hypertension in older patients with type 1 diabetes mellitus with nephropathy.

CARDIOVASCULAR DISEASE

A Blood pressure reduction should be part of a cardiovascular risk reduction strategy.

A When blood pressure reduction is required in patients with cardiovascular disease, ACE inhibitors and/or β-blockers should be considered.

RENAL DISEASE

B Blood pressure in older patients should be controlled to reduce the progression of renal disease.

C Accelerated phase (malignant) hypertension requires immediate hospital admission for treatment.

C The **threshold** for antihypertensive treatment is 140/90 mm Hg for patients with proteinuria or renal impairment.

A The blood pressure **target** for patients with renal impairment or persistent proteinuria is <130/85 mm Hg.

Patients with chronic renal disease of any aetiology and proteinuria >1 g/24 hours should have blood pressure controlled to 125/75 mm Hg.

A In the absence of renal artery stenosis, ACE inhibitors should be the drugs of choice in patients with renal failure.

STROKES AND TIAS

A Blood pressure reduction is recommended for the primary prevention of stroke and TIA.

A Antihypertensive therapy is not generally recommended in the early days after an acute stroke.

C Antihypertensive therapy should be considered for secondary prevention in patients who are recovering from stroke.

DEMENTIA

C Blood pressure in older people should be controlled to reduce the incidence of dementia.

VERY OLD PEOPLE

C Chronological age should not be a barrier to the judicious use of antihypertensive therapy.

1 Introduction

1.1 REMIT OF THE GUIDELINE

This guideline is designed to help practitioners tackle blood pressure problems in older patients, defined for the purposes of this guideline as over 60 years of age. While many of the principles and practices outlined in this guideline may be applied to younger patients, the guideline is targeted at the 60+ age group who are often disadvantaged in setting treatment priorities and whose risk of a serious end-point as a consequence of hypertension is much greater than for younger people.

The main aim of the guideline is to highlight the importance of treating older patients with all types of hypertension, including "mild" and isolated systolic hypertension. This area has been the cause of uncertainty among policy makers and clinicians in the past. The guideline is designed to offer practical help to those who care for patients with high blood pressure and suggests that a holistic approach to the management of cardiovascular risk should be adopted in older people. The guideline provides a system of care for older people with hypertension which will allow them to have the fullest quality of life.

While there is a strong evidence base for the treatment of hypertension in people over 60 years of age, the evidence becomes sparse for patients over 80 years. Hypertension in very old people is considered in section 6.6.

1.2 THE NEED FOR A GUIDELINE ON HYPERTENSION IN OLDER PEOPLE

Hypertension awareness, treatment, and control rates in Scotland have increased over the past three decades, but are still poor. Age-adjusted mortality rates for stroke and coronary heart disease declined during this time period,[2] but not as steeply as in other countries[19]. The incidence of end-stage renal disease[3, 4] and the prevalence of heart failure and left ventricular hypertrophy are thought to be increasing.

Prevention and treatment of hypertension and target organ disease remain important public health challenges that must be addressed. A survey in England has shown that, whilst most patients with hypertension are detected, those diagnosed as hypertensive often do not continue on treatment and those treated are often not controlled satisfactorily.[5] A recent study of US military veterans also showed that those who receive more intensive medical therapy had better blood pressure control, and that many patients did not receive sufficiently aggressive antihypertensive therapy.[6]

An important area for improving the control of blood pressure is among older people. The results in the trials of antihypertensive therapy follow a common and consistent pattern[7] and the benefits are greater in studies which select older patients.[8] However, there appears to be a problem in according priority to the older hypertensive patient. A study in East Anglia identified the paradox that the lowest diastolic BP at which general practitioners (GPs) would define or treat hypertension in different age groups appeared to be at variance with that recommended by the British Hypertension Society guidelines for treatment.[9] This is illustrated in figure 1 overleaf. There is also evidence that there is less awareness of, or less inclination to treat, mild hypertension and systolic hypertension in older people.[9, 10]

Figure 1

HYPERTENSION TREATMENT THRESHOLDS IN GENERAL PRACTICE COMPARED WITH BRITISH HYPERTENSION SOCIETY GUIDELINES

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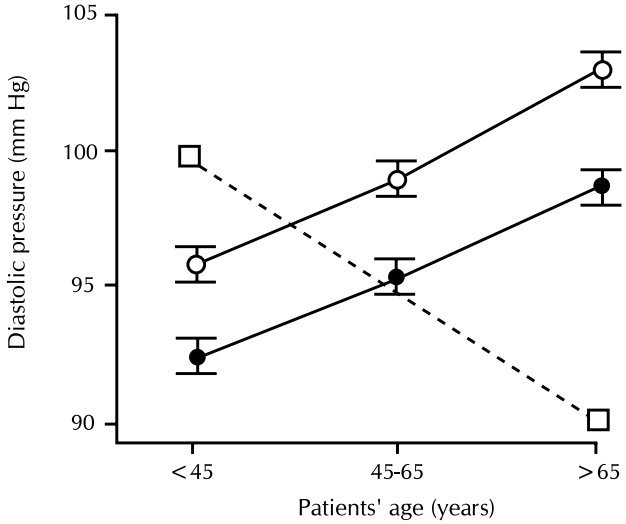


The figure illustrates the mean levels of diastolic blood pressure at which GPs ● identified and ○ treated hypertension for the age groups shown, as compared with □ the BHS guidelines for treatment current at that time.

The reasons why it was decided to accord priority to younger patients are not clear, as the benefits to older patients would be more substantial. Concerns that elderly patients might tolerate antihypertensive drugs poorly have been dispelled by analysis of adverse effects within the large outcome trials. The beneficial effects of treating hypertension greatly outweigh the incidence of adverse effects in the published trials.[11, 12, 13, 14, 15, 16, 17]

This guideline on hypertension in older people aims to reflect national and international consensus on standards of care in hypertension and to suggest ways in which the detection and treatment of hypertension in older people in Scotland can be improved. It is in broad agreement with the recommendations of other recently published guidelines on hypertension, such as those from the World Health Organisation and the International Society of Hypertension (WHO-ISH);[18] the US Joint National Committee on Prevention, Detection, Evaluation and Treatment of High Blood Pressure (JNC-VI);[19] the Joint British Recommendations on prevention of coronary heart disease in clinical practice;[20] and the revised British Hypertension Society (BHS) guidelines.[21]

However, with the exception of the WHO guideline, none of these specifically address older people. Although other guidelines treat older patients as a subgroup, this guideline has focused on the various different pathologies that older patients suffer from and identifies therapy for subgoups of elderly patients.

This guideline has followed a systematic literature review based on a previously published Cochrane systematic review on the subject. Further details of the literature review undertaken for this guideline are provided at Annex 1.

1.3 DEFINITION AND CLASSIFICATION: WHAT IS HYPERTENSION IN OLDER PEOPLE?

The problems associated with blood pressure are those of continuously increasing risk associated with higher blood pressure. Older people are more likely than younger people to have hypertension and to benefit from treatment to bring blood pressure down. Meta-analyses of trials in hypertension in the elderly have shown that the relative risk reduction by antihypertensive treatment is about 40% for strokes and 20% for coronary events.[12, 22, 23, 24]

The WHO-ISH guideline defines hypertension as a blood pressure (BP) ≥140 mm Hg and/or a diastolic ≥90 mm Hg.[18] Isolated systolic hypertension (ISH) is present when the systolic BP is equal to or greater than 140 mm Hg (with a diastolic BP <90 mm Hg). ISH is particularly common among older patients.[25]

Table 1 shows the definition and classification of different blood pressure used in this guideline.

The following important points identified in the WHO-ISH guideline[18] must also be appreciated in relation to this SIGN guideline:

- Blood pressure levels are continuously related to the risks of cardiovascular disease so the definition of "hypertension" is arbitrary. Defining a level of blood pressure as hypertension does not mean that treatment is of benefit, simply that the risk is significant
- Most of the evidence about the risks and benefits of blood pressure reduction comes from trials where patients were selected on the basis of having mild to moderate hypertension.
- It is not certain whether the estimates of treatment effect obtained in trials in carefully selected hypertensive individuals can be applied to other groups, although the consistency of data from meta-analysis does suggest that treatment would be of benefit.
- High risk patients with normotension may benefit from blood pressure reduction, but further studies are required to elucidate this.

Table 1

DEFINITIONS AND CLASSIFICATIONS OF BLOOD PRESSURE LEVELS (mm Hg)

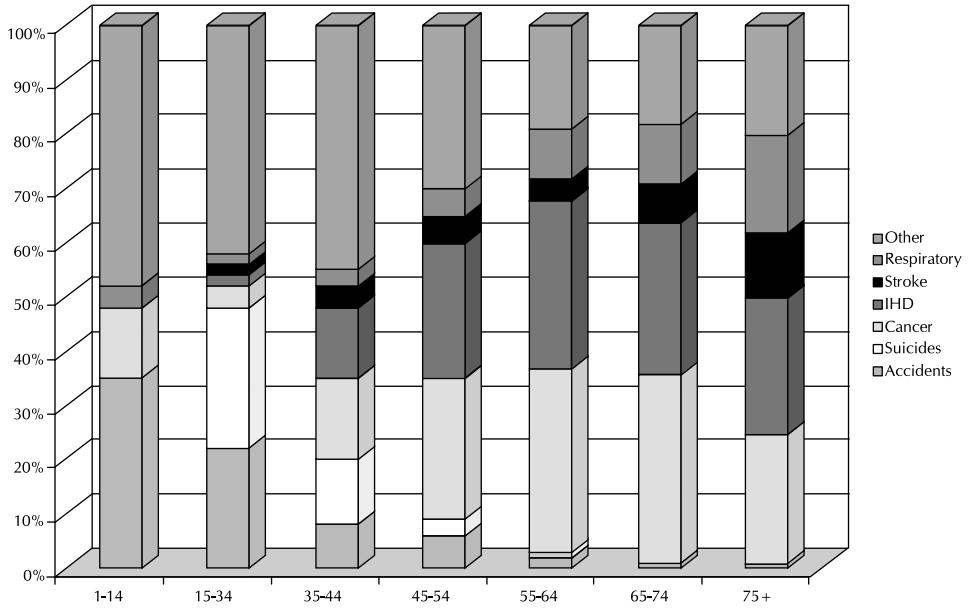
Category*	Systolic	Diastolic
Normal	<140	<90
Mild hypertension	140-159	90-99
Moderate hypertension	160-179	100-109
Severe hypertension	≥180	≥110
Borderline isolated systolic hypertension (ISH)	140-159	<90
Established ISH	≥160	<90

* *When a patient's systolic and diastolic blood pressure fall into different categories, the higher category should apply*

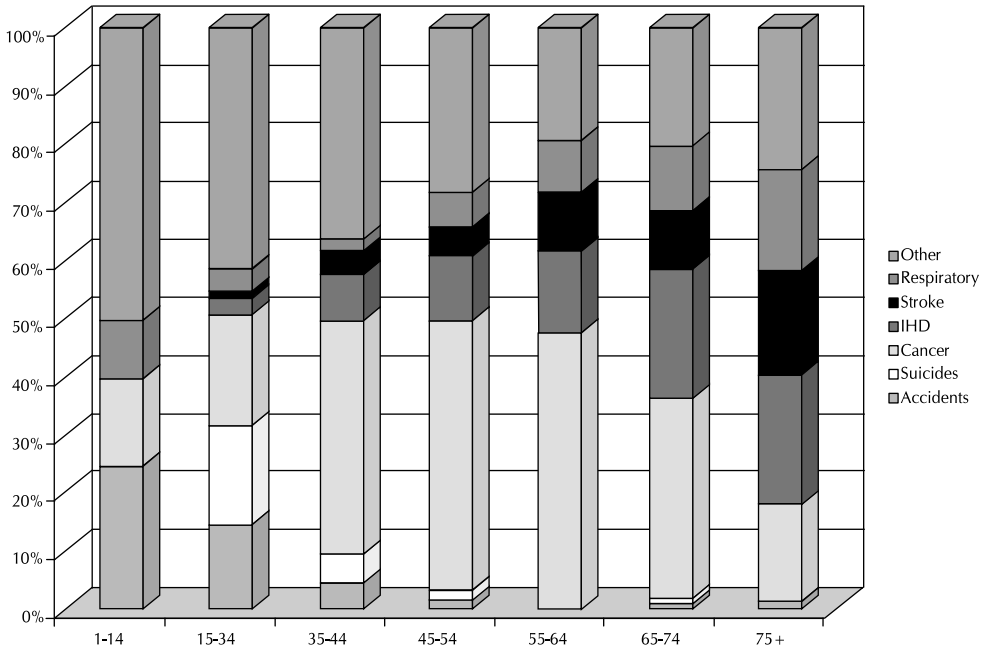
Figure 2

CAUSE OF DEATH BY AGE IN SCOTLAND IN 1997

Men



Women



1.4 COMPLICATIONS OF HYPERTENSION

Hypertension is usually symptomless but should be treated to reduce the risk of developing complications. The prevalence and risk of developing complications of hypertension increase with age. Potential consequences of inadequate treatment of hypertension are shown in table 2. It is worth emphasising that hypertension is the major cardiovascular risk factor that is amenable to intervention and prevention.

Table 2

POTENTIAL CONSEQUENCES OF INADEQUATE TREATMENT OF HYPERTENSION

Cerebrovascular disease
- Ischaemic stroke
- Haemorrhagic stroke
- Transient ischaemic attack (TIA)
- Dementia

Cardiovascular disease
- Myocardial infarction
- Angina
- Congestive cardiac failure
- Left ventricular hypertrophy
- Left ventricular dysfunction

Renal disease

Peripheral vascular disease

Aortic aneurysm

Retinopathy

Accelerated (malignant) **hypertension**

The main determinants of hypertension-related risk are:
- level of blood pressure
- presence of other cardiovascular risk factors
- age
- target organ damage (TOD)
- associated clinical conditions.

Multifactorial risk assessment for patients with hypertension is discussed in section 4.2.

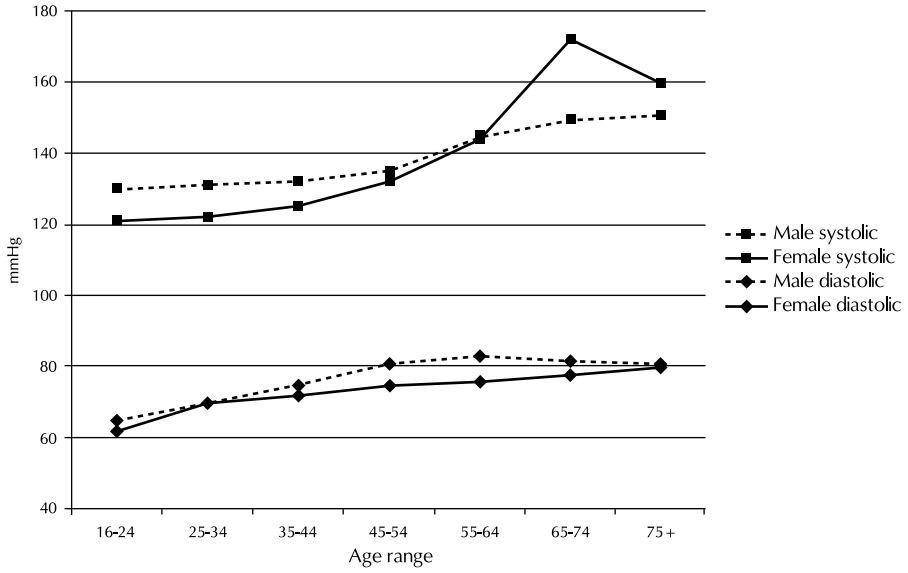
Myocardial infarction and stroke are the leading causes of both morbidity and mortality in Scotland. These diseases become particularly common with increasing age. Figure 2 shows the increasing proportion of deaths in men and women in Scotland from cerebrovascular and ischaemic heart disease by age.[2]

1.5 BENEFITS OF TREATING HYPERTENSION IN OLDER PEOPLE

The prevalence of hypertension increases with age, as does the incidence of the diseases caused by hypertension.[26, 27] Figure 3 overleaf shows data from the 1995 Scottish Health Survey, illustrating increasing blood pressure with age in the Scottish population.[28]

Figure 3

INCREASING BLOOD PRESSURE BY AGE IN THE SCOTTISH POPULATION



There is a widespread belief that a rise in blood pressure with age is inevitable and harmless, but observational data in several populations have demonstrated that this is not so. In Western populations, mean systolic blood pressure rises steadily with increasing age: the prevalence of hypertension (≥140/90 mm Hg) or isolated systolic hypertension (≥140/<90 mm Hg) in the third US National Health and Nutrition Examination Survey (NHANES III) was more than 50% in people aged over 60 years[29] (although not all would be eligible for treatment). This is not seen in non-industrialised societies.[30]

Older patients with hypertensive blood pressures have a higher risk of cardiovascular complications when compared to younger hypertensives,[31] and treatment which reduces diastolic[12, 13] and isolated systolic[14, 15] hypertension reduces this risk. Recent evidence also shows a 50% reduction in heart failure in the elderly group.[16, 17] Treatment of hypertension reduces the incidence of fatal and non-fatal stroke, cardiovascular disease (major coronary events and chronic heart failure) and, in some studies, reduces cardiovascular and total mortality.[8, 32] The effects vary between different studies because of varying end-points (and premature halts due to impressive treatment effects), follow-up times, study population size, treatment regimen, blood pressure levels, age of participants, and presence of other risk factors.

The relative risk reduction from treatment of hypertension remains the same at all ages, but the absolute risk of complications of hypertension is higher among older patients than younger at every level of blood pressure, so that the number needed to treat (NNT) to obtain the same benefit is lower in older adults. The NNT for five years to prevent one death for patients aged under 60 years is 167 whereas for patients aged over 60 years the NNT is 72.[33]

The guideline development group acknowledges the resource implication of treating this increasingly large proportion of the population. However a study from Sweden suggests that it is cost-effective to treat hypertension in older people.[34] Further economic analysis in the Scottish context will be required to inform local implementation of this guideline *(see Annex 2)*.

2 Detection and diagnosis of hypertension

2.1 DETECTION OF HYPERTENSION

Routine blood pressure measurement is of value in detecting hypertension and also provides a useful record of baseline blood pressure in normotensive patients. As hypertension occurs commonly and is often asymptomatic, a proactive strategy is required to ensure its detection at a community level. There is a lack of data regarding the process of detection of hypertension in older people, but in younger patients this has been achieved using different practice-based strategies.[35, 36, 37, 38, 39, 40]

Case finding is one approach, where hypertension is detected when the patient rather than the doctor initiates the consultation. Blood pressure checks may be done during any consultations but are particularly suitable for inclusion in new patient examinations.

☑ For patients over the age of 75, a blood pressure check should be performed in those who attend for their annual health care check.

☑ Practices should also have a strategy for case finding in the 60-75 year age group.

Case finding should be considered as an ongoing process where blood pressure measurements are performed in the target population at regular intervals. Audit is an important element of any practice-based screening or case finding strategy. Follow up recordings are required to establish a diagnosis of hypertension following an initial high reading *(see section 2.3)*. Audit is an important element of any case finding strategy.

2.2 MEASUREMENT OF BLOOD PRESSURE

Before blood pressure measurements are taken there is a need for patients to understand the potential benefits and implications of treating hypertension. Blood pressure control should form part of a cardiovascular risk reduction strategy. Lifestyle changes should be emphasised and other risk factors addressed.

Detailed advice on the measurement of blood pressure has been published by the British Hypertension Society.[41] An updated version on CD-ROM has been published by the BMJ in 1999 and is recommended for consultation by all health professionals involved in hypertension management. A video is also available *(see Annex 3)*.

C **Blood pressure measurement is critical to the management of hypertension. Validated equipment should be used and the recommendations of the British Hypertension Society on blood pressure measurement should be followed.** *Evidence level IV*

Important points to be considered in recording the patient's blood pressure are noted in table 3. In practice it may not be possible to meet the ideal conditions described in all circumstances.

Table 3

IMPORTANT POINTS IN RECORDING BLOOD PRESSURE

Patient
▪ Quiet room, relaxed, sitting position *(If postural hypotension is suspected, a standing measurement should be taken)* ▪ If possible, avoid recording within two hours of a meal, coffee, alcohol or tobacco use.
Equipment
▪ Well maintained (if aneroid machines used - check monthly) ▪ New equipment should satisfy the standards of the British Hypertension Society protocol or American National Standards ▪ Appropriate cuff size (all cuffs should have marker to indicate the correct cuff size is used for each patient)
Measurement
▪ The person carrying out the measurement should be well-trained ▪ The mean value of two readings should be recorded on three separate occasions as a baseline ▪ Higher of both arms ▪ Aim for pressure to fall by 2 mm Hg per heart beat during cuff deflation ▪ Record to nearest 2 mm Hg ▪ Diastolic phase V (Disappearance of sounds) ▪ Check by palpation first, to avoid "silent gap"

Table 4

RECOMMENDATIONS FOR REVIEW FOLLOWING INITIAL BLOOD PRESSURE MEASUREMENT (ADAPTED FROM JNC-VI)

Initial Blood Pressure (mm Hg)*		**Recommended minimum review period****
Systolic	**Diastolic**	
<130	<85	Recheck in 2-5 years (patients aged >75 years offered annual health check)
130-139	85-89	Provide advice about lifestyle modification and recheck in one year
140-159	90-99	Provide advice about lifestyle modification and confirm within two months
160-179	100-109	Serial blood pressures repeated within one month
>180	>110	Confirm immediately and repeat BP in one day and again within one week depending on clinical situation

* *If systolic and diastolic categories are different, follow recommendations for shorter review period.*

** *Modify review period according to reliable information about past blood pressure measurements, other cardiovascular risk factors, or target organ disease.*

2.2.1 HOME AND AMBULATORY BLOOD PRESSURE RECORDING

Home blood pressure checking may improve the effectiveness of management and can help check compliance/concordance. Ambulatory blood pressure monitoring (ABPM) has also proved useful in certain circumstances, for example in borderline situations, in suspected "white coat" hypertension (patients whose blood pressure is consistently elevated in the GP surgery or the hospital clinic but normal at other times), and in apparent refractory hypertension. The British Hypertension Society also recommends use of ABPM when clinic blood pressure shows unusual variability and when symptoms suggest the possibility of hypotension.[21]

There are limited data available about the prognostic value of home and ambulatory blood pressure monitoring devices: further studies are required to clarify their role in the management of blood pressure problems and the recommendations of a BHS working party are awaited and will be considered on review of this guideline.

It should be noted that the normal range for blood pressure levels when using home and ambulatory BP monitoring devices is set lower than surgery recording. It is likely that the upper limit of normal is around 135/85 mmHg for home and ambulatory blood pressure monitoring.[42, 43] The results of longitudinal studies are awaited.

C **The normal range for home blood pressure measurements and ambulatory blood pressure monitoring is lower than "normal" surgery or clinic values.**

2.3 DIAGNOSIS OF HYPERTENSION

This requires careful consideration and requires at least three repeated blood pressure measurements over a period varying from days to months. The frequency of visits will be dictated by the severity of hypertension and co-morbidity. Clearly those at highest risk will require more rapid assessment to confirm the diagnosis, facilitate investigation and commence treatment.

Recommendations for review following initial blood pressure measurement to facilitate the diagnosis of hypertension adapted from JNC-VI[19] are shown in table 4. Anyone who has a high reading on one or more occasion should have their blood pressure re-measured at least annually.

☑ The average of three blood pressure readings should be taken as the baseline blood pressure.

3 Assessment and investigation of the hypertensive patient

3.1 EVALUATION

Evaluation of the patient is of value in six main areas:

- Recording the blood pressure
- Assessment of severity of hypertension
- Assessment of target organ damage
- Assessment of cardiovascular risk
- Identification of underlying causes
- Selection of specific drug therapy.

3.1.1 RECORDING THE BLOOD PRESSURE

Some important points regarding blood pressure measurement are shown in Table 3 in Section 2.

3.1.2 ASSESSMENT OF SEVERITY OF HYPERTENSION

Accelerated phase (malignant) hypertension is now rare, but the appearance of bilateral haemorrhages and cotton wool spots on retinal examination points to the diagnosis. Without effective treatment the prognosis is poor – fewer than 10% of patients survive one year – whereas with treatment more than 80% survive five years.[44]

Evidence level III

It is important to avoid sudden reduction in blood pressure in these patients, in whom autoregulation of cerebral blood flow may be temporarily impaired. This phase of hypertension is accompanied by an increased prevalence of renovascular disease.

C **Accelerated phase hypertension requires urgent hospital admission for investigation and treatment.**

3.1.3 ASSESSMENT OF TARGET ORGAN DAMAGE

The effect of hypertension on the end organs, i.e. brain, heart, kidneys and eyes *(see table 5)* must be assessed as well as coexistent risk factors. Unilateral or segmental retinal changes are more likely to indicate branch vessel occlusion than accelerated hypertension. Clinical signs of left ventricular failure or dysfunction at presentation may also influence the urgency and mode of treatment, as may features suggesting aortic aneurysm or dissection. These are usually indications for urgent hospital admission and antihypertensive treatment.

☑ Left ventricular failure or dysfunction at presentation requires hospital admission for investigation and treatment.

Proteinuria or haematuria in the absence of primary renal disease is a sign of severe hypertension.

3.1.4 ASSESSMENT OF CARDIOVASCULAR RISK

This depends largely on careful elucidation of the history. Preceding cardiovascular or cerebrovascular disease immediately places the patient in a higher risk category. Such patients have a three- to five-fold increased risk of adverse outcome than a hypertensive patient without such a history.

In respect of primary prevention, most guidelines on hypertension have now adopted the concept of multiple risk assessment.[18, 19, 20, 21, 50] These risk assessment methods base their estimates on age, gender, smoking habit, blood pressure, glucose tolerance, and cholesterol/HDL ratio. Tables, charts, computerised risk calculators are all very helpful and informative, but clinicians need to be able to recognise and identify the major risk factors *(see table 6)*. Details of the family history can add to the quantitative risk assessment and may reveal additional clues about underlying conditions. Body mass index (BMI) measurement should be a routine assessment at baseline and subsequently.

C **A full assessment of cardiovascular risk should be carried out for all hypertensive patients.**

3.1.5 IDENTIFICATION OF UNDERLYING CAUSES

Identifiable and remediable causes of hypertension are found infrequently but should be actively sought where appropriate.

The most common form (probably less than 5%) of secondary hypertension in older people is renovascular disease. Clinical clues include the presence of existing vascular disease: cerebrovascular, coronary or peripheral vascular disease. Renal artery stenosis coexists in up to 30% of such patients and may influence both blood pressure control and renal function. Other causes occasionally come to light: Cushing's syndrome, phaeochromocytoma, primary aldosteronism, polycystic kidney disease. It is often possible to alter the management and, occasionally, to cure the hypertension by dealing specifically with one of these problems. However, their prevalence is low.

3.1.6 SELECTION OF SPECIFIC DRUG THERAPY

Recognition of compelling indications or contraindications for particular drugs will determine the choice of therapy in many patients. For example, thiazides should be avoided in patients with gout, β-blockers in patients with asthma, dihydropyridines and rate limiting calcium channel antagonists in severe heart failure. By contrast, β-blockers may be especially useful in patients with angina, ACE inhibitors in patients with left ventricular dysfunction and dihydropyridines in patients with Raynaud's phenomenon *(see section 5.2)*.

3.2 INVESTIGATION

Investigations should be carried out with two main objectives:

(1) to aid in the assessment of cardiovascular risk; and

(2) to identify patients in whom an underlying cause of hypertension may be present.

Not all tests will be required in every patient. Investigations will be tailored by how quickly blood pressure comes under control and relevant additional pathology.

3.2.1 URINALYSIS

Proteinuria or haematuria can be indicators of underlying renal disease or of hypertensive nephropathy.

3.2.2 BIOCHEMICAL SCREEN

- **Full blood count**: an elevated mean cell volume may indicate alcohol excess.
- **Serum creatinine**: a normal creatinine level does not exclude renal disease. An elevated level may require further investigation. Baseline values are valuable for future reference.
- **Potassium**
  - **Hyperkalaemia** may indicate renal failure or other causes and the need for further investigations; however, haemolysis in transit is a common cause.
  - **Hypokalaemia** suggests aldosteronism. Hypokalaemia may be due to diuretic therapy or very rarely renovascular disease. The possibility of primary aldosteronism should be borne in mind.
- **Gamma glutamyl transpeptidase (γGT)**: an elevation may give a clue towards alcohol abuse.
- **Thyroid stimulating hormone (TSH)** may be considered in the initial screen of the hypertensive patient because it will identify a readily treatable condition and may explain some cases of dyslipidaemia. Hypothyroidism may be associated with hypertension in certain patients.
- **Blood glucose and full lipid profile** (total and HDL cholesterol and triglycerides) help define cardiovascular risk more accurately. The value of lipid measurements in patients over 75 years is not fully established. Although screening tests need not necessarily be fasting, treatment decisions should be based on a fasting sample.
- **Serum urate** may be useful as a baseline before initiating diuretic therapy
- **Serum calcium profile** should be measured to exclude hyperparathyroidism, which is associated with hypertension in some patients.

3.2.3 CARDIAC ASSESSMENT

All hypertensive patients should have a standard **12 lead ECG**. This provides a baseline for future reference and will reveal evidence of myocardial ischaemia, conduction defects and left ventricular hypertrophy.

Echocardiography is increasingly available. It is more sensitive than the ECG and is particularly helpful in further assessment of a cardiac murmur, in identifying left ventricular dysfunction requiring treatment, and in defining left ventricular hypertrophy. However, there are significant difficulties with standardisation of the technique and the intra- and inter-observer variability remains a problem. The availability of echocardiography will depend on local facilities and expertise.

3.2.4 ADDITIONAL INVESTIGATIONS

Further investigation of brain, heart, kidneys and endocrine system may be appropriate in selected individuals. Additional diagnostic tests will usually require specialist referral. These are often undertaken in ascending order of invasiveness and complexity.

4 Thresholds and targets for treating hypertension in older people

4.1 WHAT SHOULD WE TREAT: THE SYSTOLIC, THE DIASTOLIC OR BOTH?

There has been much debate on the relative importance of systolic and diastolic hypertension and in epidemiological studies both systolic and diastolic blood pressures are important risk factors for cardiovascular disease.[45] Treatment of systolic blood pressure[14, 15] and diastolic blood pressure[46, 47] have shown similar reductions in cardiovascular end points. There is evidence to suggest that it is the pulse pressure (difference between systolic and diastolic pressures) that may be the most important risk indicator in older hypertensive patients.[48, 49]

Evidence levels Ia and Ib

C **Both systolic and diastolic hypertension require treatment.**

C ***Thresholds* for antihypertensive therapy and *targets* for treatment should be set.***

Extrapolated from evidence levels Ia and Ib

* ***A threshold*** *of 140/90 mm Hg means either ≥ 140 systolic or ≥ 90 diastolic.*
A target *of < 140/90 mm Hg means < 140 systolic and < 90 diastolic.*

4.2 WHEN SHOULD WE START TREATMENT?

4.2.1 MULTIFACTORIAL RISK ASSESSMENT

The relationship between blood pressure and adverse cardiovascular outcome is direct, log-linear and tends to be steeper for systolic than for diastolic blood pressure. There is no obvious "cut off" level of blood pressure at which treatment should be started and any such threshold is somewhat arbitrary. Decisions on starting treatment should take into account not just the level of blood pressure, but also the presence of other clinical features, including risk factors, evidence of target organ damage and associated clinical conditions.

It is vital to assess the whole cardiovascular risk for each individual patient and several approaches to multifactorial risk assessment have been proposed, such as the New Zealand guidelines,[50] JNC-VI,[19] the Joint European guidelines,[51] three versions of the Sheffield table,[52, 53, 54] the Joint British chart (sometimes referred to as the Manchester tables),[20] and the WHO-ISH guideline.[18] All are derived from the Framingham risk equations, which included data from people aged up to 80 years. In addition to blood pressure, cardiovascular risk requires consideration of age, gender, smoking habit, diabetes, total/HDL cholesterol ratio, and family history. Any previous vascular events must be taken into account in the cardiovascular risk assessment.

The important factors influencing prognosis and assessment of risk are usefully summarised in the WHO/ISH guideline and an adaptation of this is provided as table 5. The combination of this list of risk factors, target organ damage and associated clinical conditions along with assessment of blood pressure severity allows patients to be allocated to a range of risk categories for cardiovascular outcome, as shown in table 6. From these tables can be derived both the absolute risk of a cardiovascular event over 10 years and an indication of the anticipated benefits of antihypertensive therapy *(see table 7)*.

Evidence level IV

Table 5

IMPORTANT FACTORS INFLUENCING PROGNOSIS AND ASSESSMENT OF RISK
(adapted from WHO-ISH classification[18])

Risk factors for cardiovascular disease	Target Organ Damage (TOD)	Associated Clinical Conditions (ACC)
I Used for risk stratification – Systolic and diastolic blood pressure (mild, moderate or severe) – Age >55 (men) >65 (women) – Smoking – Total cholesterol >6.5 mmol/l or TC/HDL ratio >5.0 – Diabetes – Family history of cardiovascular disease	Left ventricular hypertrophy (ECG or echo) Proteinuria and /or creatinine >150 µmol/l Atherosclerotic plaque (x-ray or ultrasound evidence in carotid, iliac, or femoral arteries or aorta)	Cerebrovascular disease – Ischaemic stroke – Haemorrhagic stroke – Transient ischaemic attack – Vascular dementia Cardiovascular disease – Myocardial infarction – Angina – Congestive cardiac failure Renal disease Peripheral vascular disease Aortic aneurysm Retinopathy
II Other factors adversely influencing prognosis – Reduced HDL cholesterol – Raised LDL cholesterol – Microalbuminuria in diabetics – Impaired glucose tolerance – Obesity		

Table 6

STRATIFICATION OF RISK TO QUANTIFY PROGNOSIS
(adapted from WHO-ISH guideline[18])

Other risk factors and disease history	Blood pressure (mm Hg)		
	Mild hypertension SBP 140-159 or DBP 90-99	**Moderate hypertension** SBP 160-179 or DBP 100-109	**Severe hypertension** SBP ≥ 180 or DBP ≥ 110
No other risk factors	**LOW RISK***	**MEDIUM RISK**	**HIGH RISK**
1-2 risk factors	**MEDIUM RISK**	**MEDIUM RISK**	**VERY HIGH RISK**
3 or more risk factors or TOD or diabetes	**HIGH RISK**	**HIGH RISK**	**VERY HIGH RISK**
Presence of associated clinical conditions	**VERY HIGH RISK**	**VERY HIGH RISK**	**VERY HIGH RISK**

* *Risk category refers to the risk of a cardiovascular event within 10 years: low risk: < 15%, medium: 15-20%, high: 20-30%, very high: > 30%*

Table 7

ESTIMATED EFFECTS OF ANTIHYPERTENSIVE TREATMENT ON CARDIOVASCULAR RISK
(adapted from WHO-ISH guideline[18])

Risk group *(see Table 5)*	**Absolute risk of event* over 10 yrs**	**Number needed to treat (NNT) over 10 years to prevent one event***	
		BP reduction 10/5 mm Hg	*BP reduction 20/10 mm Hg*
LOW	< 15%	>40	>20
MEDIUM	15-20%	30	20
HIGH	20-30%	25	17
VERY HIGH	> 30%	<20	<10

** Fatal and non-fatal stroke or myocardial infarction*

4.2.2 CHOICE OF RISK ASSESSMENT METHOD

These tables jointly illustrate a number of important issues in respect of the impact of hypertension on patients over the age of 60:

- Pre-existing vascular disease immediately places patients in a very high risk category. **All** such patients are candidates for antihypertensive, lipid lowering and antiplatelet therapy.
- Most patients in this age group with a sustained blood pressure of 140/90 mm Hg or greater merit antihypertensive therapy, with relatively few being at less than 15% risk of a major cardiovascular event over 10 years.
- The higher the risk, the greater the expected benefit from treatment.

The merits of the WHO-ISH approach to risk assessment are particularly in highlighting the value of treating older patients and in summarising the clinical features that determine outcome. However, the tables may lack precision for assessing risk in individual patients and are not designed to provide specific guidance about other interventions such as lipid lowering or antiplatelet therapy. These issues are especially important in reaching decisions about primary prevention in patients with mild hypertension **without** preceding vascular disease.

For this purpose the guideline development group commends the use of the most recent version of the Joint British chart,[20] which can be used to formulate decisions about antihypertensive, lipid lowering and antiplatelet therapy. It has been recommended by the SIGN guideline on lipids and the primary prevention of CHD[55] and is approved by the British Hypertension Society in its most recent guideline.[21] This chart has been widely publicised in the UK, is already extensively used in specialist clinics and has been favourably received by GPs and practice nurses in a limited field test in Dumfries & Galloway.[56] The guideline development group supports the adoption of a uniform system that is accurate, reliable, user friendly, widely applicable across specialties, and which can be subject to further evaluation and audit. However, the Joint British Chart does not extend to patients over the age of 75 or to patients with pre-existing vascular disease. It is only applicable to patients with mild hypertension and is not suitable for patients with a sustained systolic blood pressure of > 160 mm Hg.

4.2.3 CORONARY RISK VS. CARDIOVASCULAR RISK

An important factor to appreciate in applying the risk assessment methods is the difference between coronary and cardiovascular risk. The Joint British chart presents data on coronary risk over 10 years. Hypertensive patients are prone to both coronary disease and stroke and this is better reflected in terms of absolute cardiovascular risk (fatal plus non-fatal stroke and myocardial infarction, as illustrated in table 7). A 10 year coronary risk of 15% is equivalent to a combined cardiovascular risk of 20%. As with categories of blood pressure and levels of cholesterol, the level of risk chosen to determine intervention is rather arbitrary and may well change over time. Economic factors will also influence the level of intervention that can be supported within the health service. At this level of risk, the equivalent NNT over five years to prevent an event is 40.

For primary prevention, the current recommendation is that antihypertensive treatment and antiplatelet therapy should be started when 10 year coronary risk is 15% or greater. Lipid lowering therapy with a statin is recommended at a corresponding risk of 30% or greater.

The computer programme corresponding to the Joint British chart displays the 10 year risk of coronary disease and stroke separately and can be conveniently used to demonstrate the relative benefits of lowering blood pressure and cholesterol. In general terms, antihypertensive therapy is relatively more effective in preventing strokes and lipid lowering therapy is more effective in preventing coronary events.

C **Thresholds for antihypertensive therapy should take into account both the level of blood pressure and other risk factors.**

C **The decision to start treatment should be based on a structured assessment of cardiovascular risk.**

☑ For individual risk assessment in primary prevention of cardiovascular disease, use the Joint British chart. Note that the charts are only valid for patients aged 32-74 and with no pre-existing atherosclerotic disease.

☑ For risk assessment in patients aged ≥75 or with pre-existing vascular disease, use the WHO tables. Although these patients will almost certainly require blood pressure therapy, other aspects of cardiovascular risk should be assessed and modified where possible.

A black and white version of the Joint British chart is included as Annex 4. The full colour version is included in the 'quick reference guide' accompanying SIGN guideline no. 40: lipids and the primary prevention of coronary heart disease, and can also be downloaded from the SIGN website. The Joint British risk assessment method is also available in the form of a computer program (see Annex 3).

4.3 TARGETS OR NOT?

Just as definitions of hypertension and thresholds of blood pressure for starting therapy are somewhat arbitrary, so specific target pressures should be used sensibly, always bearing in mind the realities of clinical practice. Targets are useful but problems such as drug-induced adverse effects and genuine refractory hypertension may reduce patient compliance and concordance *(see sections 5.5 and 5.6)*.

The only large study specifically designed to investigate treatment optimal targets was the Hypertension Optimal Treatment (HOT) study, in which three groups of approximately 6,000 patients were randomised to target diastolic pressures of <90 mm Hg, <85 mm Hg and <80 mm Hg.[57] At the end of follow up (mean 3.8 years) the three groups could not be separated in respect of major cardiovascular end-points.

There were fewer events than expected and only 4 mm Hg separated the three groups in terms of the mean blood pressure achieved. However, the lowest risk of cardiovascular events was seen in patients with the lowest blood pressures, and the risk seemed to plateau at 86.5 mm Hg and 138.8 mm Hg for diastolic and systolic blood pressure respectively. One of the main findings of the study was that most of the benefit from antihypertensive treatment is achieved by lowering systolic blood pressure to about 140 mm Hg and diastolic to about 90 mm Hg in non-diabetics (although this was reported in the conclusions as 90 mm Hg diastolic). Only a small additional benefit was observed by reducing the blood pressure any further.

Evidence level Ib

A **A target blood pressure of <140/90 mm Hg is recommended for most older hypertensive patients.**

Many hypertension trials in the older patients have not aimed for as low a target as was achieved in the HOT study, and even lowering blood pressure by a small amount is beneficial. In trials of diuretic, β-blocker and dihydropyridine therapy, reduction in diastolic blood pressure by 5-6 mm Hg was accompanied by a substantial reduction (c. 40%) in stroke risk and c. 20% reduction in coronary heart disease risk.[12, 14, 22-24, 58-60]

Evidence level Ib

A **Even a small reduction in blood pressure is worthwhile if absolute targets prove difficult to achieve.**

There does seem to be a case for tighter blood pressure targets in some patient subgroups. Tight BP control was superior to average BP control in Type 2 diabetes in the UK Prospective Study of Diabetes (UKPDS)[61] and the outcome in diabetic patients and in patients with ischaemic heart disease in the HOT study was best in the lowest target group[57] *(see sections 6.1 and 6.2)*.

Evidence level Ib

It is not entirely clear if the better outcomes are related solely to the lower achieved BP or to particular properties of the additional drugs used to achieve these pressures. In some patients with intrinsic renal disease, lower thresholds and targets for antihypertensive therapy may also be appropriate *(see section 6.3)*.

C **Hypertensive patients with diabetes or with renal disease should be considered for specialist referral. Some patients may require further investigation and lower target blood pressures may be desirable.**

A small study has recently suggested that caution should be exercised in reducing blood pressure to too low a value.[62] A J-shaped relation between systolic and diastolic blood pressure and incidence of stroke in 2,351 older adults who were receiving treatment for hypertension has been found. In the group whose diastolic blood pressure was below 65 mm Hg, the relationship held even after the researchers adjusted for other stroke risk factors. In the lowest category of diastolic blood pressure, <65 mm Hg, the increase in stroke risk was statistically greater than in the second-lowest category, 65 to 74 mm Hg. The risk increased steadily again for diastolic blood pressure of 75 mm Hg and above. This suggests that over aggressive treatment may be detrimental. Further studies are required to determine the significance of this finding.

4.4 PRIORITISING TREATMENT

Treatment of all older patients with hypertension appears worthwhile, however certain groups who have certain other risk factors will benefit more than others because they are at an even higher risk of a clinical end-point. According to the data in tables 5 and 6, very few older people are in a "low risk" category. The risks associated with 1-2 risk factors are not insignificant, while risks associated with three or more risk factors or target organ damage are "high" to "very high". In patients with associated clinical conditions the risks associated with all grades of hypertension is "very high", emphasising the importance of treating the older adult.

Threshold and target recommendations derive from trials, usually with a wide range of exclusion clauses. Consequently, estimation of treatment effect has to be extrapolated with caution, although there is increasing evidence of benefit in everyday practice. The proposed thresholds define in excess of 20% of adults and greater than 50% of the 70+ age group as hypertensive. Therefore, in setting realistic targets for blood pressure reduction, practitioners should take into account not only the quality of life of patients, but also the available resources.

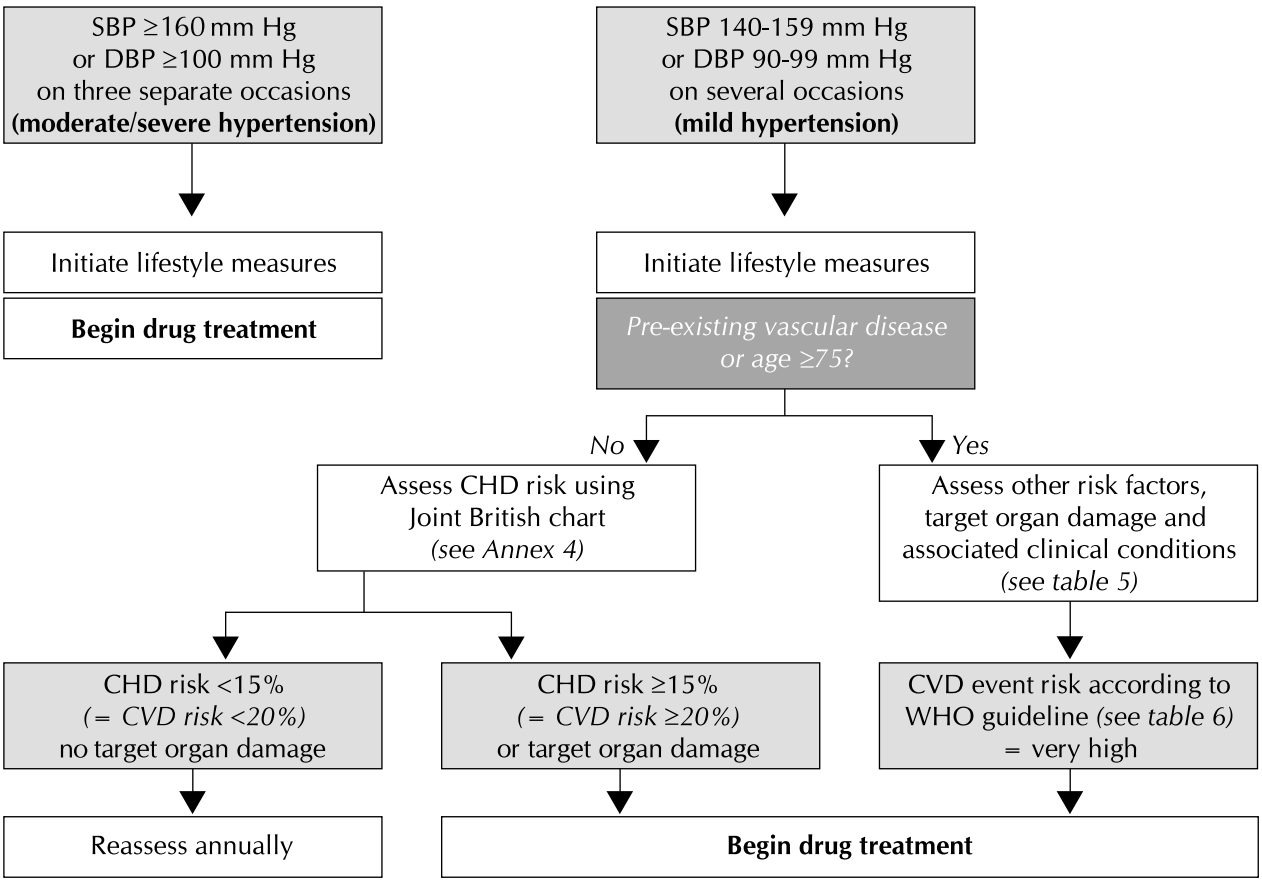
☑ Many hypertensive patients are at very high risk of coronary events and will need aspirin and or lipid-lowering therapy in addition to non-pharmacological measures and antihypertensive therapy[21] *(see section 5.3)*.

5 Treatment of hypertension in older people

Initiation of treatment for hypertension in older people is illustrated in Figure 4, adapted from the WHO-ISH[18] and Joint British[20] guidelines.

Figure 4

INITIATION OF TREATMENT FOR HYPERTENSION IN OLDER PEOPLE



5.1 LIFESTYLE MODIFICATION

Population change in lifestyle could lessen the rise in blood pressure associated with age. A change in diet will be required, including a diet high in fruit and vegetables; high in pulses and whole grains; high in fat-free and low fat dairy, poultry, fish, shellfish, and meat products; high in all essential nutrients; reduced in salt; reduced in total fat, saturated fat and cholesterol; no more than one or two drinks of alcohol per day; and controlled in calories to prevent or correct obesity.[63]

Meta-analyses of long term trials of lifestyle measures for blood pressure show that these are not very effective in the general population, when studied either singly[64] or in combination.[65] However, they may be of benefit to the individual patient and there is evidence that compliance with non-pharmacological methods of controlling hypertension can be reasonable[66] and that a useful decrease in blood pressure can be achieved.[67] Lifestyle modification may reduce the need for drug therapy.

Evidence levels Ia and Ib

C **Lifestyle measures aimed at controlling hypertension should be recommended in all cases.**

Extrapolated from level Ia

These methods can be used alone or in combination with drugs. Effective implementation of lifestyle measures will require enthusiasm, knowledge and considerable time spent with patients and their families. Both written and verbal instructions should be given

5.1.1 WEIGHT LOSS

A recent Cochrane review suggests that weight loss of 3 to 9% can be achieved with a weight reducing diet and this may translate to a 3 mm Hg decrease in systolic and diastolic blood pressure.[66] Weight loss also lowers the risk of diabetes and hyperlipidaemia.[68]

Evidence level Ib

A **Overweight and obese hypertensive patients (BMI ≥25.0) should be encouraged to lose weight.**

5.1.2 ALCOHOL

Excessive alcohol intake is an important risk factor for high blood pressure, can cause resistance to antihypertensive therapy,[69] and is a risk factor for stroke.[70] Hypertensives with high alcohol intake can lower blood pressure by decreasing alcohol intake.

Evidence levels Ib and III

B **Alcohol intake should be reduced when it exceeds 21 units per week for men and 14 units per week for women.**

5.1.3 DIETARY CHANGE

By decreasing sodium chloride intake from 10 g to 5 g, a reduction in blood pressure of around 5/3 mm Hg in hypertensive patients can be achieved[67, 71] The effects are greater in older people and in those with very high blood pressure. Sodium intake can be reduced by minimising intake of processed food and by not adding salt at table, but it is acknowledged that the target may be difficult to achieve in this age group.

Evidence levels Ia and III

A **Sodium intake should be reduced towards a target of < 5 g/day.**

By increasing fruit and vegetable consumption the total daily intake of potassium can be increased. A diet which consists of a high fruit and vegetable intake and a low saturated fat intake can lower blood pressure.[72]

Evidence level Ib

A **Fruit and vegetable consumption should be increased to five portions/day, total and saturated fat consumption reduced.**

Input from dietitians, where available, will be helpful in achieving dietary change.

5.1.5 EXERCISE

Blood pressure can be lowered by 30-45 minutes brisk walking most days.[73, 74, 75]

Evidence level Ib

A **Increase physical activity by taking regular exercise.**

5.1.6 OTHER CARDIOVASCULAR RISK FACTORS

Other cardiovascular risk factors should be addressed. These are discussed in detail in the SIGN guidelines on lipids and the prevention of coronary heart disease[55] and secondary prevention of CHD after myocardial infarction,[76] which both include the following recommendation about smoking cessation:

B **All patients should be actively discouraged from smoking.**

While blood pressure may respond well to non-pharmacological measures, it is essential to check that other cardiovascular risk factors are adequately treated and consider drug therapy for these factors *(see section 5.3)*.

5.2 ANTIHYPERTENSIVE DRUG TREATMENT

Long term compliance with non-pharmacological approaches such as the lifestyle modifications outlined above, may not be perfect and indeed there are no trials to indicate that this approach alone reduces morbidity and mortality from hypertension. Drug treatment must often be considered in addition.

The choice of therapy should take into account specific indications and contraindications for individual drugs and individual patients *(see table 8)*. Significant end-point trials have shown the benefits of using thiazide diuretics, β-blockers, calcium channel antagonists, and angiotensin converting enzyme (ACE) inhibitors for treatment of hypertension in older patients. Evidence from outcome trials is not presently available for other drug therapies (including α-blockers, angiotensin II inhibitors). Trials have shown no major difference in quality of life measures between different groups of drugs.

There is a wealth of data showing that inexpensive therapy is effective in controlling hypertension.[11, 13, 14, 15, 77] It is logical therefore to consider thiazide diuretics as first choice for most patients. However, in many cases combination therapy may be required and, in some patients, alternatives to the most inexpensive therapy may be necessary. Small doses of combinations may offer fewer side effects than larger doses of monotherapy. All trial results suggest that the act of lowering blood pressure is more important than the means by which it is achieved. The Swedish Trial in Old Patients with Hypertension-2 (STOP-2) study[78] showed that similar blood pressure reductions and end-point reductions could be achieved by "older" (β-blocker or combination diuretics) and "newer" (ACE inhibitors or long-acting dihydropyridine calcium antagonists) antihypertensive agents.

Table 8: SPECIFIC INDICATIONS AND CONTRAINDICATIONS FOR THE MAJOR CLASSES OF ANTIHYPERTENSIVE DRUGS

INDICATION	DRUG THERAPY		
	Compelling indication	**May have favourable effects**	**May have unfavourable effects**
Angina		β-blockers Calcium antagonists	
Atrial tachycardia and fibrillation		β-blockers Rate limiting Calcium antagonists	
Bronchospastic disease			β-blockers ***(contraindicated)***
Depression			β-blockers
Diabetes mellitus – types 1 and 2			Diuretics (high dose)
– type 2		Low-dose diuretics ACE Inhibitors β-blockers Calcium antagonists	
– types 1 and 2 with proteinuria		ACE inhibitors *(preferred)* Calcium antagonists (rate limiting) Angiotensin II receptor antagonists	
– type 1 with proteinuria	ACE inhibitors		
Dyslipidaemia		α-blockers	β-blockers Diuretics (high dose)
Essential tremor		β-blockers (non-cardioselective)	
Gout and hyperuricaemia			Diuretics
Heart block – 2° or 3°			β-blockers ***(contraindicated)*** Rate limiting Ca antagonists ***(contraindicated)***
Heart failure	ACE inhibitors Diuretics β-blockers*	Angiotensin II receptor antagonists	β-blockers* Calcium antagonists (except amlodipine, felodipine)
Isolated systolic hypertension	Diuretics Calcium antagonists (long-acting dihydropyridine)		
Liver disease			Labetalol
Myocardial infarction	β-blockers ACE inhibitors		
Osteoporosis		Thiazides	
Peripheral vascular disease			β-blockers**
Prostatism		α-blockers	
Renal insufficiency+		ACE inhibitors	Potassium-sparing agents
Renovascular disease			ACE inhibitors Angiotensin II receptor blockers

* Use may be limited by lack of symptomatic improvement - should be initiated under hospital supervision or advice *(see SIGN guideline on heart failure due to LVSD)*

** β-blockers should not be used in critical ischaemia (rest pain or impending gangrene)

\+ *Caution in renovascular hypertension and creatinine >150 mmol/l*

5.2.1 THIAZIDES

Thiazides have been shown in several randomised, controlled trials to reduce morbidity and mortality. A systematic review has concluded that first-line diuretic therapy reduces cerebrovascular events, coronary heart disease and stroke, cardiovascular and all-cause mortality in elderly hypertensive patients.[79] Thiazides compare favourably with other antihypertensive drugs in respect of efficacy, adverse effects and quality of life[80] and are considerably less expensive than the other drug classes. Low dose thiazides will have the same antihypertensive effect but cause less metabolic effects than higher doses.[81]

Evidence levels Ia and Ib

A **Thiazide diuretics are recommended as first line therapy for drug treatment of hypertension in older patients.**

A **Low doses should be used as there is clear evidence that this minimises potential adverse biochemical and metabolic disturbance.**

Thiazides have been combined with a potassium-sparing agent (amiloride in the MRC older adults trial;[11] triamterene in the European Working Party on High Blood Pressure in the Elderly (EWPHE) trial[77]). It is not absolutely clear if this provides advantage over the use of low dose thiazides alone in respect of major outcomes, but most trials of antihypertensives in older people have used diuretics in combination with potassium supplements or potassium sparers and this may contribute to the favourable results.[82]

Thiazides can cause hypokalaemia and this has the risk of increasing arrhythmias.[82] It is therefore advisable to measure serum potassium within the first 4-6 weeks of diuretic therapy and change if necessary to combination therapy.

☑ Serum potassium levels should be checked within 4-6 weeks of starting low-dose thiazide therapy.

5.2.2 β-BLOCKERS

β-blockers were used in a number of major outcome trials in older people[11, 13, 15] but are less effective antihypertensives when used as monotherapy in this age group[83] and compare less favourably to thiazides in terms of major cardiovascular outcomes.[11] β-blockers reduce cerebrovascular events[79] but are less useful in terms of other end-points.

Evidence level Ib

A **β-blockers can be used as alternative or supplementary therapy to thiazide diuretics in older patients.**

A long-acting cardioselective drug will maximise tolerability and compliance with therapy.

5.2.3 CALCIUM ANTAGONISTS

Long-acting dihydropyridine calcium antagonist drugs may be used in the elderly hypertensive. The Syst-Eur trial has shown that nitrendipine *(not presently licensed in the UK)* reduces the rate of fatal and non-fatal stroke and fatal and non-fatal cardiovascular events when compared to placebo in elderly patients with systolic hypertension.[14] These findings have been confirmed in a similar (though non-randomised) study in China (Syst-China)[84] in which total mortality was significantly reduced by 39%. Similar results were also found in a large non-randomised trial in China with long-acting nifedipine.[85]

Evidence levels Ib and IIa

Favourable results were also obtained in the HOT study using felodipine as first line therapy, although this was an investigation of different blood pressure targets rather than a comparison of active therapy versus placebo.[57] The combined data from these studies, however, do tend to suggest that the benefits of dihydropyridines may be a class effect, but the guideline development group recognises that absolute proof of long term efficacy and safety is lacking for many drugs in this group.

Long-acting dihydropyridine calcium antagonists have been shown to have similar efficacy to diuretics or β-blockers in prevention of cardiovascular events.[78]

Evidence level III

A **Long-acting dihydropyridine calcium antagonists can be used as alternative therapy to thiazide diuretics or supplementary to other therapy in older patients, particularly in patients with isolated systolic hypertension.**

Retrospective cohort studies have suggested that some calcium antagonists may be associated with an increased risk of mortality,[86] myocardial infarction,[87] and other adverse outcomes such as cancer[88] and gastrointestinal bleeding.[89] However, a review of all the available evidence does not establish the existence of either beneficial or harmful effects[90] and these adverse effects have not been confirmed in prospective randomised studies.[14]

Evidence level III

These reports have been linked predominantly to the use of short-acting nifedipine, sometimes used in high dosage. There are good mechanistic reasons for believing that short-acting agents may have undesirable effects on the cardiovascular system and these are no longer recommended.

B **Short-acting dihydropyridine calcium antagonists should be avoided.**

There are no long term outcome trial data on the use of either diltiazem or verapamil on which to base a recommendation on the use of these drugs, although equivalence of efficacy of diltiazem 300 mg has been shown in one study.[83] They are of use in selected hypertensive patients.

5.2.4 ACE INHIBITORS

These agents have been proven useful in blood pressure reduction, can reduce cardiovascular mortality and morbidity after myocardial infarction when left ventricular dysfunction is present,[91] and have proven useful in diabetics.[92] The recently reported Heart Outcomes Prevention Evaluation (HOPE) study found that, in a broad range of high-risk patients, ramipril reduced the incidence of cardiovascular death, stroke, myocardial infarction, heart failure, revascularisation, development of diabetes, and (in diabetics) diabetic microvascular complications including nephropathy.[93] The beneficial effects of the ACE inhibitor on stroke and MI reduction achieved in the HOPE trial (31% and 20% respectively) appear to be far greater than what would be expected from the blood pressure reduction alone, which was modest in this study.

Evidence level Ib

The serum creatinine must be checked within 1-2 weeks of commencing ACE inhibitor therapy, because of the risk of renal artery stenosis being present in the older patient. Caution should be exercised when the serum creatinine is above 150 µmol/l, although in many patients with intrinsic renal failure the creatinine concentration will fall with therapy.

The Captopril Prevention Project (CAPPP) trial (although not in an elderly population) showed a significant reduction of cardiovascular mortality in the ACE inhibitor treated group when compared to conventional antihypertensive therapy (diuretics and/or β-blockers).[94] There was an excess of fatal and non-fatal stroke in the ACE inhibitor group and the reason for this is not clear; however different blood pressure levels were achieved in the two groups, and captopril was only given once daily in this trial.

Evidence level Ib

In the STOP-2 trial,[78] ACE inhibitors were similar in efficacy to diuretics and β- blockers. The frequencies of myocardial infarction and of congestive heart failure were significantly lower in patients treated with ACE inhibitors than in those receiving calcium antagonists in this trial.

A **ACE inhibitors are specifically indicated as first line therapy for hypertension in patients with type 1 diabetes, proteinuria, or left ventricular dysfunction.**

A **In most other hypertensive patients, ACE inhibitors are recommended as alternative or supplementary therapy in the absence of renal artery stenosis.**

5.2.5 ANGIOTENSIN II ANTAGONISTS

Angiotensin II antagonists have certain features in common with ACE inhibitors, although they do not have the same tendency to cause cough as a side effect. They are reasonably well-tolerated, but the renal function must be checked as above.[95] Outcome trials are awaited in this group of drugs.

☑ Angiotensin II antagonists are recommended as alternatives to ACE inhibitors when cough is a limiting adverse effect.

☑ Serum potassium and creatinine should be checked within 1-2 weeks of commencing ACE inhibitor or angiotensin II antagonist therapy.

5.2.6 α-BLOCKERS

While α-blockers are effective in reducing blood pressure[68] there is still no evidence that their use prevents clinically important end-points. They may have useful ancillary properties in men with prostatism and in dyslipidaemia. However, the doxazosin arm of the Antihypertensive and Lipid-Lowering Treatment to Prevent Heart Attack Trial (ALLHAT) was discontinued due to a higher proportion of patients developing congestive cardiac failure compared with the diuretic group.[96] α-blockers should not be used as first-line therapy and should be used with caution.

Evidence levels Ib and III

C **α-blockers may be used as supplementary therapy for hypertension in older patients.**

5.2.7 OTHER AGENTS

Other agents may be used as additional therapy in refractory hypertension or as alternative therapy when other drugs are contraindicated or limited by adverse effects. These include the centrally acting drugs (e.g. clonidine, methyldopa, moxonidine) and vasodilators (e.g. hydralazine, minoxidil).

5.2.8 COMBINATION THERAPY

Given that most drugs used alone lower blood pressure by only 10-20 mm Hg systolic and 5-10 mm Hg diastolic, it is likely that many patients will require three or perhaps four antihypertensive drugs if blood pressure targets are to be achieved. For patients who require three antihypertensive drugs in combination, one of these should usually be a diuretic in order to counteract the fluid-retaining properties of the other drugs.

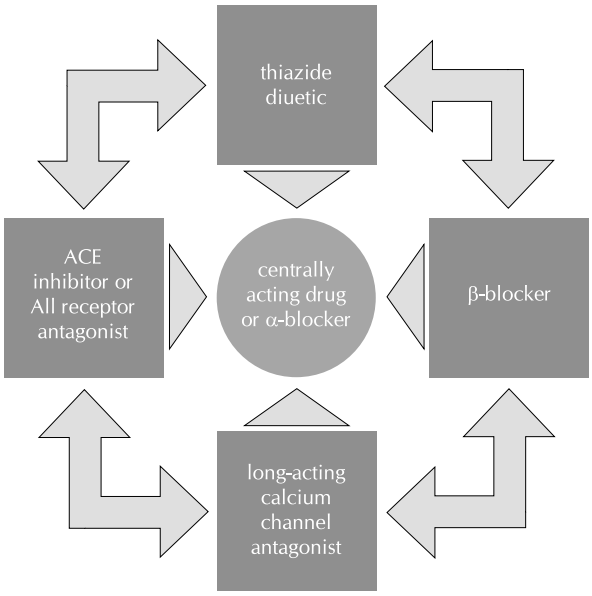
An example of a system for choosing add-on therapy is the Birmingham system, illustrated in figure 5.[97]

☑ The achievement of a reduction in blood pressure will take time. Doses of individual drugs should be carefully titrated up and multiple drug regimens may have to be used. However, specialist advice should be sought if hypertension is difficult to treat (> 3 drugs).

Figure 5

THE BIRMINGHAM SYSTEM FOR CHOOSING ADD-ON THERAPY

Start therapy at any square and use add-on therapy on either side as shown by the arrows. Drugs in adjacent squares have additive antihypertensive effects, complementary actions, and are usually well-tolerated. Multiple combinations may be required.



5.3 ADDITIONAL DRUG THERAPY

5.3.1 ASPIRIN

Two trials indicate the value of aspirin when given to hypertensive individuals. The HOT trial showed that aspirin 75 mg daily in well-controlled hypertensive patients (blood pressure <150/90 mm Hg) aged 50 years or more reduced cardiovascular events by 9% and myocardial infarction by 15%, but had no effect on fatal events.[57] In the Thrombosis Prevention Trial of aspirin 75 mg daily for primary prevention, in which 26% of those studied had treated hypertension, there was a 16% reduction in all cardiovascular events, a 20% reduction in myocardial infarction, and no effect on fatal events.[98] In both trials, however, the number of clinically significant bleeding episodes caused by aspirin was high, suggesting that the margin between benefit and harm was narrow.

Evidence level Ib

In primary prevention, hypertension must be controlled satisfactorily before starting aspirin treatment, as there is a risk of cerebral haemorrhage. When aspirin is used for secondary prevention, e.g. following acute myocardial infarction or unstable angina, the benefit of aspirin treatment is probably seen at all levels of blood pressure. Aspirin may be unsuitable for certain patients and alternative antiplatelet agents may be required *(see the SIGN guideline on antithrombotic therapy[99])*.

A **Aspirin 75 mg daily is recommended for older hypertensive patients who have:**

- **no contraindication to aspirin**
- **blood pressure controlled to < 150/90 mm Hg**

and any of the following:

- **cardiovascular complications**
  (MI, angina, nonhaemorrhagic cerebrovascular disease, peripheral vascular disease or atherosclerotic renovascular disease)
- **target organ damage**
  (LVH, renal impairment, or proteinuria)
- **cardiovascular event risk ≥2% per year (20% over 10 years)**
  (e.g. when estimated by the New Zealand guidelines)
- **coronary event risk ≥1.5% per year (15% over 10 years)**
  (e.g. when estimated by the Joint British chart).

5.3.2 LIPID LOWERING THERAPY

In addition to dietary and lifestyle changes which may reduce cholesterol as well as blood pressure *(see section 5.1)*, drugs such as HMG CoA reductase inhibitors (statins) may be required to reduce cardiovascular risk. (*See the SIGN guidelines on lipids and the primary prevention of coronary heart disease[55] and secondary prevention of CHD after myocardial infarction.[76]*)

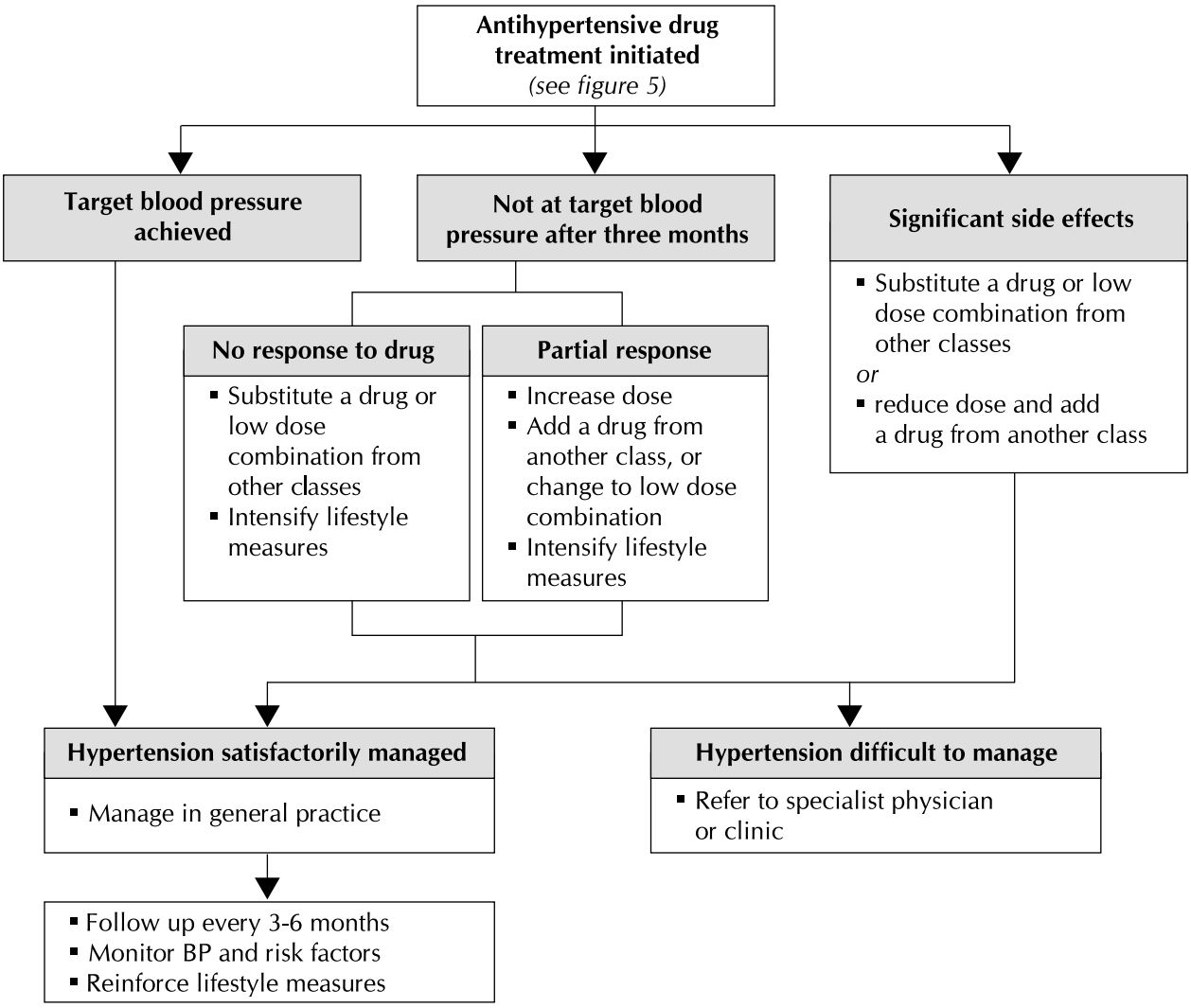
5.3.3 HORMONE REPLACEMENT THERAPY

Hormone replacement therapy is not contraindicated in women with mild hypertension.[21]

Figure 6

STABILISATION, MAINTENANCE AND FOLLOW UP AFTER INITIATION OF ANTIHYPERTENSIVE DRUG THERAPY

(adapted from WHO-ISH guideline[18])



5.4 FOLLOW UP

Suggested follow up of patients following initiation of antihypertensive medication is shown in figure 6 overleaf. The recommendations from section 4.3 are reiterated here:

A **A target blood pressure of <140/90 mm Hg is recommended for most older hypertensive patients.**

A **Even a small reduction in blood pressure is worthwhile if absolute targets prove difficult to achieve.**

The British Hypertension Society recommends that the routine for follow up visits should be simple:[21]

- measure blood pressure and weight
- enquire about general health, side effects and treatment problems
- reinforce advice on non-pharmacological measures
- test urine for proteinuria annually.

Nurses have an important role in the accurate measurement of blood pressure and in advising patients on non-pharmacological measures and possible drug side effects.

5.5 REFRACTORY HYPERTENSION

Patients who are refractory to treatment are a problem and may require referral to specialist physician or clinic. Some causes of apparent refractory hypertension are shown in table 9.

Table 9

SOME CAUSES OF APPARENT REFRACTORY HYPERTENSION

Poor adherence to therapeutic regimen
Lifestyle problems *(e.g. failure to lose weight, excessive alcohol intake)*
Treatment itself may be ineffective
Isolated office (white-coat) hypertension
Failure to use a large enough cuff on arm
Use of other drugs that may raise blood pressure *(e.g. NSAIDs, sympathomimetics)*
Volume overload *(e.g. high sodium intake, renal insufficiency, inadequate or ineffective diuretic therapy)*
Unsuspected secondary cause *(e.g. renal, endocrine)*

5.6 COMPLIANCE AND CONCORDANCE

Both compliance and concordance with drug and lifestyle therapy for hypertension are important because of the serious risks associated with poor blood pressure control. Compliance is defined as the extent to which the patient's behaviour (in terms of taking medication, following dietary or other lifestyle changes) coincides with the clinical prescription.

Compliance and concordance in clinical trials are often better than would be expected in normal practice. Compliance may be improved by factors such as:

- the use of single-daily or (if not available) twice-daily dosing[100, 101]
- combination tablets
- minimising polypharmacy[102]
- use of compliance aids (e.g. dosette box)[103,104]
- considering side effects which may cause discontinuation of drug use and changing the drug regimen promptly.

Evidence level III

Good communication and involving the patient in making treatment decisions lies at the core of the successful management of hypertension. Increasing patients' knowledge about treatment regimens and the rationale for treatment improves concordance and can result in a substantial improvement in overall outcomes.[105,106] This may be facilitated by the use of patient counselling and information leaflets.[107] See Annex 3 for sources of patient information materials.

A multidisciplinary team approach involving co-ordination between doctors, nurses, pharmacists and other healthcare professionals is recommended.

C **Each practice should develop a multidisciplinary approach to improve compliance and concordance.**

C **Single daily dosing of drugs (or, when this is not availabe, twice daily dosing) should be encouraged.**

6 Treatment of special groups of older people

6.1 DIABETES MELLITUS

6.1.1 TYPE 2 (NON-INSULIN DEPENDENT) DIABETES MELLITUS

Among older people, diabetes is an important problem, with type 2 diabetes mellitus being particularly common. In diabetics the prevalence of hypertension is 1.5-2 times greater than matched non-diabetic individuals.[108] Type 2 diabetes is associated with an insulin-resistant state (syndrome X) with the additional cardiovascular risks of hyperinsulinaemia, obesity and dyslipidaemia.[109]

Evidence level III

Antihypertensive therapy retards the progression of nephropathy in patients with type 2 diabetes.[110] Tight control of hypertension has been shown to lower the risks of cardiovascular complications and retinopathy in the HOT study[57] and UKPDS.[63]

ACE inhibitor and β-blocker based therapeutic regimens were equally effective in reducing mortality in the UKPDS trial,[92] although it is important to recognise that this study was underpowered. Low dose thiazide diuretics are now also recommended in type 2 diabetes. New evidence from outcome trials indicate that thiazides improve prognosis substantially[111, 112] (previously they were regarded as contraindicated in diabetes). One trial (ABCD)[113] was designed to compare the effects of enalapril versus nisoldipine in patients with diabetes. The trial was stopped prematurely when it appeared that the risk of myocardial infarction in patients randomised to nisoldipine was significantly greater than in those randomised to the ACE inhibitor, although it is not clear if this might represent a disadvantage from nisoldipine or an advantage from enalapril.

Evidence level Ib

The FACET study[114] was designed primarily to compare the effects of fosinopril with those of amlodipine on the lipid profile in hypertensive patients with type 2 diabetes, but reported that fewer cardiovascular events occurred in the fosinopril group. New evidence from the Syst-Eur trial,[115] however, suggests that nitrendipine was of relatively greater benefit in diabetic than in non-diabetic patients. The calcium antagonist based regimen in the HOT study was also effective in reducing cardiovascular events.[57]

Problems must be recognised in interpreting trials that have been stopped prematurely, that have included relatively small numbers of patients and that have been based on the results of post hoc analyses. There is a need for more large scale, simple comparative studies of antihypertensive therapy in diabetes.

In summary, ACE inhibitors, low dose thiazides, β-blockers and calcium channel antagonists are all effective antihypertensive agents in patients with type 2 diabetes, possibly in that order of preference, although definitive evidence on that is lacking. Combination therapy is frequently required to achieve optimal blood pressure control.

A **The threshold blood pressure for starting antihypertensive treatment in type 2 diabetes with cardiovascular complications, hypertensive target organ damage, or diabetes-specific microvascular disease (including microalbuminuria or proteinuria) is ≥140/90 mm Hg.**

C **In the absence of these complications, formal estimation of cardiovascular risk should guide the treatment decision.**

In the HOT study, the group of diabetic hypertensive patients randomised to the lowest target blood pressure (<130/80 mm Hg) had the greatest reduction in the risk of cardiovascular events.[57] Similar results were found in the UKPDS, where a lower achieved blood pressure (144/82 mm Hg vs. 154/87 mm Hg) was associated with significantly reduced risk of both macro and microvascular disease outcomes.[61]

Evidence level Ib

B **Tight control of blood pressure in type 2 diabetes is recommended.**

Extrapolated from evidence level Ib

Many diabetic patients, particularly those with type 2 diabetes, are overweight[116] and have high cardiovascular risk.[116, 117]

Evidence level III

☑ Intensive and continued advice on lifestyle measures is needed.

☑ Aspirin (provided blood pressure is controlled) and/or statin treatment in addition to antihypertensive treatment will often be indicated.

6.1.2 TYPE 1 (INSULIN DEPENDENT) DIABETES MELLITUS

Target blood pressures used in the major outcome trials are <130/80 mm Hg[57] or <125/75 mm Hg when there is proteinuria >1 g/24 hours.[118] Similar thresholds and targets apply for type 1 diabetic patients with target organ damage, cardiovascular complications or diabetic microvascular disease.

Evidence level Ib

A **The threshold for institution of antihypertensive treatment in type 1 diabetes is ≥140/90 mm Hg.**

A **The target blood pressure in type 1 diabetes is <130/80 mm Hg.**

B **In patients with proteinuria >1 g/24 hours, the target is <125/75 mm Hg.**

The prevalence of hypertension in insulin dependent (type 1) diabetes mellitus (IDDM) in the absence of nephropathy (microalbuminuria or proteinuria) is similar to that in the nondiabetic population. The decline in renal function in overt diabetic nephropathy is slowed by blood pressure reduction and ACE inhibitors,[119] delaying progression from the microalbuminuric phase to overt nephropathy.[110, 120, 121]

Optimal blood pressure control protects renal function. ACE inhibition also can protect renal function when proteinuria is present.[110] Diuretics, calcium antagonists, cardioselective β-blockers, and α-blockers are all suitable in patients without proteinuria. ACE inhibitors are recommended as first line therapy as they appear to have a renoprotective action in patients with incipient or overt nephropathy.[110, 119, 120, 121] Combination therapy is often required.

Evidence level Ib

A **ACE inhibitors are recommended as first line therapy for control of hypertension in older patients with type 1 diabetes mellitus with nephropathy.**

The maximum recommended and tolerated dose of ACE inhibitor should be used after titrating up. If ACE inhibitor treatment has to be discontinued because of persistent cough an angiotensin II receptor antagonist may be considered, although evidence for renoprotection in humans by this drug class is awaited.

6.2 CARDIOVASCULAR DISEASE

There is a very high risk of further cardiovascular events in patients with coronary heart disease. The risk appears directly related to the blood pressure. Although most blood pressure lowering trials of antihypertensive agents exclude patients with recent myocardial infarction (MI), severe angina, and congestive cardiac failure, there is evidence of their value in such patients in other important end-point trials. These agents probably have other effects than blood pressure lowering alone. In primary prevention, blood pressure reduction can substantially reduce the mortality and morbidity associated with cardiovascular disease.[13, 15, 11, 77, 122]

Evidence level Ib

The HOT study showed that controlling blood pressure to the lowest target level (<130/80 mm Hg) in patients with ischaemic heart disease significantly reduced the risk of cardiovascular events.[57]

6.2.1 ANGINA AND MYOCARDIAL INFARCTION

β-blockers can reduce re-infarction and cardiovascular death by approximately 25% after MI.[123] ACE inhibitors, in patients with left ventricular dysfunction or heart failure, can reduce the risk of MI or sudden death by approximately 20%[124] One study has shown benefit for diltiazem with aspirin in post MI patients following thrombolysis.[125]

Evidence levels Ia and Ib

The Heart Outcome Prevention Evaluation (HOPE) study was terminated early because of clear reduction in cardiovascular deaths in patients with coronary artery disease taking ramipril.[126] Subgroup analysis is awaited. Calcium antagonists, too, may have an important role to play in reducing end-points in coronary heart disease, but the evidence is inconclusive.

6.2.2 CHRONIC HEART FAILURE

In heart failure, ACE inhibitors can reduce mortality and morbidity[127] and reduce the need for further hospitalisation in patients with congestive heart failure. There is a role for β-blockers in carefully selected hypertensive patients with heart failure[128] although there may be little symptomatic improvement.

Evidence level Ia

The drugs should be introduced cautiously in low dose and carefully titrated upwards over a period of weeks or months. The SIGN guideline on heart failure due to left ventricular systolic dysfunction addresses this area in more detail.[129] Diuretics are useful for symptomatic relief of congestive cardiac failure and are also discussed in the SIGN guideline.

A **Blood pressure reduction should be part of a cardiovascular risk reduction strategy.**

A **When blood pressure reduction is required in hypertensive patients with cardiovascular disease, ACE inhibitors and/or β-blockers should be considered.**

☑ β-blockers should be introduced carefully under hospital supervision in patients with heart failure.

6.3 RENAL DISEASE

In patients with renal impairment, uncontrolled hypertension accelerates the decline in renal function, therefore good blood pressure control is essential.[130]

Evidence level III

B **Blood pressure in older patients should be controlled to reduce the progression of renal disease.**

Mild to moderate hypertension is not normally a cause of renal failure,[131] therefore a raised creatinine (>150 µmol/l) is likely to reflect associated obstructive, parenchymal or renovascular disease.[130]

☑ Serum creatinine should be checked within 1-2 weeks of commencing antihypertensive therapy, especially ACE inhibitors or angiotensin II antagonists.

☑ If serum creatinine is raised, renal artery stenosis should be considered and further investigations undertaken. If there is rapid deterioration of renal function, specialist help should be sought.

Blood pressure is particularly salt sensitive in patients with impaired renal function, and dietary salt reduction is important. Patients with renal failure have a very high risk of cardiovascular complications, and may need aspirin or statin treatment in addition to nonpharmacological measures to reduce their risk.[132]

6.3.1 RENOVASCULAR DISEASE

Atherosclerotic renovascular disease (renal artery stenosis) is an infrequent cause of hypertension (1%) but is more common in older people[133] and should be suspected in the following clinical situations:

- accelerated (malignant) hypertension
- renal impairment of unknown cause, especially with little or no proteinuria
- resistant hypertension (to a three drug regimen) in the presence of other indications
- inequality of renal size on ultrasound
- elevation of serum creatinine by ACE inhibitor or angiotensin II antagonist treatment
- peripheral vascular disease or severe generalised atherosclerotic disease
- recurrent pulmonary oedema.

☑ Patients with any of these features should be referred because the investigations required to confirm or exclude renovascular disease are complex.

In renovascular disease the choice of antihypertensive therapy may be limited. ACE inhibitors cause deterioration in renal function in renal artery stenosis, especially when severe and/or bilateral.[134] The same probably applies to angiotensin II antagonists. Calcium channel blockers and α-blockers are therefore the drugs of choice.

☑ ACE inhibitors should not be used in patients with renal artery stenosis.

Atherosclerotic renovascular disease may warrant further investigation resulting in percutaneous transluminal angioplasty along with stenting.[135] However, unlike renal artery stenosis due to fibromuscular dysplasia,[136] reversal of renal artery stenosis due to atherosclerosis has a variable outcome.[137] Until further evidence becomes available the decision to proceed with angioplasty must take the individual problems of the patient into account.[138]

6.3.2 RENAL PARENCHYMAL DISEASE

Hypertensive patients with an elevated serum creatinine and/or proteinuria may have parenchymal or obstructive renal disease, and should also be referred for specialist evaluation. Accelerated phase (malignant) hypertension is a medical emergency which can cause rapid loss of renal function.[139]

Evidence level III

C **Accelerated phase (malignant) hypertension requires immediate hospital admission for treatment.**

In one major outcome trial patients with parenchymal renal disease associated with proteinuria (> 1g) showed the greatest benefit from lower than usual blood pressure, leading to the conclusion that mean blood pressure should be as low as 92 mm Hg, equivalent to 125/75 mm Hg[118]

Evidence level Ib

C **The threshold for antihypertensive treatment is 140/90 mm Hg for patients with proteinuria or renal impairment.**

A **The blood pressure target for patients with renal impairment or persistent proteinuria is < 130/85 mm Hg.**

Patients with chronic renal disease of any aetiology and proteinuria > 1 g/24 hours should have blood pressure controlled to 125/75 mm Hg.

☑ The dose of those antihypertensive drugs excreted by the kidney may need to be adjusted.

All antihypertensive drugs are effective in mild renal failure but thiazides are ineffective in moderate renal failure (creatinine > 250 µmol/l), therefore loop diuretics should be used.[134]

☑ Loop diuretics should be used in patients with moderate renal failure (creatinine > 250 µmol/l).

Whilst ACE inhibitors worsen renal function in renal artery stenosis, they may have a renoprotective action in non-diabetic parenchymal renal disease.[141, 142, 143] This renoprotective action has not been demonstrated for polycystic kidney disease or in patients with the DD ACE genotype.[141] Thus, ACE inhibitors may be the treatment of choice in certain patients with renal impairment but may cause deterioration in other patients and should be used with caution.

Evidence levels Ia and Ib

A **In the absence of renal artery stenosis, ACE inhibitors should be the drugs of choice in patients with renal failure.**

6.4 STROKES AND TIAs

Randomised controlled trials in hypertension in the elderly have consistently shown reduction of fatal and non-fatal stroke. [11,13,14,15,144]

Evidence level Ia

A **Blood pressure reduction is recommended for the primary prevention of stroke and TIA.**

After an acute stroke, blood pressure is often elevated and relatively unstable for a few days. There is evidence that lowering blood pressure in this phase may be harmful, possibly by reducing cerebral perfusion in the ischaemic penumbra that surrounds both cerebral infarcts and haematomas. Further work is being done to determine the safety or otherwise of blood pressure reduction in the acute phase of stroke.[145]

Evidence level Ib

A **Antihypertensive therapy is not generally recommended in the early days after an acute stroke.**

Blood pressure lowering after acute stroke may be appropriate in some patients with primary intracerebral haemorrhage and if the stroke occurs as a result of accelerated hypertension, but this must be undertaken in hospital with intensive monitoring under specialist supervision. After subarachnoid haemorrhage nimodipine is now standard therapy because of its effects in reducing unfavourable outcomes from cerebral vasospasm. It also lowers blood pressure but is not useful in ischaemic stroke.

Patients who have recovered from the acute phase of stroke and who remain hypertensive are at increased risk of recurrence. The risk of further cerebrovascular events is directly related to levels of blood pressure and extends to levels of blood pressure that may be regarded as "normal" or "high-normal".[146]

Evidence level III

Blood pressure reduction among hypertensive patients with a history of stroke produced a 29% reduction in stroke risk and a trend towards reduction of CHD risk. [147]

Evidence level Ib

C **Antihypertensive therapy should be considered for secondary prevention in patients who are recovering from stroke.**

The level of blood pressure that necessitates intervention, the timing of treatment after the initial event, and the degree of residual disability that would justify secondary prevention, are matters for individual clinical judgement, and blood pressure control should be seen as just one part of risk factor management in the secondary prevention of further cerebrovascular events. Results of the PROGRESS trial may further clarify the role of antihypertensive medication after stroke and TIA. [148]

6.5 DEMENTIA

Dementia is a serious problem in older people and its prevention would be a major benefit. Hypertension may precede the onset of dementia by many years[149] and, in combination with other risk factors, may predispose to the development of Alzheimer's disease. Treating hypertension in older adults may therefore reduce the risk of dementia as well as cardiovascular events.

Vascular dementia, after Alzheimer's disease, is the second most common type of dementia in older people with an incidence of about 7/1000 persons/year. Hypertension is the most powerful risk factor for all the vascular dementias.[150, 151, 152, 153, 154] The distinction between vascular dementia and Alzheimer's disease is less clear-cut than previously thought and many patients show a mixed pattern.

Evidence level III

One small study has shown that treating isolated systolic hypertension resulted in a 50% relative reduction in the incidence of dementia.[155]

Evidence level Ib

Treating 1000 patients for five years might therefore prevent 20 new cases of dementia, over and above the cardiovascular events prevented. This observation needs confirmation, and whereas it is not in itself an indication to start therapy or to choose a particular form of therapy, it does highlight the potential for preventing cognitive decline in older patients with hypertension. Treatment of hypertension will also prevent decline in mental function by preventing strokes.

C **Blood pressure in older people should be controlled to reduce the incidence of dementia.**

There is no evidence that treatment of hypertension worsens dementia, but people with dementia are often excluded from trials on the basis that they are unable to give informed consent. Further studies underway, including results from the PROGRESS study, should give more information on the role of treating hypertension in preserving mental function.

6.6 VERY OLD PEOPLE

While the evidence for treating those with hypertension is clear in those up to 80 years of age, there is less evidence about those over that age.

The EWPHE study[77] included 155 patients over 80 years of age (maximum age 97 years), the STOP study[13] recruited 269 patients over 80 years of age (up to 84 years). While these two studies did not show any benefit from treatment over the age of 80 years, the small numbers were insufficient to exclude the possibility of an advantage. In SHEP, 649 patients over 80 years took part and treatment of ISH was associated with a 45% reduction in stroke incidence with treatment.[15]

Evidence level Ib

A recent meta-analysis shows a significant reduction in morbidity but not mortality and suggests that an age threshold beyond which hypertension should not be treated cannot be justified.[156]

Evidence level Ia

The Hypertension in the Very Elderly Trial (HYVET) study is currently exploring the value of antihypertensive therapy in patients over the age of 80.[157]

C **Chronological age should not be a barrier to the judicious use of antihypertensive therapy.**

There is an absence of trial data to inform decisions about the treatment of elderly patients who are very frail, housebound, or suffering from co-morbid conditions such as dementia. The management of such patients, including decisions to withdraw therapy, as well as to start therapy, will remain a matter of individual clinical judgement.

One study among very old, frail hypertensive patients living in nursing homes has shown that the important determinants of treatment choice include age, functional status, and co-morbidity.[158]

Evidence level III

☑ The treatment of very frail old people with hypertension will depend on individual circumstances and need not necessarily follow the guideline recommendations.

Annex 1

DETAILS OF SYSTEMATIC REVIEW UNDERTAKEN FOR THE GUIDELINE

The evidence base for this guideline was synthesised in accordance with SIGN methodology. A number of systematic literature searches were carried out as detailed below.

Papers were only included if they adhered to recognisable methodological principles, including adequate sample size, a clearly identified hypothesis and measure of outcome, and accurate reporting of results.

LITERATURE SEARCH STRATEGY

An Internet search was carried out to identify all literature relating to hypertension in older people including randomised controlled trials and meta-analyses. Existing guidelines on hypertension were also sought. This search covered a range of general and specialised search engines (such as Medline, Healthstar and Embase), as well as a number of specific medical sites (including the Cochrane library). Further searches were made with particular regard to the frail elderly and dementia.

The Cochrane Review on *Antihypertensive Drug Therapy in the Elderly* was used as the principal source of evidence. The search strategy from this review was run on Healthstar and Medline, and a similar strategy run on Embase, to bring coverage of the literature up to September 1998. Additional searches designed to identify other reviews and meta analyses were carried out on these three databases as well as the DHSS database and the Australian, British, and US official publications databases.

The Cochrane Library, Embase, Healthstar and Medline were also searched for material relating to patient compliance or conformance with antihypertensive drug therapy, or the effectiveness of patient education in improving compliance.

The evidence base was updated during the course of development of the guideline. Full details of the search strategies used and the coverage of the Internet search are available from the SIGN Executive.

Annex 2

RECOMMENDATIONS FOR PUBLIC HEALTH, AUDIT AND RESEARCH

PUBLIC HEALTH CHALLENGES OF HYPERTENSION

The prevention and treatment of hypertension represent major public health challenges for Scotland. These include:

- **Preventing the rise of blood pressure with age**. Blood pressure rise with age is not inevitable. If the Scottish population retained the average blood pressure levels of young adults, there would be less cardiovascular disease. This will mean alterations in lifestyle and diet.
- **Decreasing the existing prevalence of hypertension and isolated systolic hypertension.** This will take efforts in detection and treatment.
- **Increasing hypertension awareness and detection**. A large number of adults with hypertension are still unaware that they have high blood pressure.
- **Improving control of hypertension.** Substantial numbers of adults in Scotland with hypertension do not have their blood pressure controlled to below 140/90 mm Hg.
- **Reducing cardiovascular risks.** Many people with hypertension have additional risk factors for cardiovascular disease. These must also be tackled.
- **Improving recognition of the importance of high-normal blood pressure**. The impact of high-normal blood pressure—systolic blood pressure of 130-139 mm Hg and diastolic blood pressure of 85-89 mm Hg—on the development of hypertension and target organ damage remains unappreciated.
- **Reducing ethnic, socioeconomic, and regional variations in hypertension.** Differences remain in the prevalence of hypertension, high-normal blood pressure, and cardiovascular events in different ethnic and socio-economic groups and geographic regions within Scotland.
- **Improving opportunities for treatment**. Well-tolerated and affordable treatment options, including both lifestyle modifications and pharmacological treatment, should be applied. The treatment options should tackle all cardiovascular risks.

RECOMMENDATIONS FOR AUDIT AND RESEARCH

- To identify the current burden of high blood pressure in the population
- To undertake population-based epidemiological studies to demonstrate the effect of tighter blood pressure control on cardiovascular risk
- To evaluate the role of ambulatory and home-based blood pressure monitoring
- To evaluate the role of antihypertensive therapy in prevention of renovascular disease, dementia, and acute stroke
- To identify optimum patient follow up mechanisms
- To audit blood pressure management in practices and the adequacy of blood pressure control in individuals
- To evaluate the benefits of dietary change in the management of hypertension
- To audit the actual cashing in of prescriptions of antihypertensive drugs
- To review the cost-effectiveness of antihypertensive treatment regimens and follow up strategies
- To examine whether systematic screening for hypertension in older people is acceptable to the public, cost-effective, and has a higher pick up rate than traditional case finding and opportunistic screening methods.

Annex 3

SOURCES OF FURTHER INFORMATION FOR PROFESSIONALS AND PATIENTS

MATERIAL FOR PROFESSIONALS

- 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.hyp.ac.uk/bhs/)
- 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: 0207 383 6244; fax: 0207 383 6455; orders@bmjbookshop.com

MATERIAL FOR PATIENTS

- Patient information booklet: "Understanding High Blood Pressure"
- Fact sheets:
  - Self-help 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: 0208 725 3412; fax: 0208 725 2959; www.hyp.ac.uk/bhsinfo/ (for information service);
website: www.hyp.ac.uk/bhs/

Annex 4

JOINT BRITISH SOCIETIES CORONARY RISK PREDICTION CHART

A black and white version of the Joint British Chart, together with notes for users is provided on the following pages. The full colour chart is included in the 'Quick Reference Guide' accompanying SIGN guideline No.40 and can also be downloaded from the SIGN web site (www.sign.ac.uk).

HOW TO USE THE JOINT BRITISH CHART FOR PRIMARY PREVENTION

To estimate a person's CHD risk (fatal CHD or non fatal MI) over the next 10 years:

- Choose the table relating to the individual's diabetic status, gender, smoking habit, and age range.
- Enter the individual's systolic blood pressure and total cholesterol/HDL ratio and read off the CHD risk using the colour or shading code.

Additional notes on use of the chart:

- Do not use for decisions on secondary prevention.
- The chart is only applicable to patients with mild hypertension and is not suitable for patients with a sustained systolic blood pressure of >160 mm Hg.
- The Joint British Chart may underestimate risk in some individuals:
  - British Asians
  - Those with a strong family history of premature CHD (men <55 years, women <65 years)
  - Those with familial hypercholesterolaemia or other inherited dyslipidaemia
  - Patients with hypertension and electrocardiographic left ventricular hypertrophy (increased voltage with flat or inverted T waves in V5 and V6)
  - Type 1 diabetics
  - Type 2 diabetics with nephropathy (microalbuminuria or proteinuria)
  - Patients with chronic renal disease (serum creatinine >150 µmol/l)
  - Those who have recently stopped smoking or started antihypertensive drug treatment
  - Those at the top end of their age range. This is because risk for each age band (e.g. 55-64 years) is calculated at the mid point (eg 60 years). Risk will therefore be underestimated as patients approach the next age category.

British Cardiac Society

British Hypertension Society

Joint British Societies Coro

Joint British Recommendations on Prevention

NO DIABETES

CHD risk <15% over next 10 years

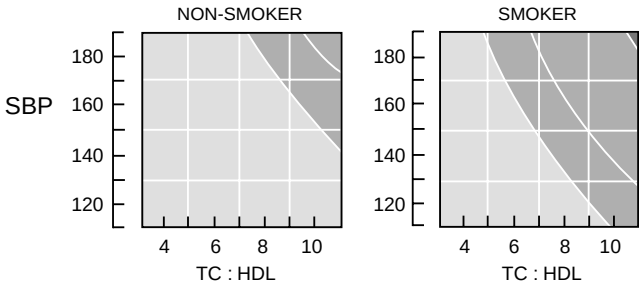
CHD risk 15-30% over next 10 years

CHD risk >30% over next 10 years

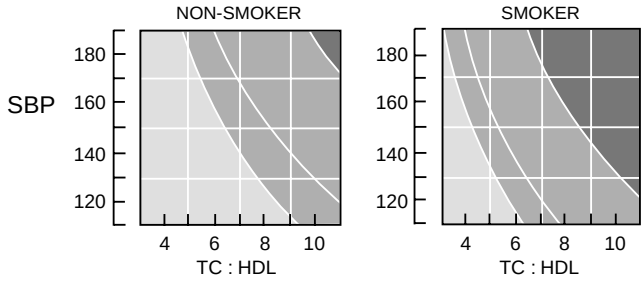
SBP = systolic blood pressure mmHg
TC : HDL = serum total cholesterol to HDL cholesterol ratio.

MEN

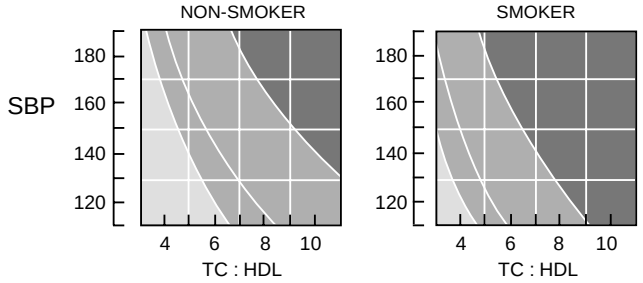
AGE 35 - 44 YEARS



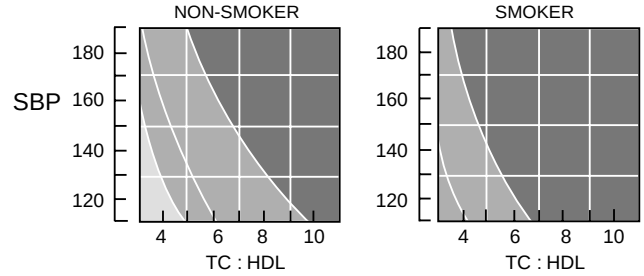
AGE 45 - 54 YEARS



AGE 55 - 64 YEARS

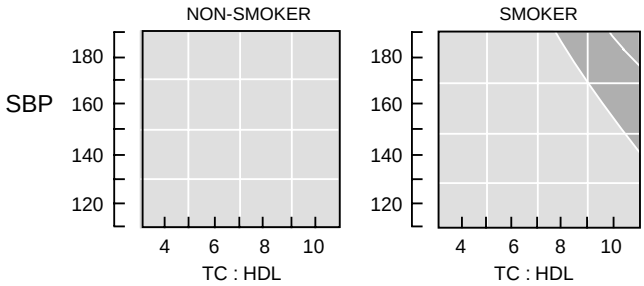


AGE 65 - 74 YEARS



WOMEN

AGE 35 - 44 YEARS



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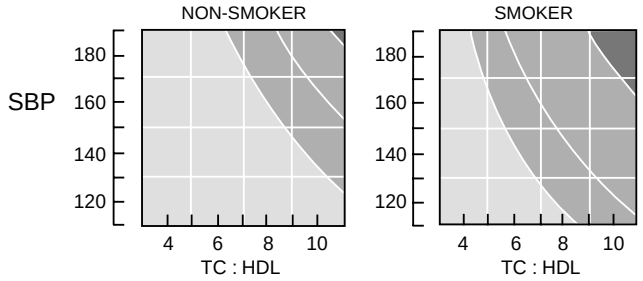

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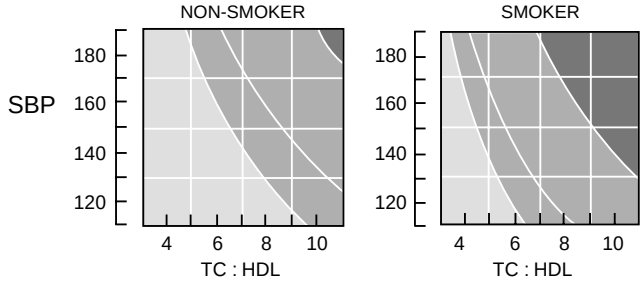
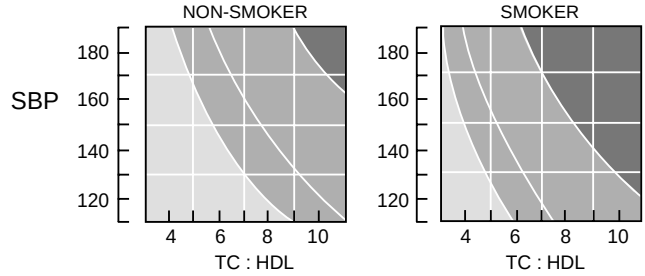


AGE 65 - 74 YEARS



nary Risk Prediction Chart

of Coronary Heart Disease in Clinical Practice

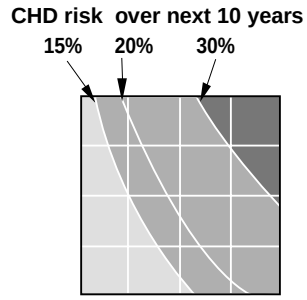
British Hyperlipidaemia Association

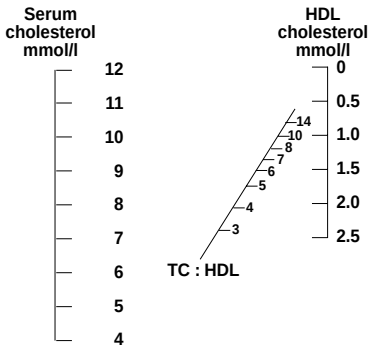
British Diabetic Association

DIABETES

CHD risk <15% over next 10 years
CHD risk 15-30% over next 10 years
CHD risk >30% over next 10 years

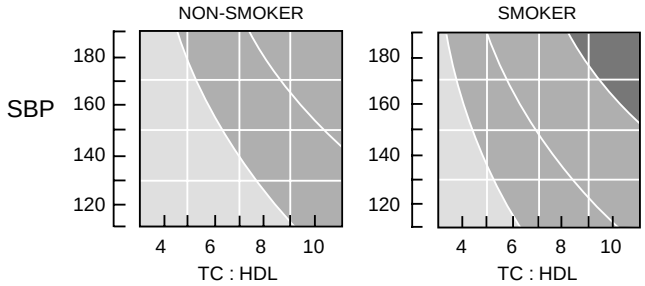
SBP = systolic blood pressure mmHg
TC : HDL = serum total cholesterol to HDL cholesterol ratio.





MEN

AGE 35 - 44 YEARS



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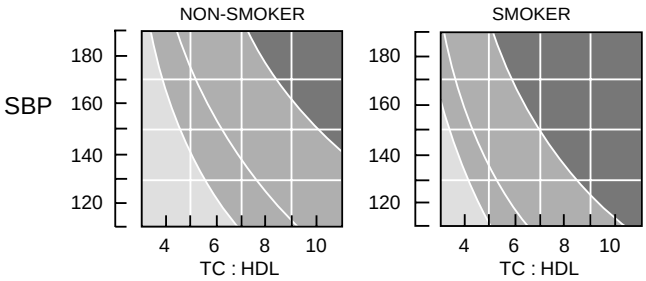

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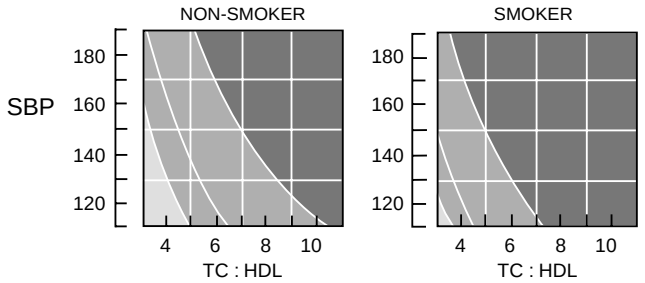
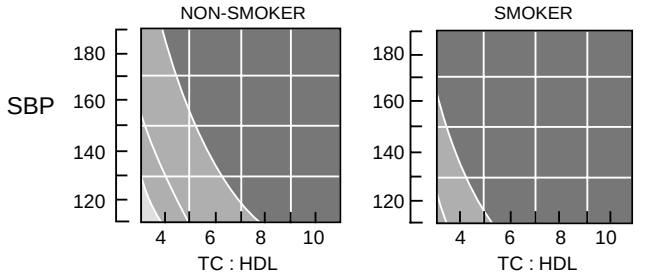
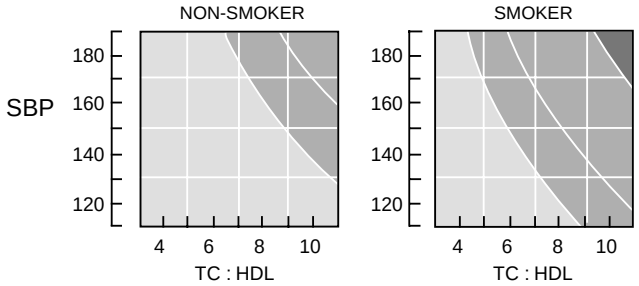


AGE 65 - 74 YEARS



WOMEN

AGE 35 - 44 YEARS



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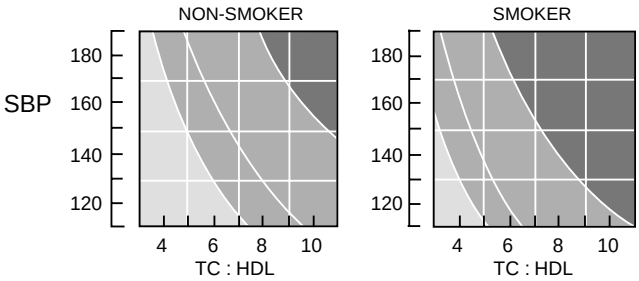

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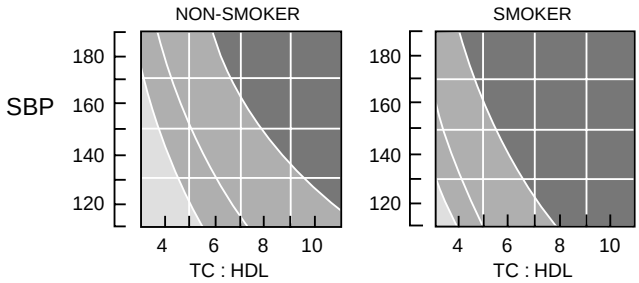
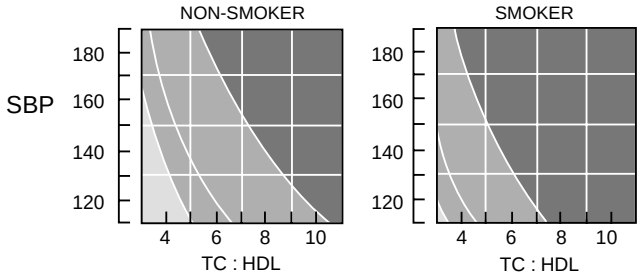


AGE 65 - 74 YEARS



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SIGN

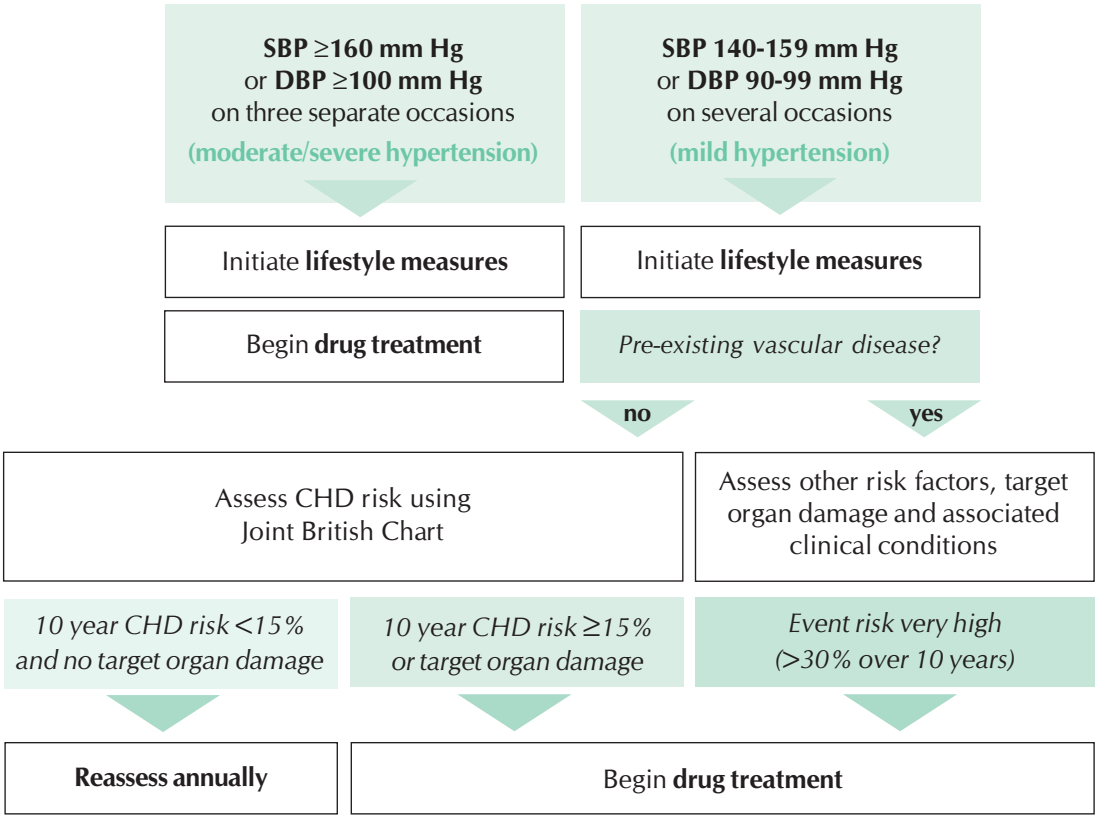
Hypertension in older people

Quick Reference Guide

Older patients with hypertension have a higher absolute benefit from treatment since they are at higher risk of vascular events and tolerate antihypertensive treatment at least as well as younger patients. Number needed to treat (NNT) to prevent one death in patients aged:

- *under 60 years = 167*
- *over 60 years = 72*

▯	For patients over the age of 75, a blood pressure check should be performed in those who attend for their annual health care check. Practices should also have a strategy for case finding in the 60-75 year age group.
C	A full assessment of cardiovascular risk should be carried out for all hypertensive patients. Treatment thresholds should take into account the level of blood pressure and other risk factors.
A	A target blood pressure of <140/90 mm Hg is a reasonable goal for most hypertensive patients. Even a small reduction in blood pressure is worthwhile if targets prove difficult to achieve.



Target organ damage

- Left ventricular hypertrophy *(ECG or echo)*
- Proteinuria and/or creatinine >150 µmol/l
- Atherosclerotic plaque *(x-ray or ultrasound evidence in carotid, iliac, or femoral arteries, or aorta)*

Associated clinical conditions

- Cerebrovascular disease *(ischaemic stroke, haemorrhagic stroke, TIA, vascular dementia)*
- Cardiovascular disease *(MI, angina, congestive cardiac failure)*
- Renal disease
- Peripheral vascular disease
- Aortic aneurysm
- Retinopathy

KEY A B C indicates grade of recommendation ▯ good practice point

SIGN Publication Number 49

LIFESTYLE MODIFICATION

- **C** Lifestyle measures aimed at controlling hypertension should be recommended in all cases
- **B** Reduce alcohol intake if >21 units/week for men, >14 for women
- **A** Eat more fruit and vegetables, less saturated fat and salt
- **A** Reduce weight if overweight or obese (BMI ≥25.0)
- **A** Take regular exercise
- **B** Stop smoking

ADDITIONAL DRUG THERAPY

- **A** **Aspirin 75 mg daily**
  if no contraindication,
  BP controlled to <150/90 mm Hg
  and cardiovascular complications,
  target organ damage,
  10 year CHD risk >15%
  or 10 year CVD risk >20%

Lipid lowering therapy
may be required: see the SIGN guidelines on lipids and primary prevention of CHD and secondary prevention of CHD following MI
(SIGN guidelines 40 and 41)

ANTIHYPERTENSIVE DRUG TREATMENT

Start therapy at any square and use add-on therapy on either side as shown by the arrows.
Drugs in adjacent squares have additive antihypertensive effects, complementary actions, and are usually well tolerated.
Multiple combinations may be required.

- **A** **Thiazide diuretics** as first line therapy for treatment of hypertension in older patients
- **A** Use low doses to minimise biochemical and metabolic problems

- **A** **ACE inhibitors** as first line therapy for patients with IDDM, proteinuria, LVSD; or as alternative or supplementary therapy to thiazide diuretics ***if no renal artery stenosis***
- **Angiotensin II antagonists** as alternative to ACE-I if cough is adverse effect

Centrally acting drugs
as additional therapy in refractory hypertension or as alternative therapy when other drugs are contraindicated

α-blockers as
supplementary therapy

- **A** **β-blockers** as alternative or supplementary therapy to thiazide diuretics

- **A** Long-acting dihydropyridine **calcium antagonists** as alternative therapy to thiazides or supplementary to other therapy, particularly in isolated systolic hypertension
- **B** Avoid short-acting calcium antagonists

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Derived from the national clinical guideline recommended for use in Scotland by the Scottish Intercollegiate Guidelines Network (SIGN), Royal College of Physicians of Edinburgh, 9 Queen Street, Edinburgh EH2 1JQ

Available on the SIGN website: www.sign.ac.uk