

# Hypertension Management Guide for Doctors 2004



**Heart Foundation**

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These guidelines are endorsed by:



High Blood Pressure Research  
Council of Australia Inc.



KIDNEY  
HEALTH  
AUSTRALIA



National Prescribing Service Limited



NATIONAL  
STROKE  
FOUNDATION



The Royal Australian College  
of General Practitioners

## A guide to assessing and managing raised blood pressure in patients

### Summary points

- ♥ Raised blood pressure, particularly systolic blood pressure, is directly related to increased risk of cardiovascular events and death.
- ♥ Lifestyle modifications are first-line interventions for high blood pressure management even where drug therapy is instituted.
- ♥ High blood pressure should not be managed in isolation. All cardiovascular disease risk factors need to be addressed.
- ♥ Absolute risk of cardiovascular disease determines who benefits most from intervention.
- ♥ Those with both elevated blood pressure and high absolute risk including the elderly, Aboriginal and Torres Strait Islander peoples, and those with diabetes or pre-existing cardiovascular disease warrant anti-hypertensive intervention and drug treatment.
- ♥ There are now five major classes of antihypertensive agents, which are commonly used as first-line therapy in the management of hypertension – low dose thiazide diuretics, beta-blockers, angiotensin converting enzyme inhibitors, calcium channel blockers and angiotensin II receptor antagonists. Drugs from any of the five major classes are suitable for initiation and maintenance of antihypertensive therapy. Outcome data indicate that the most important property of all these drugs either as monotherapy or in combination is the ability to lower blood pressure.

## General principles

- ♥ Raised blood pressure is a major risk factor for cardiovascular disease. The higher the blood pressure, the higher the risk of stroke, coronary heart disease, kidney disease, heart failure and death. This relationship applies across the whole range of blood pressures usually encountered in clinical practice.
- ♥ Systolic blood pressure is a stronger and more consistent predictor of cardiovascular risk than diastolic blood pressure.
- ♥ The dividing line between normotension and hypertension is arbitrary. The current definition of hypertension is based on the level of blood pressure above which a therapeutic plan is recommended. Management decisions will be influenced by an assessment of the patient's absolute risk for cardiovascular disease, determined by the presence and magnitude of other risk factors (e.g. age, male gender, smoking, dyslipidaemia, kidney impairment, diabetes, physical inactivity, etc).
- ♥ Standard procedures and several visits are needed to assess clinic blood pressure and achieve appropriate management. Consideration should also be given to obtaining blood pressure measurements outside the clinic, either by home or ambulatory blood pressure monitoring. Patients who might benefit most from obtaining such additional blood pressure values include those with:
  - Unusual variability of blood pressure
  - Chronic hypertension, low cardiovascular risk and absence of target organ disease
  - Hypertension resistant to drug treatment
  - Known significant 'white coat' effect on their blood pressure.
- ♥ When assessing raised blood pressure always assess other cardiovascular risk factors and determine the patient's absolute risk of cardiovascular disease. Intervene more vigorously for those at higher absolute risk.
- ♥ The possibility of underlying secondary causes should always be borne in mind because their identification may lead to cure or improvement in hypertension control through the institution of specific treatments. However, most hypertensive patients have essential hypertension often associated with 'unhealthy' lifestyle factors rather than secondary hypertension.
- ♥ Lifestyle modifications are the first-line approach in managing elevated blood pressure. Drug therapy is also required in many patients.
- ♥ Elderly people with hypertension have a greater absolute cardiovascular risk than younger patients and have at least the same relative benefit from treatment.
- ♥ Assessing and encouraging patient compliance is an essential part of ongoing management. Patient motivation to adhere to the prescribed therapeutic regimen is strongly dependent on establishment of a trusting, empathetic doctor-patient relationship.
- ♥ The Aboriginal and Torres Strait Islander population has an increased risk of developing cardiovascular disease and at an earlier age than the Caucasian population. Although no national data exist, there are regional prevalence studies that indicate a prevalence of hypertension in indigenous populations two to three times higher than the general population, and that hypertension in these populations remains undiagnosed and poorly controlled.

## Absolute cardiovascular risk

- ♥ Absolute cardiovascular risk can be expressed as the percentage chance of an individual experiencing a cardiovascular event over a pre-defined period of time, usually the next five or 10 years.
- ♥ The level of blood pressure is a major determinant of an individual's absolute risk for cardiovascular events such as heart attack and stroke.
- ♥ Those at highest absolute risk include people with multiple risk factors, those with diabetes who tend to demonstrate risk factor clustering and those who have already suffered cardiovascular events.
- ♥ Age and male gender are important drivers of absolute risk for cardiovascular disease. For example, a 70-year-old male with blood pressure  $\geq 140/85$  mm Hg and without other cardiovascular risk factors has a 10-15% chance of having a cardiovascular event over the next five years. A 45-55 year old male with a similar risk profile has  $\leq 5\%$  risk over the same period.
- ♥ A combination of hypertension and diabetes substantially elevates risk, especially in females. This combination is often associated with other risk factors including older age, overweight/obesity and dyslipidaemia.
- ♥ Aboriginal and Torres Strait Islander peoples have a high prevalence of risk factors for cardiovascular disease, as well as an exceedingly high age-standardised mortality from cardiovascular disease which has not shown the downward trend seen in the rest of the Australian community over the past 40 years. Similar observations also apply to people of Maori or Pacific Islander origin.

There are several assessment tools available for use in Australia to assist doctors to identify high absolute risk individuals. These are mostly based on data from the ongoing prospective study in Framingham, USA. These include the New Zealand (NZ) cardiovascular risk calculator that has been actively promoted in Australia by the National Prescribing Service. Pending the development of a national absolute risk tool that is validated to the Australian population, risk assessment in

this hypertension guide uses features of the NZ cardiovascular risk calculator to assist with the primary prevention of cardiovascular events in patients without diabetes.

### 1. Factors influencing absolute cardiovascular risk and prognosis

When managing raised blood pressure, risk factors that should be considered include:

- ♥ Personal history of associated clinical conditions or presence of target organ disease (Table 1).
- ♥ Age ( $> 55$  years male,  $> 65$  years female).
- ♥ Male gender (increased risk at any age compared to females).
- ♥ Family history of hypertension or premature cardiovascular disease (in the first-degree relative age  $< 60$  years).
- ♥ Cigarette smoking.
- ♥ Dyslipidaemia (raised total or LDL cholesterol or reduced HDL cholesterol – refer to National Heart Foundation of Australia/Cardiac Society of Australia and New Zealand – *Lipid Management Guidelines 2001* at [www.heartfoundation.com.au](http://www.heartfoundation.com.au)).
- ♥ Diabetes.
- ♥ Obesity (BMI  $\geq 30$  kg/m<sup>2</sup>); overweight (BMI  $\geq 25$  kg/m<sup>2</sup>); and/or increased waist circumference ('increased risk':  $> 94$  cm males,  $> 80$  cm females – 'high risk':  $> 102$  cm males;  $> 88$  cm females)<sup>a</sup>.
- ♥ Excessive alcohol intake.
- ♥ Sedentary lifestyle.
- ♥ Psychosocial risk factors:
  - depression
  - social isolation
  - lack of quality social support.
- ♥ Populations at risk:
  - people of Aboriginal, Torres Strait Islander, Maori or Pacific Islander origin
  - lower socioeconomic groups.

<sup>a</sup>These categorisations of risk may not be appropriate for all population groups. See page 15.

If blood pressure is elevated, make stronger efforts to correct it when any of these factors are present. The other risk factors, where modifiable, deserve attention in their own right whether or not blood pressure is elevated.

## 2. Assessment of absolute cardiovascular risk

### a) Higher risk groups

Patients belonging to any of the following groups can be classified as being at high or very high risk of a cardiovascular event:

- People with diabetes, other associated clinical conditions or target organ disease (Table 1).
- People of Aboriginal, Torres Strait Islander, Maori or Pacific Islander origin.

**Table 1: Categories of associated clinical conditions and target organ disease, as ‘markers’ for those at high or very high absolute risk of a primary or secondary cardiovascular event.**

Associated Clinical Conditions (ACC)	Target Organ Disease (TOD)
<p><b>Diabetes</b></p> <p><b>Cerebrovascular disease</b></p> <ul style="list-style-type: none"> <li>● Ischaemic stroke</li> <li>● Cerebral haemorrhage</li> <li>● Transient ischaemic attack</li> </ul> <p><b>Heart disease</b></p> <ul style="list-style-type: none"> <li>● Myocardial infarction</li> <li>● Angina</li> <li>● Coronary revascularisation</li> <li>● Chronic heart failure</li> </ul> <p><b>Chronic kidney disease</b></p> <ul style="list-style-type: none"> <li>● Diabetic nephropathy</li> <li>● Glomerulonephritis</li> <li>● Hypertensive renovascular disease</li> </ul> <p><b>Aortic disease</b></p> <ul style="list-style-type: none"> <li>● Dissecting aneurysm</li> <li>● Fusiform aortic aneurysm</li> </ul> <p><b>Peripheral arterial disease</b></p>	<ul style="list-style-type: none"> <li>● Left ventricular hypertrophy (electrocardiogram, echocardiogram)</li> <li>● Microalbuminuria <math>\geq 30 \mu\text{g}/\text{min}</math> and/or proteinuria <math>\geq 200 \text{ mg}/\text{day}</math> and/or glomerular filtration rate (GFR)* <math>&lt; 60 \text{ mls}/\text{min}</math></li> <li>● Ultrasound or radiological evidence of atherosclerotic plaque (aorta, carotid, coronary, femoral and iliac arteries)</li> <li>● Hypertensive retinopathy (Grade II or more)</li> </ul>

\* GFR is estimated by the Cockcroft Gault formula =  $(140 - \text{age}) \times \text{weight (kg)} / (\text{serum creatinine } (\mu\text{mol/L}) \times 0.814)$  for males. For females, multiply result by 0.85. (This formula is available on some general practice software.)

Modified from: Guidelines Subcommittee of the WHO-ISH: 1999 WHO-ISH guidelines for the management of hypertension. *J Hypertens* 1999, 17:151-183.

### b) Absolute risk assessment using the New Zealand Cardiovascular Risk Calculator

For patients with hypertension who do not belong to any of the higher risk groups as defined above, it is recommended that an absolute risk assessment is undertaken using the modified New Zealand Cardiovascular Risk Calculator. This tool is also available at [www.nzgg.org.nz](http://www.nzgg.org.nz).

**Figure 1. Modified New Zealand Cardiovascular Risk Calculator.**

Modified with permission of the New Zealand Heart Foundation and the New Zealand Guidelines Group.

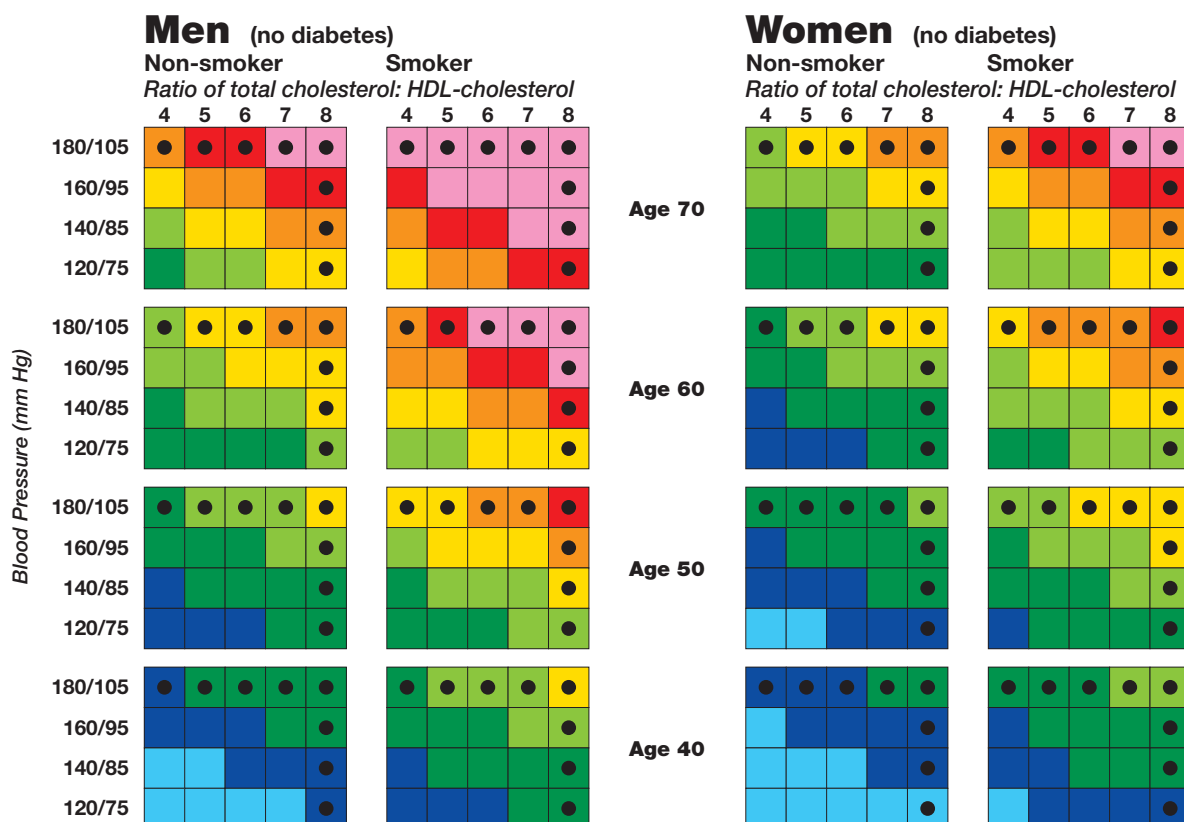
**Use this figure to estimate absolute risk in those whom:**

- ♥ Do not have diabetes or other associated clinical conditions or target organ disease (Table 1).
- ♥ Are not of Aboriginal, Torres Strait Islander, Maori or Pacific Islander origin.

Risk Level		Benefit	Benefit
5 year cardiovascular risk (non-fatal and fatal)		Cardiovascular events prevented per 100 treated for 5 years*	Number needed to treat for 5 years to prevent 1 event*
<b>Very high</b>	>30%	>10	<10
	25–30%	9	11
	20–25%	7.5	13
<b>High</b>	15–20%	6	16
<b>Moderate</b>	10–15%	4	25
<b>Mild</b>	5–10%	2.5	40
	2.5–5%	1.25	80
	<2.5%	<0.8	>120

Cells with this marker (●) indicate that in patients with very high levels of total cholesterol (> about 8.5–9 mmol/L) or blood pressure (> about 170/100 mm Hg), the risk equations may underestimate the true risk.

\* Assumes that cholesterol reduction of about 20% in patients with total cholesterol > 5.0–5.5 mmol/L or blood pressure reduction of about 12/6 mm Hg in patients with BP > 140–150/90 mm Hg produces an approximate 30% reduction in cardiovascular disease risk, whatever the pretreatment absolute risk.



## How to use the risk calculator

Find the colour block which best describes your patient's:

- ♥ Gender.
- ♥ Age (mean for that category, e.g. age 60 represents 55-64 years).
- ♥ Smoking status (i.e. regular daily cigarette smoking or having stopped in the previous 12 months).
- ♥ Blood pressure (mean of two readings on two occasions).
- ♥ Total cholesterol/high-density lipoprotein cholesterol (HDL-C) ratio (ensure correct ratio is used).

Cell colour estimates a patient's absolute five-year risk of a cardiovascular event:

- ♥ Newly diagnosed angina.
- ♥ Myocardial infarction.
- ♥ Coronary heart disease death.
- ♥ Stroke.
- ♥ Transient ischaemic attack.

## Note:

1. For age > 75 years the absolute risk of a cardiovascular event in the next five years is > 15% in nearly all individuals.
2. The estimated risk of cardiovascular events is not precise and is presented as a range with interpolation required between categories.
3. Very high-risk patients. All patients with symptomatic cardiovascular disease<sup>b</sup> or electrocardiogram diagnosed left ventricular hypertrophy are assumed to have a cardiovascular disease risk of greater than 20% in five years.

Younger patients with high blood pressure but low to moderate absolute risk of events in five years may nonetheless run considerable lifetime risk of premature disability or death from stroke or heart disease.

## Where risk is underestimated

4. Patients with a strong family history of cardiovascular disease (i.e. in first degree relatives < 60 years) are likely to be at greater risk than the tables indicate:
  - consider increasing risk estimate by one colour category.
5. Those patients who are obese with a BMI of 30 kg/m<sup>2</sup> or more are likely to be at greater risk than the tables indicate:
  - consider increasing risk estimate by one colour category.
6. In patients with very high levels of total cholesterol (> 8.5-9 mmol/L) or blood pressure (>170/100 mm Hg) the risk tables may underestimate true risk:
  - consider increasing risk estimate by one colour category.

<sup>b</sup> Symptomatic cardiovascular disease includes angina, myocardial infarction, chronic heart failure, stroke, transient ischaemic attack and peripheral vascular disease.

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## How to measure blood pressure accurately

- ♥ It is still recommended to use a mercury sphygmomanometer. If another form of sphygmomanometer is used, it should be calibrated regularly against a mercury sphygmomanometer to ensure accuracy. Because of environmental concerns about the toxicity of mercury, there is a move to phase out mercury sphygmomanometers. At present there has been no agreement relating to an optimal replacement, as the accuracy of other available devices is very dependent on the particular product chosen.
- ♥ The patient should be seated and relaxed, preferably for several minutes prior to the measurement and in a quiet room.
- ♥ The arm being used for measurement should be free of constricting clothing so that the cuff can be wrapped around the upper arm without impediment.
- ♥ Select an appropriate cuff size. The bladder length should be at least 80% and the width at least 40% of the circumference of the mid-upper arm. Use of a 'standard size' cuff in people with large arms can result in artificially high blood pressure readings. If an oversized cuff cannot be satisfactorily fitted on a large arm then the utilisation of an appropriately sized cuff on the forearm with radial artery auscultation should be considered.
- ♥ Wrap the cuff snugly around the upper arm, with the centre of the bladder of the cuff positioned over the brachial artery and the lower border of the cuff about 2 cm above the bend of the elbow.
- ♥ Ensure the cuff is at heart level by appropriately supporting the arm whatever the position of the patient.
- ♥ Inflate the cuff to the pressure at which the radial pulse disappears.
- ♥ Deflate the cuff at a rate of 2-3 mm Hg/beat (2-3 mm Hg/sec) or less and note the pressure at which the radial pulse reappears.
- ♥ Fully deflate the cuff, wait approximately 30 seconds and then inflate the cuff to at least 30 mm Hg above that at which the radial pulse reappeared.
- ♥ While deflating the cuff at a rate of 2-3 mm Hg/beat (2-3 mm Hg/sec) or less, auscultate over the brachial artery at the elbow.
- ♥ Record the result for systolic and diastolic pressures to the nearest 2 mm Hg. For the systolic reading, record the level at which the first (at least two consecutive) sounds are heard, even if they subsequently transiently disappear with progressive deflation (the 'auscultatory gap'). For the diastolic reading, use phase V Korotkoff (disappearance of sound). Only use phase IV Korotkoff (muffling of sound) if sound continues towards zero.
- ♥ Wait 30 seconds before repeating the procedure in the same arm.
- ♥ Average the readings. If the first two readings differ by more than 10 mm Hg systolic or 6 mm Hg diastolic or if the initial readings are high, take several readings after five minutes of quiet rest, until consecutive readings do not vary by greater than these amounts.
- ♥ Ideally, patients should not take caffeine-containing beverages or smoke for at least two hours before blood pressure is measured, as both tend to produce acute increases in blood pressure (and particularly in combination).



- ♥ Measure blood pressure on both arms at the first visit, particularly if there is evidence of peripheral vascular disease. A variation of up to 5 mm Hg in blood pressure between arms can be acceptable. In certain conditions (e.g. chronic aortic dissection, subclavian artery stenosis) all blood pressure recordings should be taken from the arm with the highest reading.
- ♥ Measure sitting and standing blood pressures in patients who are elderly, or have diabetes, or where orthostatic hypotension might be suspected. Repeat measurement after at least two minutes standing.

## Role of ambulatory blood pressure monitoring

- ♥ In all patients consideration should be given to obtaining blood pressure measurements outside the clinic setting either by self-measurement of blood pressure at home or by non-invasive ambulatory blood pressure monitoring. Target organ disease and the occurrence of cardiovascular events relate more closely to blood pressures measured outside the clinic, particularly with those obtained by ambulatory monitoring.
- ♥ In up to 30% of patients who have hypertension in the clinic, blood pressure outside the clinic is within acceptable limits ('white coat' hypertension). Available data suggest that outcomes and thus treatment decisions for these patients are best based on blood pressure obtained outside the clinic setting.
- ♥ In 10 - 20% of patients, ambulatory blood pressure may be higher than clinic blood pressure. In this situation, outcome is also better related to ambulatory blood pressure than to clinic blood pressure.
- ♥ Night time blood pressure may be the strongest predictor of cardiovascular events.

**Table 2: How to interpret ambulatory blood pressure (ABP) profile**

- ABP profiles should be inspected in relation to any patient diary information and time of drug treatment where relevant.
- 'Normal' ABP values for adults (non-pregnant) are < 135/85 mm Hg during the day, < 120/75 mm Hg during the night and <130/80 mm Hg over 24 hours. These values are the 95<sup>th</sup> centile of blood pressure distributions in larger Caucasian populations.
- Daytime and night time ABP 'loads'\* should be < 20% above accepted arbitrary values.
- Mean daytime and night time (sleep) ABP measurements should differ by > 10%. Cardiovascular risk is increased in those with day-night differences < 10% ('non-dippers').

\* Percentage of BP values above particular arbitrary limits.

Modified from: McGrath BP and on behalf of the National Blood Pressure Advisory Committee of the National Heart Foundation of Australia: Ambulatory Blood Pressure Monitoring. Position statement. MJA 2002; 176: 588-592.

## Guide to diagnostic levels

As blood pressure is characterised by large spontaneous variations, the diagnosis of hypertension should be based on multiple blood pressure measurements taken on several separate occasions.

International definitions of hypertension vary. This suggested classification was developed following an assessment of different systems recently updated in the United States<sup>1</sup> and Europe<sup>2</sup>.

**Table 3: Definitions and classification of blood pressure levels (mm Hg)**

<b>Category</b>	<b>Systolic</b>	<b>Diastolic</b>
Normal	< 120	< 80
High-normal	120-139	80-89
Grade 1 (mild)	140-159	90-99
Grade 2 (moderate)	160-179	100-109
Grade 3 (severe)	≥ 180	≥ 110
Isolated systolic hypertension	≥ 140	< 90

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

**Table 4: Guide to follow-up of adults 18 years and over**

<b>Systolic (mm Hg)</b>	<b>Diastolic (mm Hg)</b>	<b>Action</b>
< 120	< 80	Recheck in 2 years
120-139	80-89	Recheck in 1 year – lifestyle advice
140-159	90-99	*Confirm within 2 months – lifestyle advice
160-179	100-109	*Evaluate or refer within 1 month – lifestyle advice
≥ 180	≥ 110	*Further evaluate and refer within 1 week (or immediately depending on clinical situation)

If blood pressure has been confirmed at ≥ 180mm Hg systolic and/or ≥ 110 diastolic mm Hg (after multiple readings and excluding 'white coat' hypertension), drug treatment should be commenced

If systolic and diastolic categories are different, follow recommendations for shorter follow-up (e.g. BP 160/86 mm Hg evaluate or refer within 1 month).

\*Note – earlier initiation of drug therapy may be indicated for some patients. See page 13.

# Diagnostic evaluation in patients with confirmed hypertension

## 1. History

- ♥ Known duration of raised blood pressure and previous levels.
- ♥ Blood pressure levels measured outside of the clinic setting (if known).
- ♥ Previous antihypertensive therapy efficacy and adverse effects.
- ♥ Past history or current symptoms of ischaemic heart disease, heart failure, cerebrovascular disease or peripheral vascular disease.
- ♥ Past history or current symptoms of kidney disease. Earlier symptoms suggestive of kidney disease include nocturia and passage of dark urine.
- ♥ Symptoms suggestive of secondary hypertension, e.g. paroxysmal headache, sweating, palpitations suggestive of pheochromocytoma, sleep apnoea.
- ♥ Asthma, chronic obstructive pulmonary disease, diabetes, dyslipidaemia, gout, sexual dysfunction (males), sleep apnoea or other significant illnesses and their treatments.
- ♥ Family history of hypertension, diabetes, dyslipidaemia, stroke, premature coronary heart disease, kidney disease.
- ♥ Modifiable risk factors: obesity, alcohol intake, salt use, physical activity, smoking, saturated fat intake.
- ♥ Ingestion of prohypertensive substances: alcohol, oral and 'depot' contraceptives, non-steroidal anti-inflammatory drugs (NSAIDs) including Cox 2 inhibitors, liquorice, steroids, cyclosporin and tacrolimus, nasal decongestants and other sympathomimetic agents, sibutramine, appetite suppressants, monoamine oxidase inhibitors, cocaine, amphetamines, coffee (prior to blood pressure measurement), bupropion, glucocorticoids, erythropoietin and some complementary medications.
- ♥ Personal, psychosocial and environmental factors that could influence the course and outcome of antihypertensive care, including family situation, work environment and educational background. Assess for depression, social isolation and quality of social support.

## 2. Physical examination

Full physical examination with particular attention to:

- ♥ Presence of other cardiovascular risk factors:
  - Body size is assessed and monitored by measuring:
    - *waist circumference* measured half way between the inferior margin of the last rib and the crest of the ilium in the mid-axillary plane. The measurement is taken at the end of normal expiration.
      - increased risk > 94 cm males; > 80 cm females
      - high risk > 102 cm males; > 88 cm females
    - and/or*
    - *body mass index (BMI)*, body weight in kilograms divided by the square of height in metres, kg/m<sup>2</sup>.
      - overweight BMI ≥ 25 kg/m<sup>2</sup>
      - obesity BMI ≥ 30 kg/m<sup>2</sup>
- ♥ Cardiovascular system:
  - heart size
  - evidence of heart failure
  - evidence of arterial disease – carotid, peripheral, renal
  - absent femoral pulses or radiofemoral delay.
- ♥ Lungs:
  - basal crackles
  - wheeze.
- ♥ Abdomen:
  - renal size
  - other masses
  - bruits.

- ♥ Optic Fundi:
  - arteries – tortuosity, thickening, arteriovenous nipping
  - background – haemorrhages, exudates, diabetic retinopathy
  - discs – papilloedema.
- ♥ Nervous system:
  - evidence of previous neurological disease.
- ♥ Endocrine system:
  - e.g. evidence of Cushing's syndrome.

### 3. Investigations

- ♥ Dip stick testing of urine for blood, protein – if abnormal proceed to urine microscopy.
- ♥ Urinary protein
  - in those patients with hypertension but not diabetes: if proteinuria is detected on urinalysis (consider when  $\geq 1+$  on dipstick), determine 24 hour urinary protein excretion or protein/creatinine ratio on a spot urine sample
  - an assessment for microalbuminuria is mandatory for people with diabetes and highly desirable in others with hypertension. In people with hypertension and diabetes: knowledge of urinary albumin excretion determines the intensity of antihypertensive therapy. The best screening test (if available) is the urinary albumin/creatinine ratio on the 'spot' urine. In patients with values  $\geq 2.5$  mg/mmol (males) or  $\geq 3.5$  mg/mmol (females), repeat with one or more timed urine samples to confirm. A 24-hour urine collection should be obtained for accurate quantification.

- ♥ Blood analysis for electrolytes, sodium, potassium, urea, creatinine, uric acid, haemoglobin, fasting glucose and total, LDL and HDL cholesterol and triglycerides.
- ♥ An electrocardiogram for evaluation of conduction disturbances, arrhythmia or ischaemic heart disease.
- ♥ (Where available) an echocardiogram for detection of left ventricular hypertrophy.

### 4. Further investigations

Further investigations should be determined on the basis of clinical suspicion from the history and physical examination or the results of initial investigations. Primary aldosteronism may be more common than previously suggested in medical texts and is not necessarily excluded by normokalaemia. It is advised that specialist referral should be considered if secondary hypertension is suspected.

## When to intervene

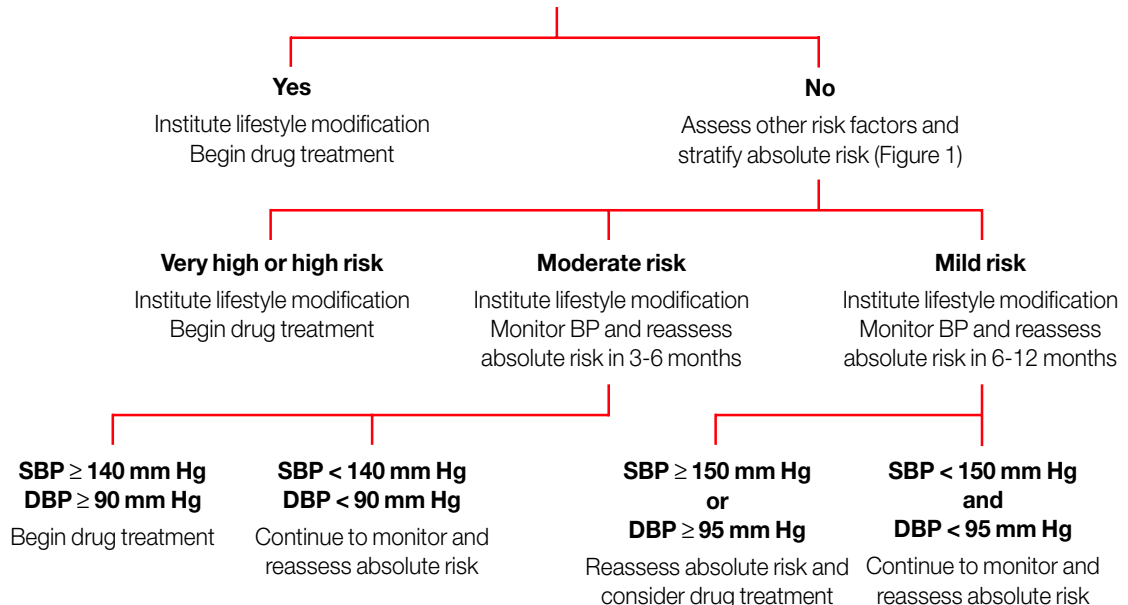
A therapeutic plan should be implemented in all patients with hypertension (BP  $\geq$  140 mm Hg systolic and/or  $\geq$  90 mm Hg diastolic). The plan should be aimed at both blood pressure reduction and reduction of overall cardiovascular risk. The management strategy should be related to the patient's absolute risk category. In all individuals whose blood pressure is  $\geq$  120/80 mm Hg, modification of lifestyle should also be recommended.

**Note:** *High-normal blood pressure* – early and active antihypertensive drug treatment should be considered for patients who have high-normal blood pressure (as previously defined) and diabetes and/or renal insufficiency. This is to reduce the rate of loss of kidney function. Other patients with high-normal blood pressure should be advised to have their blood pressure checked at least annually and to adopt a healthy lifestyle.

**Figure 2: Initiation of drug treatment**

**When to initiate drug treatment\* for individuals with SBP 140-180 mm Hg or DBP 90-110 mm Hg on several occasions\*\***

Are **Associated Clinical Conditions** or **Target Organ Disease** present? (Table 1) or is the person of Aboriginal, Torres Strait Islander, Maori or Pacific Islander origin?



\* Lifestyle modification remains first-line treatment in all individuals with hypertension.

\*\* Individuals with confirmed SBP > 180 mm Hg and/or DBP > 110 mm Hg warrant initiation of drug treatment – See Table 4.

## Clinic treatment goals (mm Hg)

**Table 5**

Adults ≥ 65 years (unless there is diabetes and/or renal insufficiency and/or proteinuria ≥ 0.25 g/day)	< 140/90
• Adults < 65 years and/or • Adults with diabetes and/or • Adults with renal insufficiency and/or • Adults with proteinuria 0.25 – 1.0 g/day	< 130/85
Adults with proteinuria >1 g/day (in people with and without diabetes)	< 125/75

*Modified from National Heart Foundation of Australia/Cardiac Society of Australia and New Zealand 'Reducing Risk in Heart Disease – Guidelines for the prevention of cardiovascular events in people with coronary heart disease', 2003.*

Treatment goals are now generally lower than previously recommended particularly in high risk patients. The major driving forces for these recommendations are:

- ♥ Less than adequate achievement of improved outcomes with previous recommendations.
- ♥ The knowledge that the relationship between blood pressure and outcome is continuous with lower blood pressures being associated with better outcomes.
- ♥ The information from clinical trials that have aimed for better blood pressure control and achieved improved outcomes.

It is acknowledged that in many patients these targets may be difficult to achieve but they should remain as the goals. Combination drug therapy will often be required. Achievement of reductions in blood pressure that remain higher than target may need to be accepted in individual patients – any improvement in blood pressure should be beneficial but generally the lower the better.

## Lifestyle modifications to reduce blood pressure and absolute cardiovascular disease risk

- ♥ Lifestyle modifications are an integral part of the management of hypertension, whether or not drugs are also used.
- ♥ These can be addressed by paying particular attention to the 'SNAP' (Smoking, Nutrition, Alcohol, Physical Activity) risk factors.
- ♥ Effective nutritional and other lifestyle measures may abolish or reduce the need for antihypertensive drugs.

### Weight reduction

Reducing excess weight is a priority in managing hypertension and can lower blood pressure in most patients by an average of 2 mm Hg systolic per kilogram of weight lost. Weight reduction by as little as 5 kg reduces blood pressure in most individuals who are more than 10% over ideal weight. Healthy eating (see dietary modification section on page 16) combined with regular physical activity can have a positive impact on weight, blood pressure and overall cardiovascular risk.

Advise patients that to reach and maintain a healthier weight they will need to make some lifestyle changes they can enjoy and maintain for a lifetime. There is no quick solution to weight loss. To achieve a healthier weight, the kilojoules coming into the body from food and drinks should be less than the kilojoules being used up by the body through day to day activities and planned regular physical activity. For those patients for whom weight loss is recommended, as well as being given physical activity advice they should be advised to reduce their kilojoule intake.

Assess and continue to monitor both waist circumference and BMI. Management goals are:

- ♥ Waist circumference: males  $\leq 94$  cm; females  $\leq 80$  cm.
- ♥ BMI  $< 25$  kg/m<sup>2</sup>.

However, it is best to set intermediate achievable goals with patients.

**Note:** These goals are largely based on evidence of increased risk of death in European populations and may not be appropriate for all age and ethnic groups. For example, in Asian populations increased risk of cardiovascular disease is typically at a lower BMI than in European populations.

Now that sibutramine is being more widely used as a pharmacological approach to weight reduction, caution is advised with respect to its well-documented action to increase blood pressure in some patients.

## Regular physical activity

Physical inactivity is an important risk factor for cardiovascular disease and there is compelling evidence for the cardioprotective effect of regular physical activity. Moreover, recent meta-analysis evidence shows that regular aerobic exercise can lower systolic and diastolic blood pressure by an average of approximately 4 and 2.5 mm Hg respectively.

Advise patients of any age to do at least 30 minutes of moderate intensity physical activity on five or more days of the week. This amount of activity can be accumulated in shorter bouts (e.g. three 10 minute walks). Moderate activity (e.g. brisk walking, lawn mowing, low paced swimming, cycling, gentle aerobics) will cause a slight increase in breathing and heart rate, and may cause light sweating. Advise caution for patients who as part of regular activity, are undertaking isometric exercise routines such as weight lifting, which may increase blood pressure.

## Alcohol

Advise patients with hypertension to limit their intake of alcohol to two standard drinks per day or less if male, or one standard drink per day if female. By reducing alcohol consumption, blood pressure can fall substantially in some patients.

## Salt

Several well-controlled studies have shown an average reduction in blood pressure of 5-7 mm Hg in patients with hypertension where sodium intake is reduced below 90 mmol/day by a 'no-added-salt' low salt eating pattern. The effect is more marked in systolic blood pressure, and particularly on standing blood pressure. Patients vary in their blood pressure response to dietary salt restriction, with the greater response being in the elderly and in those with severe hypertension.

Most salt in the diet comes from processed foods. Advise patients to use 'low salt' (no more than 120 mg sodium/100 g) or 'no added salt' processed foods, and not to add salt to food at the table or in cooking.

It is important to be aware that some cultural groups have a characteristically high salt intake.

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## Dietary modification

Dietary modification involves making sustainable behavioural changes to adopt a healthier eating pattern.

Encourage patients to choose:

- ♥ Mainly plant-based foods – vegetables, fruits and legumes (dried peas, beans and lentils) and grain based foods (preferably wholegrain) such as bread, pasta, noodles and rice;
- ♥ Moderate amounts of lean meats, poultry, fish and reduced fat dairy products; and
- ♥ Moderate amounts of polyunsaturated or monosaturated fats.

A diet high in plant-based foods assists in managing blood pressure and, in conjunction with a reduced saturated fat intake, helps prevent coronary heart disease.

An initial consultation with a dietitian is often important in identifying the most important dietary modifications relevant to each individual patient. Follow-up consultations are equally important in monitoring outcome and reinforcing appropriate dietary recommendations.

## Smoking cessation

This is the single most important lifestyle modification in all patients with hypertension, although the impact will be on cardiovascular risk, rather than on blood pressure. Patients who smoke have three to four times the risk of a heart attack and stroke compared with non-smokers.

Strongly advise patients to stop smoking and provide appropriate counselling. Smoking cessation advice from health professionals has been shown to be effective in increasing quit rates. Even three to five minutes of time taken to encourage smokers to attempt to quit can increase success rates with cessation. Assessment of readiness to quit is a valuable step in providing effective counselling. Advise patients to stop smoking in a way that is clear and unambiguous.

Refer to Quitline 131 848. Consider referral to a smoking cessation program.

Pharmacotherapy is an effective aid to assist motivated smokers to quit and in absence of contraindications should be considered for those smoking more than 10 cigarettes per day. Nicotine replacement therapy (NRT) and bupropion as monotherapy are both effective with suitable patients. For patients requiring additional assistance, bupropion in combination with NRT can be considered. Consider the high risk of continuing to smoke when assessing benefits and risks of pharmacotherapy.

## Maintaining lifestyle changes in the long term

- ♥ Tailor programs to individual patient's needs.
- ♥ Give regular encouragement.
- ♥ Provide specific written instructions.
- ♥ Review progress regularly.

## Further information

Further information for patients on healthy eating, salt and high blood pressure, weight management, smoking cessation and physical activity is available through Heartline **1300 36 27 87** or **[www.heartfoundation.com.au](http://www.heartfoundation.com.au)**.



## Drug treatment

There are now five major classes of antihypertensive agents which are commonly used as first-line therapy in the management of hypertension – low-dose thiazide diuretics, beta-blockers, angiotensin converting enzyme inhibitors (ACEI), calcium channel blockers (CCB) and angiotensin II receptor antagonists (ARA). Drugs from any of the five major classes are suitable for initiation and maintenance of antihypertensive therapy. Outcome data indicate that the most important property of all these drugs, either as monotherapy or in combination, is the ability to lower blood pressure.

- ♥ Initial drug choice will be influenced by:
  - the patient's cardiovascular risk profile
  - presence of target organ disease, clinical cardiovascular disease, renal disease or diabetes
  - presence of co-existing conditions which may either favour or limit the use of particular drug classes
  - possibility of interactions with other co-prescribed drugs
  - strength of evidence for the reduction of cardiovascular events with individual drugs
  - cost.

Combination therapy is often necessary. Fewer than 50% of patients treated for hypertension will achieve an optimal blood pressure response with a single agent (monotherapy). In the majority of cases a combination of antihypertensive drugs from two or more antihypertensive drug classes will therefore be required.

## Stroke issues

All five major classes of antihypertensive drugs are effective in preventing first-ever stroke, but their respective adverse effects and costs differ.

The ACE inhibitor ramipril and the combination of the thiazide diuretic indapamide and the ACE inhibitor perindopril have separately been shown to be effective in reducing the risk of recurrent stroke irrespective of the blood pressure when therapy was commenced.

For patients who have survived the acute phase of a stroke and who are clinically stable, it is safe and effective to lower blood pressure. This is irrespective of the type of stroke, the time since the stroke (within two weeks to five years), the patient's ethnic origin and country of residence, or whether the patient is currently normotensive or hypertensive. Greater benefits (i.e. greater reductions in recurrent stroke) are seen with more intensive blood pressure lowering, but caution is required in elderly patients and those with 'miserly (cerebral) perfusion' due to occlusive cerebrovascular disease.

**Table 6: Choice of drug in patients with co-existing conditions**

Potentially favourable effect on co-existing conditions	
Co-existing disease, conditions	Drug
Angina	Beta-blockers (except oxprenolol, pindolol), CCBs
Heart failure	ACEIs, ARAs, thiazide diuretics, beta-blockers <sup>1</sup> (bisoprolol, carvedilol and metoprolol)
Myocardial infarction	Beta-blockers (except oxprenolol, pindolol), ACEIs
Type I and Type 2 diabetes with proteinuria or microalbuminuria	ACEIs and ARAs
Potentially unfavourable effect on co-existing conditions	
Co-existing disease, conditions	Drug
Asthma	Beta-blockers
Bradycardia, second or third degree atrioventricular block	Beta-blockers, non-dihydropyridine CCBs (verapamil, diltiazem)
Diabetes	Beta-blockers, thiazide diuretics
Gout	Thiazide diuretics
Heart failure	CCBs, alpha-blockers
Peripheral vascular disease	Beta-blockers
Renovascular disease, pregnancy	ACEIs, ARAs

<sup>1</sup> Some beta-blockers are now indicated in the treatment of heart failure but because of the risks involved these should only be used under close supervision.  
 Modified from: Australian Medicines Handbook 2003

**Table 7: Adverse effects**

Common adverse effects	Thiazide diuretics	Beta-blockers	ACE inhibitors	Calcium channel blockers	Angiotensin II receptor antagonists
Constipation	-	-	-	+ (especially verapamil)	-
Cough, angioedema	-	-	+	-	rare reports
Dyspnoea	-	+	-	-	-
Gout	+	-	-	-	-
Headache, flushing	-	-	-	+	-
Hyperglycaemia	+	-	-	-	-
Hyperkalaemia	-	-	+	-	+
Hypokalaemia	+	-	-	-	-
Impotence	+	+	-	-	-
Lethargy	-	+	-	-	-
Oedema	-	-	-	+	-
Postural hypotension	+	-	-	-	-

Suggest consider using ARAs predominantly when an ACEI is not tolerated. Caution should be exercised in introducing ARAs in those who have experienced angioedema with ACEIs.  
 Modified from: Management guidelines in essential hypertension: report of the second working party of the British Hypertension Society. *BMJ* 1993; 306: 983 – 7.

## How to use medication

The general principles governing the use of antihypertensive drugs, independent of the particular drug class are:

- ♥ Wherever possible treat to target blood pressure (see clinic treatment goals).
- ♥ Use the lowest recommended dose of the chosen drug to initiate therapy.
- ♥ If the initial drug is not well tolerated, change to a drug of a different class, starting with the smallest recommended dose.
- ♥ The recommended approach to maximising antihypertensive efficacy while minimising adverse effects is the use of appropriate drug combinations. If initial response is inadequate add a small dose of a second drug (from another drug class) rather than increasing the dose of the original drug.
- ♥ If the blood pressure response is still above target values and the drugs have been well tolerated, it is then appropriate to increase the doses of one or more of the current antihypertensive drugs within their recommended ranges. This recommendation does not apply to low dose thiazide diuretics for which dose increases are not usually recommended.
- ♥ Occasionally three or even four different antihypertensive drugs may be required in combination to achieve adequate blood pressure control.
- ♥ Choose long-acting drugs to provide 24-hour efficacy with once daily administration.
- ♥ In general it may take at least three to four weeks to obtain a stable response to a particular dose of a drug.

- ♥ Combination preparations (e.g. ACEIs/thiazide diuretics or ARAs/thiazide diuretics) are often convenient once it has been established in the particular patient that the doses in the combination preparation are appropriate.

### Follow-up after initiation of medication

During stabilisation of treatment it is recommended that patients be seen at intervals which may be as short as a few days or extend up to one to two months, depending on the patient's needs. Once treatment is reasonably stabilised, the interval between visits can be lengthened, e.g. review every three months for the next six months and six monthly thereafter.

**Table 8: Recommended doses**

<b>Thiazide diuretics<sup>a</sup></b>	
Bendrofluzide	2.5-5 mg once daily
Chlorthalidone	12.5-25 mg once daily
Hydrochlorothiazide	12.5-25 mg once daily
Indapamide	1.5 mg (controlled release) – 2.5 mg once daily
Notes: It is usually unnecessary to increase the dose of thiazide diuretics above the lower doses for each of those shown above. Loop diuretics (e.g. frusemide) are not recommended as antihypertensives unless there is a tendency to volume overload.	
<b>Beta-blockers</b>	
Atenolol	25-100 mg once daily
Metoprolol	50-100 mg twice daily
<b>ACE inhibitors *</b>	
Captopril	6.25-50 mg twice daily
Enalapril	2.5-40 mg once daily or in two equally divided doses
Fosinopril	5-40 mg once daily
Lisinopril	2.5-40 mg once daily
Perindopril	1-8 mg once daily
Quinapril	2.5-40 mg once daily or in two equally divided doses
Ramipril	1.25-10 mg once daily or in two equally divided doses
Trandolapril	0.5-4 mg once daily
<b>Calcium channel blockers – non-dihydropyridine</b>	
Diltiazem	180-360 mg once daily (controlled release)
Verapamil	240 mg once or twice daily (controlled release)
<b>Calcium channel blockers – dihydropyridine *</b>	
Amlodipine	2.5-10 mg once daily
Felodipine	2.5-10 mg once daily (controlled release)
Lercanidipine	5-20 mg once daily
Nifedipine	30-120 mg once daily (controlled release)
<b>Angiotensin II receptor antagonists *</b>	
Candesartan	4-16 mg once daily
Eprosartan	400-800 mg once daily
Irbesartan	75-300 mg once daily
Losartan	50-100 mg once daily
Telmisartan	40-80 mg once daily
<b>Other</b>	
Hydralazine <sup>∞</sup>	12.5-100 mg twice daily
Labetalol	100-400mg twice daily
Methyldopa	125-500 mg twice daily
Prazosin <sup>++</sup>	0.5-10 mg twice daily (nocturnal initiation of therapy to avoid postural hypertension)

**Notes**

<sup>a</sup> Thiazide diuretics may be given in combination with a potassium-sparing diuretic such as amiloride 2.5-5 mg orally daily or triamterene 50 mg orally if the patient's plasma potassium concentration drops below the laboratory reference range on thiazide diuretic alone. This may not be necessary if the patient is also being commenced on an ACEI or ARA.

\* ACEI and ARAs should be started on the lowest dosage in the elderly and in patients taking thiazide diuretics. Caution should be exercised in introducing ARAs in those who have experienced angioedema with ACEIs.

+ The lowest doses of amlodipine and felodipine are particularly recommended in the elderly. Use only a long-acting nifedipine formulation.

<sup>∞</sup> Hydralazine is generally used only in combination with a thiazide diuretic and beta-blocker or verapamil, which prevent reflex tachycardia. Maintenance doses above 100mg daily are associated with increased risk of lupus like syndrome and should not be given without determining acetylator status of patient.

<sup>++</sup> Prazosin is no longer recommended as suitable for first-line antihypertensive therapy.

## When initial drug treatment fails (resistant hypertension) and for 'loss of control'

If blood pressure remains  $\geq 140/90$  mm Hg despite maximal doses of at least two appropriate agents after a reasonable period, consider:

- ♥ Underlying secondary hypertension.
- ♥ Intake of prohypertensive drugs (see page 11, particularly note NSAIDs and Cox 2 inhibitors) and/or dietary factors.
- ♥ Heavy alcohol consumption.
- ♥ Presence of 'white coat' hypertension.
- ♥ The possibility of blood pressure measurement artefacts e.g. inadequate cuff size.
- ♥ Non-compliance with therapy including recommended lifestyle modifications.
- ♥ Volume overload, especially with renal insufficiency.
- ♥ Resistance due to sleep apnoea.

Most classes of antihypertensive agents used as monotherapy lower blood pressure by a similar amount. However, the individual response to each agent is unpredictable. The majority of patients with hypertension will require more than one agent for optimal control.

Combination therapy achieves effective control in most patients. It is usually necessary only to use two drugs in combination, but occasionally three different drugs may be required to achieve optimal blood pressure control.

### Effective combinations include:

- ♥ Thiazide diuretic + beta-blocker (not recommended in people with diabetes).
- ♥ Thiazide diuretic + ACEI or ARA (particular role in the presence of heart failure).
- ♥ Beta-blocker + dihydropyridine CCB (particular role in the presence of coronary heart disease).
- ♥ ACEI or ARA + CCB (particular role in the presence of diabetes or lipid abnormalities).
- ♥ Beta-blocker + alpha-blocker.

### Caution should be exercised with the following combinations

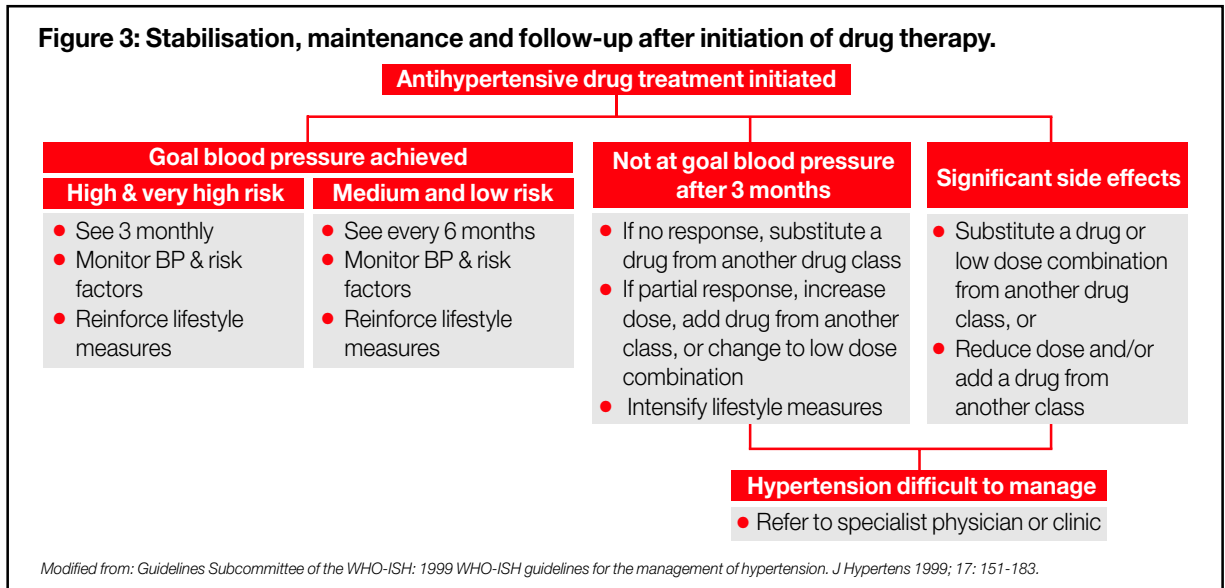
- ♥ ACEI or ARA + potassium sparing diuretic.
- ♥ Beta-blocker + verapamil or diltiazem.

### Patient compliance

Lack of compliance is a frequent problem. Strategies to address it include:

- ♥ Ensuring good communication between doctor and patient based on empathy and trust.
- ♥ Reassuring patient about prognosis and ability to lead a normal life.
- ♥ Involving the patient as a partner in all treatment decisions.
- ♥ Providing specific written instructions and patient education materials.
- ♥ Tailoring advice to each patient.
- ♥ Explaining any new symptoms and side effects.
- ♥ Assessing carefully the patient's quality of life.
- ♥ Reinforcing lifestyle modifications at follow-up visits.
- ♥ Using medication flow sheets and involving the patient's family in the therapeutic plan.
- ♥ Setting up a hypertension register and recall system for non-attendance at long term follow-up.
- ♥ Evaluating the social and economic barriers that affect medication supply and storage.
- ♥ Using compliance aids such as a 'dosette' box.
- ♥ Judicious use of home blood pressure monitoring – Note: equipment should be calibrated against doctor's usual sphygmomanometer. Refer to National Heart Foundation of Australia professional paper *Self-measurement of Blood Pressure* – at [www.heartfoundation.com.au](http://www.heartfoundation.com.au).

## Long term follow-up



♥ Once initiated, antihypertensive drug therapy is usually considered life-long. However, drug withdrawal or reduction may be considered where doubt exists about the diagnosis, or at the request of the patient. Suitable candidates for withdrawal of antihypertensive drugs are those not at high absolute risk for a cardiovascular event (i.e. no associated clinical conditions, target organ disease or other adverse cardiovascular disease risk factors), without comorbidity that necessitates such drug therapy, and in the goal range for blood pressure. Younger age, single antihypertensive drug therapy, lower pre-treatment blood pressure, and a willingness to accept or maintain lifestyle modifications such as salt restriction and loss of weight (where indicated) increase the chances of maintaining normotension post drug withdrawal. Such a patient should be willing to accept or continue behavioural change, blood pressure monitoring, and to restart drug therapy as blood pressure levels dictate. A reminder/recall system is mandatory as patients may revert to hypertension at any time. A reasonable regimen is weekly visits for two weeks, then fortnightly for two months, monthly visits for six months, and six monthly indefinitely.

- ♥ Keep good records of all treatments used and their outcomes.
- ♥ Use other drug therapies as appropriate to reduce cardiovascular disease risk:

**Diabetes:** Good diabetic control lowers cardiovascular risk.

**Cholesterol lowering therapy:** Lowering serum cholesterol reduces the risk of primary and secondary coronary heart disease (Refer to *Lipid Management Guidelines 2001* at [www.heartfoundation.com.au](http://www.heartfoundation.com.au)).

**Aspirin:** It is reasonable to use low dose aspirin in those patients with hypertension who have well controlled blood pressure, are at high or very high risk from coronary heart disease and are not particularly at risk of gastrointestinal or other bleeding. Aspirin is particularly indicated as a preventive measure in those patients who have already suffered a cerebrovascular event considered to be of ischaemic origin.

(Modified from Guidelines Subcommittee of the WHO-ISH: 1999 WHO-ISH guidelines for the management of hypertension. J Hypertens 1999, 17:151-183.)

## Process for developing these guidelines

These guidelines are an evolution of the Heart Foundation's 1999 guidelines. They have been developed using a consensus approach which involved an assessment of key Australian and International evidence-based clinical guidelines, scientific articles and trial data. This included an assessment of key international guidelines released during 2003 including the JNC-7 guidelines<sup>1</sup> and those produced by the European Society of Hypertension<sup>2</sup>.

The Heart Foundation's National Blood Pressure Advisory Committee developed early drafts. These were disseminated for comment to a wide range of hypertension, cardiovascular health and general practice experts and relevant professional organisations. The document was then reviewed and signed off by the Heart Foundation's Cardiovascular Health Advisory Committee and National Board.

The closure date for review of the evidence was end August 2003.

It is planned to review these guidelines by end 2007.

### **National Blood Pressure Advisory Committee**

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**Members:** Professor G Hankey  
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For full reference and contributor acknowledgement lists please go to **[www.heartfoundation.com.au](http://www.heartfoundation.com.au)**.

<sup>1</sup> The Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure. The JNC 7 Report. JAMA, May 21, 2003-Vol 289, No. 19.

<sup>2</sup> 2003 European Society of Hypertension – European Society of Cardiology guidelines for the management of arterial hypertension. Journal of Hypertension 2003; 21:1011-1053.

## About the Heart Foundation

The National Heart Foundation of Australia is a charity and the leading organisation in the fight against cardiovascular disease (heart, stroke and blood vessel disease) in Australia. As a charity we rely almost entirely on donations and gifts in wills from Australians to help us continue our lifesaving research and health promotion work.

The production of these guidelines have been made possible thanks to the generous support of the Australian community; and individuals who volunteer their time and knowledge on our expert advisory committees.

### **Heartline**

Heartline is the Heart Foundation's national telephone information service. Call **1300 36 27 87** (local call cost) during business hours for access to all our policies and guidelines for health professionals, as well as information on heart health and lifestyle issues for the general public. Please encourage your patients to call Heartline for heart health information enquiries.

Please note that Heartline is not an emergency, diagnostic or counselling service.

### **Heartsite**

The Heart Foundation's website provides you with access to all our latest policies and guidelines for health professionals as well as heart health and lifestyle information for the general public, cookbooks, and more. You'll also find the latest news and local events as well as information about how you can support the Heart Foundation.

Please visit **[www.heartfoundation.com.au](http://www.heartfoundation.com.au)**.

Heartline 1300 36 27 87

Heartsite [www.heartfoundation.com.au](http://www.heartfoundation.com.au)

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