

# Guide to management of hypertension 2008

Updated December 2010

This quick reference guide is derived from the National Heart Foundation of Australia *Guide to management of hypertension 2008*.<sup>1</sup> The full guideline and references are available at [www.heartfoundation.org.au/Professional\\_Information/Clinical\\_Practice/Hypertension](http://www.heartfoundation.org.au/Professional_Information/Clinical_Practice/Hypertension).

## Measuring blood pressure (BP)

Use the recommended technique at every BP reading to ensure accurate measurements and avoid common errors. Pay particular attention to the following:

- Measure BP with a regularly serviced mercury sphygmomanometer, or regularly validate your instrument against a mercury sphygmomanometer.
- At the patient's first BP assessment, measure BP on both arms. Thereafter, use the arm with the higher reading.
- In patients who may have orthostatic hypotension (e.g. the elderly, those with diabetes), measure BP in sitting position, and repeat after the patient has been standing for at least 2 minutes.

If possible, obtain BP measurements outside the clinic (by ambulatory BP monitoring or self-measurement), particularly for patients with any of the following:

- unusual variation between BP readings in the clinic
- suspected 'white coat hypertension' (e.g. clinic hypertension in a person without known cardiovascular risk factors)
- hypertension that is resistant to drug treatment
- suspected hypotensive episodes (e.g. in those who are elderly or have diabetes).

Interpret ambulatory BP profiles using standard reference values for daytime (awake), night-time (asleep) and 24-hour means.

See full guidelines for information on:

- choosing, calibrating and maintaining sphygmomanometers
- measuring BP accurately in the clinic
- ambulatory BP monitoring and self-measurement of BP.

## Diagnosis and classification of hypertension

The diagnosis of hypertension should be based on multiple BP measurements taken on separate occasions.

International definitions of hypertension vary. The suggested classification system used in this guideline was developed following an assessment of the systems used in the United States and Europe. Although the term 'hypertension' is potentially misleading because BP-related risk is a continuum with no defined lower cut-point, it has been retained in this guideline for practical reasons, on the understanding that individual cardiovascular risk assessment determines appropriate management in each patient.

Recheck BP regularly, at intervals determined by both BP category (**Table 1**) and absolute cardiovascular risk.

See full guidelines for information on:

- the correlation between BP and cardiovascular disease
- hypertension-related burden of disease
- the prevalence and significance of hypertension in Aboriginal and Torres Strait Islander peoples.

**Table 1.** Classification and follow-up of BP levels in adults

Diagnostic category*	Systolic (mmHg)	Diastolic (mmHg)	Follow up
Normal	< 120	< 80	<b>Recheck in 2 years</b> (or earlier as guided by patient's absolute cardiovascular risk). <sup>†</sup>
High-normal	120–139	80–89	<b>Recheck in 1 year</b> (or earlier as guided by patient's absolute cardiovascular risk). <sup>†</sup>
Grade 1 (mild) hypertension	140–159	90–99	<b>Confirm within 2 months.</b> See <i>When to intervene</i>
Grade 2 (moderate) hypertension	160–179	100–109	<b>Reassess or refer within 1 month.</b> See <i>When to intervene</i>
Grade 3 (severe) hypertension	≥ 180	≥ 110	<b>Reassess or refer within 1–7 days as necessary.</b> See <i>When to intervene</i>
Isolated systolic hypertension	≥ 140	< 90	<b>As for category corresponding to systolic BP.</b>
Isolated systolic hypertension with widened pulse pressure	≥ 160	≤ 70	<b>As for grade 3 hypertension.</b> <sup>‡</sup>

\* When a patient's systolic and diastolic BP levels fall into different categories, the higher diagnostic category and recommended action/s apply.

<sup>†</sup> See *Absolute cardiovascular risk assessment in hypertension management*

<sup>‡</sup> In middle-aged and elderly patients with cardiovascular risk factors or associated clinical conditions, isolated systolic hypertension with large pulse pressure indicates high absolute risk for cardiovascular disease.<sup>2</sup>

## Evaluation in patients with confirmed hypertension

In all patients with hypertension, perform a clinical assessment (including a careful history, physical examination, initial investigations and further investigations as required) in order to:

- identify all cardiovascular risk factors
- detect end-organ damage and related or comorbid clinical conditions (**Table 2**)
- identify causes of secondary hypertension.

If secondary hypertension is suspected, consider specialist referral.

Assess absolute cardiovascular risk in all patients with hypertension in order to determine the optimal management plan.

Available absolute risk calculators may significantly underestimate cardiovascular risk in Aboriginal, Torres Strait Islander, Maori, and Pacific Islander peoples.

See full guidelines for information on history, physical examination, initial investigations and further investigations.

## Absolute cardiovascular risk assessment in hypertension management

Numerical absolute cardiovascular risk assessment is now recommended for all Australians aged 45–74 (Aboriginal and Torres Strait Islander adults aged 35 years and older) who are not already known to be at high risk, whether or not they have hypertension.

The management of hypertension should be based on a thorough clinical assessment that includes an estimate of the patient's absolute risk for cardiovascular disease, as well as BP levels and

other clinical investigations. Assessment of absolute cardiovascular risk helps both doctor and patient understand the individual's overall risk profile and the potential benefit of preventive interventions.

Patients who need immediate antihypertensive drug treatment include (but are not restricted to) those at high absolute cardiovascular risk (> 15% probability of a cardiovascular event within the next 5 years).

**High cardiovascular risk can be assumed for the following groups of patients without using the risk calculator:**

### **Group A. Patients aged 75 years and over**

For almost all individuals aged  $\geq 75$  years, the absolute risk of a cardiovascular event in the next 5 years is > 15%.

### **Group B. Patients with existing cardiovascular disease**

Assume risk of cardiovascular event > 15% in the next 5 years if either of following is present:

- symptomatic cardiovascular disease (e.g. angina, myocardial infarction, chronic

heart failure, stroke, transient ischaemic attack, peripheral vascular disease)

- left ventricular hypertrophy diagnosed with electrocardiography or echocardiography.

### **Group C. Patients with associated clinical conditions and/or end-organ disease (see Table 2)**

For this group, assume risk of cardiovascular event > 15% in the next 5 years. Antihypertensive drug treatment is required (e.g. to preserve renal function).

**For all other patients, estimate absolute risk using the chart (Figure 1).**

**Table 2.** Associated clinical conditions and end-organ disease\*

Associated clinical conditions	
Diabetes	In either of the following: <ul style="list-style-type: none"> <li>adults with diabetes aged &gt; 60 years</li> <li>adults with diabetes and microalbuminuria (&gt; 20 µg/min or urinary albumin:creatinine ratio &gt; 2.5 mg/mmol (males), &gt; 3.5 mg/mmol (females))</li> </ul>
Cerebrovascular disease	<ul style="list-style-type: none"> <li>Ischaemic stroke</li> <li>Cerebral haemorrhage</li> <li>Transient ischaemic attack</li> </ul>
Coronary heart disease	<ul style="list-style-type: none"> <li>Myocardial infarction</li> <li>Angina</li> <li>Coronary revascularisation</li> </ul>
Chronic heart failure	
Chronic kidney disease	<ul style="list-style-type: none"> <li>Diabetic nephropathy</li> <li>Glomerulonephritis</li> <li>Hypertensive kidney disease</li> </ul>
Aortic disease	<ul style="list-style-type: none"> <li>Dissecting aneurysm</li> <li>Fusiform aortic aneurysm</li> </ul>
Peripheral arterial disease	(clinical diagnosis or ABI < 0.9)
Hypercholesterolaemia	Serum total cholesterol > 7.5 mmol/L
Family history of:	Premature cardiovascular disease
Previous diagnosis of:	Familial hypercholesterolaemia
End-organ disease	
Left ventricular hypertrophy	(diagnosed by electrocardiogram, echocardiogram)
Microalbuminuria	Defined as either of following: <ul style="list-style-type: none"> <li>albumin:creatinine ratio ≥ 2.0 mg/mmol (males) or ≥ 2.5 mg/mmol (females) on spot urine screening test<sup>†</sup></li> <li>24-hour urinary albumin excretion rate ≥ 20 µg/minute</li> </ul>
Chronic kidney disease	Presence of either of the following: <ul style="list-style-type: none"> <li>Proteinuria defined as either protein/creatinine ratio ≥ 30 mg/mmol<sup>†</sup> on spot urine test or urine protein &gt; 300 mg/day on timed urine sample</li> <li>Glomerular filtration rate (eGFR)<sup>‡</sup> &lt; 60 mL/minute/1.73m<sup>2</sup></li> </ul>
Vascular disease	<ul style="list-style-type: none"> <li>Atherosclerotic plaque (aorta, carotid, coronary, femoral and iliac arteries) evident on ultrasound or radiology</li> <li>Hypertensive retinopathy (grade II or greater)</li> </ul>

\* Conditions that warrant immediate treatment with antihypertensive drugs, regardless of BP or overall cardiovascular risk profile

† Value for ratio where albumin or total protein is measured in milligrams per litre and creatinine is measured in millimoles per litre. Reference range will differ where laboratories report creatinine level expressed in micromoles per litre.

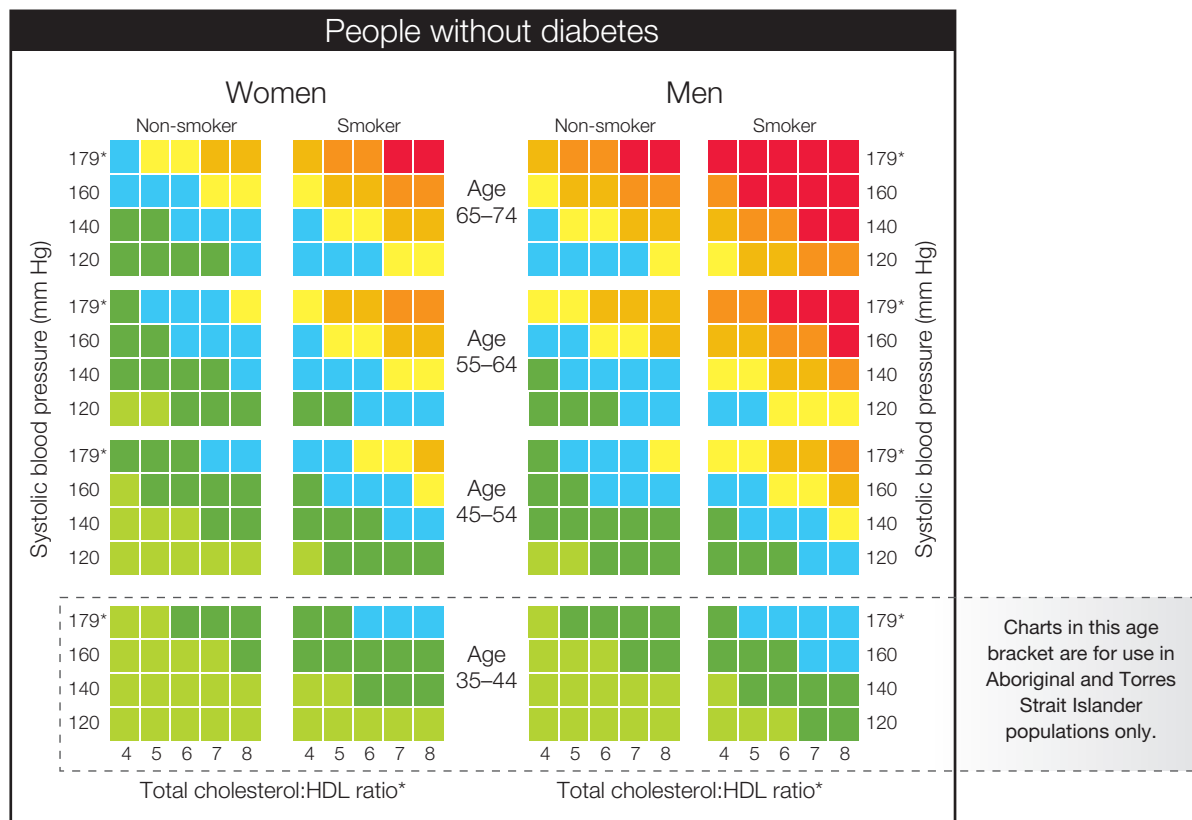
‡ Estimated glomerular filtration rate obtained using the Modification of Diet in Renal Disease (MDRD) study GFR equation (used by most pathology laboratories and routinely reported with serum creatinine in adults). This method is generally accurate for GFR below 60 mL/min/1.73m<sup>2</sup>. Studies are underway to validate this in Aboriginal and Torres Strait Islander populations.

# Australian cardiovascular risk charts

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Open this fold out spread to view the Australian cardiovascular risk charts

**Figure 1.** Australian cardiovascular risk charts



\*In accordance with Australian guidelines, patients with systolic blood pressure  $\geq 180$  mm Hg, or a total cholesterol of  $> 7.5$  mmol/L, should be considered at increased absolute risk of CVD.

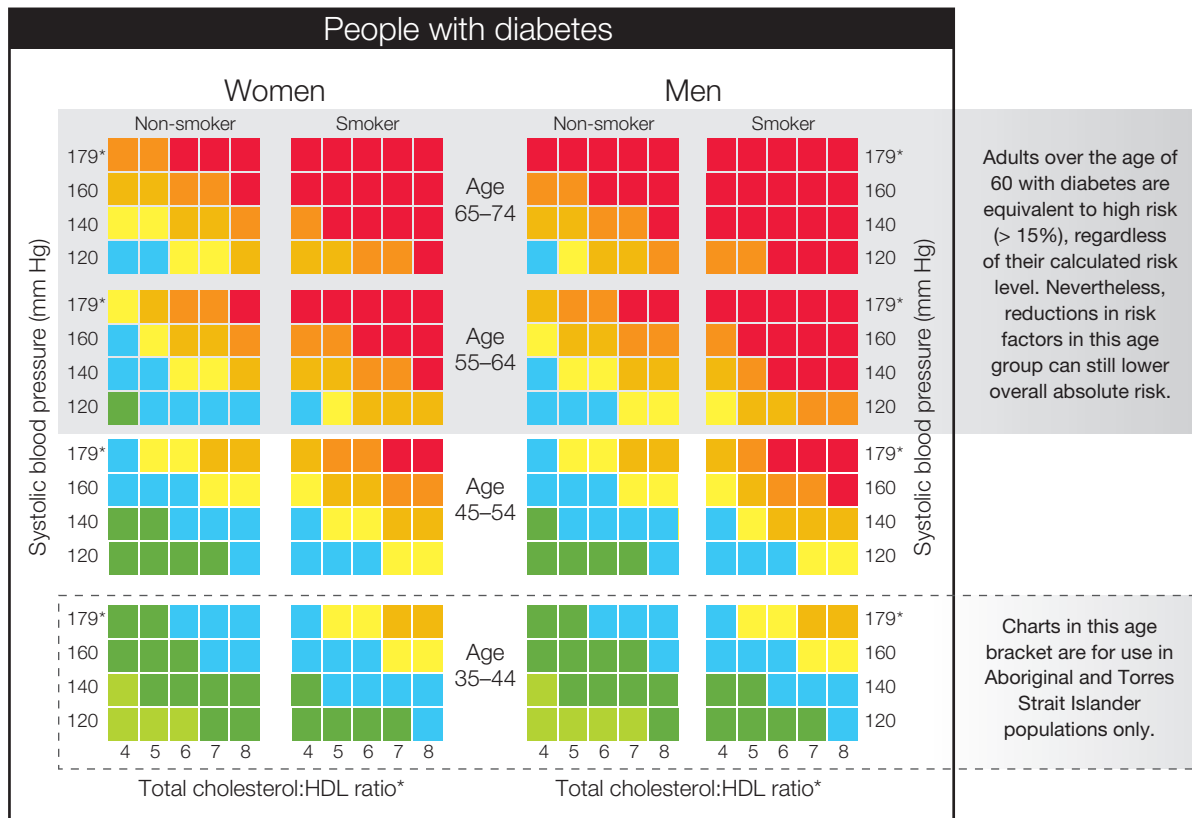
Risk level for 5-year cardiovascular (CVD) risk

High risk	Moderate risk	Low risk
<span style="color: red;">■</span> $\geq 30\%$	<span style="color: blue;">■</span> 10–15%	<span style="color: green;">■</span> 5–9%
<span style="color: orange;">■</span> 25–29%		<span style="color: lightgreen;">■</span> $< 5\%$
<span style="color: yellow;">■</span> 20–24%		
<span style="color: lightyellow;">■</span> 16–19%		

## How to use the risk charts

- Identify the table relating to the person's diabetes status, sex, smoking history and age. 'Smoker' is defined as either current daily cigarette smoker or former smoker who has quit within the previous 12 months. The charts should be used for all adults aged 45–74 years (and all Aboriginal and Torres Strait Islander adults aged 35 years and older) without known history of CVD or already known to be at high risk.
- Within the chart, choose the cell nearest to the person's age, systolic blood pressure (SBP) and total cholesterol (TC):HDL ratio. For example, the lower left cell contains all non-smokers without diabetes who are 35–44 years and have a TC:HDL ratio of less than 4.5 and a SBP of less than 130 mm Hg.
  - SBP (mean of two readings on two occasions).
  - Total cholesterol/high-density lipoprotein cholesterol (HDL-C) ratio (ensure correct ratio is used).
- The colour of the cell that the person falls into provides their 5-year absolute cardiovascular risk level (see legend above for risk category). For people who fall exactly on a threshold between cells, use the cell corresponding to higher risk. The risk calculator may underestimate cardiovascular risk in these groups:
  - Aboriginal and Torres Strait Islander adults
  - adults with diabetes aged 60 years or less
  - adults who are overweight or obese
  - socioeconomically deprived groups.

**Figure 1.** Australian cardiovascular risk charts (*continued*)



\*In accordance with Australian guidelines, patients with systolic blood pressure  $\geq 180$  mm Hg, or a total cholesterol of  $> 7.5$  mmol/L, should be considered at increased absolute risk of CVD.

**Risk level for 5-year cardiovascular (CVD) risk**

High risk	Moderate risk	Low risk
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<span style="color: orange;">■</span> 25–29%		<span style="color: lightgreen;">■</span> < 5%
<span style="color: yellow;">■</span> 20–24%		
<span style="color: lightyellow;">■</span> 16–19%		

**Notes:** The risk charts include values for SBP alone, as this is the most informative of conventionally measured blood pressure parameters for cardiovascular risk.

CVD refers collectively to coronary heart disease (CHD), stroke and other vascular disease including peripheral arterial disease and renovascular disease.

Charts are based on the NVDPA's *Guidelines for the assessment of absolute cardiovascular disease risk* and adapted with permission from New Zealand Guidelines Group. *New Zealand Cardiovascular Guidelines Handbook: A Summary Resource for Primary Care Practitioners*. Second edition. Wellington, NZ: 2009. [www.nzgg.org.nz](http://www.nzgg.org.nz).

## When to intervene in patients with confirmed hypertension

The decision to intervene and the development of a comprehensive management plan (including lifestyle advice and drug treatment) should be based on a thorough clinical investigation to identify associated clinical conditions and/or end-organ damage and assessment of absolute cardiovascular risk.

Advise lifestyle risk reduction for all patients, especially those with high-normal BP or hypertension.

Initiate antihypertensive drug treatment immediately in patients with any of the following (**Figure 2**):

- grade 3 hypertension or isolated systolic hypertension with widened pulse pressure (SBP  $\geq$  160 mmHg and DBP  $\leq$  70 mmHg)

- associated conditions or evidence of end-organ damage (regardless of BP)
- high absolute risk of cardiovascular disease, based on the presence of markers of high risk or as estimated using a risk calculator.

Also consider drug therapy for:

- patients with moderate risk of cardiovascular disease as estimated using a risk calculator
- Aboriginal and Torres Strait Islander adults.

Explain the health implications of current risk and the potential benefits of the recommended treatment.

Early initiation of antihypertensive drug therapy and intensive management of all identified cardiovascular risk factors is recommended in Aboriginal and Torres Strait Islander adults with hypertension.

Treatment targets (**Table 3**) are now generally lower than previously recommended, particularly in patients with high risk for cardiovascular disease, because lower BP targets have been associated with lower achieved BP levels and better outcomes in clinical trials and clinical outcomes were insufficiently improved under previous recommendations.

**Table 3.** Treatment targets in adults

Patient group	Target (mmHg)
People with proteinuria $>1$ g/day (with or without diabetes)	$< 125/75$
People with associated condition/s or end-organ damage: <sup>*</sup> <ul style="list-style-type: none"> <li>• Coronary heart disease</li> <li>• Diabetes</li> <li>• Chronic kidney disease</li> <li>• Proteinuria (<math>&gt; 300</math> mg/day)</li> <li>• Stroke/TIA</li> </ul>	$< 130/80$
People with none of the following: <ul style="list-style-type: none"> <li>• Coronary heart disease</li> <li>• Diabetes</li> <li>• Chronic kidney disease</li> <li>• Proteinuria (<math>&gt; 300</math> mg/day)</li> <li>• Stroke/TIA</li> </ul>	$< 140/90$ or lower if tolerated

\* Specific lower BP targets have not been established for other high-risk groups (e.g. those with peripheral arterial disease, those with familial hypercholesterolaemia or those at high absolute risk of cardiovascular disease) due to the current lack of evidence from clinical trials. Targets will be set when evidence becomes available.



**Figure 2.** When to initiate blood pressure-lowering drug treatment



BP: blood pressure; SBP: systolic BP, DBP: diastolic BP

\* For Aboriginal and Torres Strait Islander adults, consider managing as though at a higher risk level.

† e.g. diabetes (strict glycaemic control lowers cardiovascular risk); lipid disorders (cholesterol-lowering therapy reduces the risk of primary and secondary coronary events – Refer to National Heart Foundation of Australia and the Cardiac Society of Australia and New Zealand. Position statement on lipid management—2005 (available at [www.heartfoundation.org.au](http://www.heartfoundation.org.au)).

‡ Continue lifestyle modification, monitor BP and reassess absolute cardiovascular risk regularly. Note that patients with mild hypertension will require antihypertensive drug treatment if their absolute risk of cardiovascular disease is elevated due to changes in other risk factors.

## Lifestyle modification

Manage identified lifestyle risk factors in all patients, whether or not BP is elevated.

Advise patients to aim for healthy targets:

- At least 30 minutes of moderate-intensity physical activity on most, if not all, days of the week (daily total can be accumulated e.g. three 10-minute sessions). Advise patients of all ages to become more active.
- Smoking cessation. Refer patients to Quitline. Consider recommending nicotine replacement therapy and/or prescribing oral therapy (bupropion or varenicline) in patients who smoke more than 10 cigarettes per day and have no contraindications.
- Waist measurement < 94 cm for men and < 80 cm for women, body mass index (BMI) < 25 kg/m<sup>2</sup>. When recommending weight loss, advise patients how to reduce kilojoule intake as well as increase physical activity.
- Dietary salt restriction: ≤ 4 g/day (65 mmol/day sodium). Recommend low-salt and reduced-salt foods as part of a healthy eating pattern.
- Limited alcohol intake: ≤ two standard drinks per day for men or ≤ one standard drink per day for women.

See full guidelines for more information on lifestyle modification.

## Drug treatment

### Initiating drug therapy

For all major antihypertensive drug classes, the beneficial effect is mainly due to BP lowering, irrespective of their mechanism of action. In uncomplicated hypertension, the following classes of antihypertensive agents are equally effective for first-line use, both in initial and maintenance therapy (**Figure 3**):

- angiotensin-converting enzyme (ACE) inhibitors (or angiotensin II receptor antagonists)\*
- dihydropyridine calcium channel blockers
- low-dose thiazide diuretics (suitable for patients aged 65 years and older).

Thiazide diuretics have been associated with increased risk of new-onset diabetes and should be used with caution in patients with glucose intolerance and/or metabolic syndrome.<sup>4</sup> The use of thiazide diuretics as first-line therapy should be limited to older patients, in whom the benefits of managing isolated systolic hypertension and preventing stroke with these agents are likely to outweigh the risk of diabetes onset.

Beta-blockers are no longer recommended as first-line therapy in uncomplicated hypertension because of the increased risk of developing diabetes and the recently described trend towards worse outcomes in patients treated with beta-blockers (mainly atenolol) compared with those treated with other classes of antihypertensive drugs.<sup>5</sup>

For patients with stable, well-controlled hypertension who are already taking a beta-blocker, it is reasonable to continue the regimen unchanged.

For patients with uncomplicated hypertension, begin antihypertensive monotherapy with any of these agents:

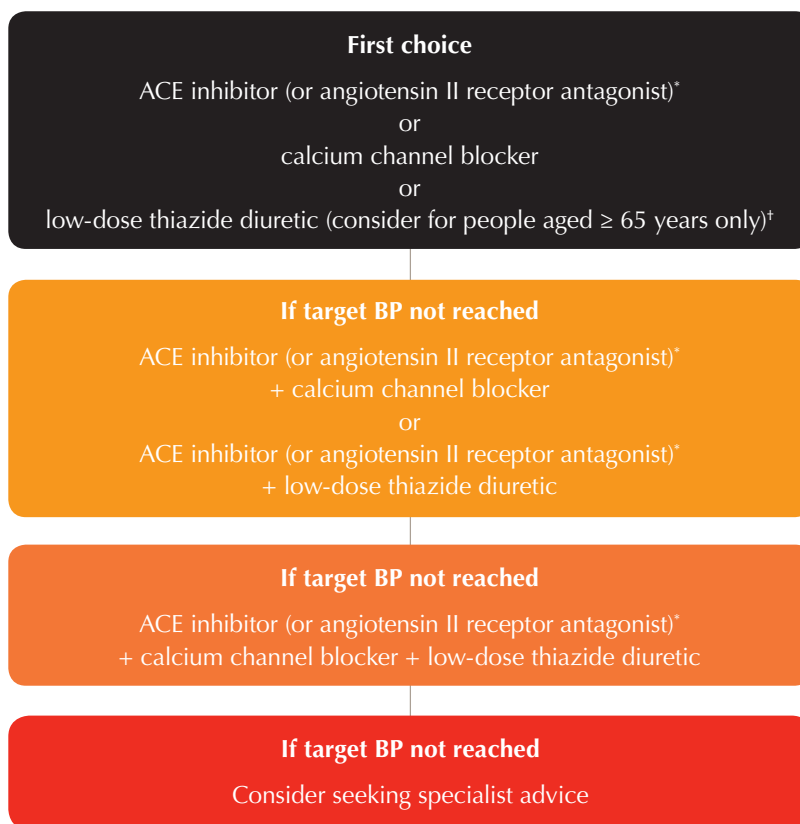
- ACE inhibitors (or angiotensin II receptor antagonists)
- calcium channel blockers
- thiazide diuretics (consider for patients 65 years or older only).

For patients with comorbid or associated conditions, consider:

- the benefits, contraindications and cautions associated with specific agents
- potential drug–drug interactions.

Begin antihypertensive therapy with the lowest recommended dose.

**Figure 3.** Initiating drug treatment for newly diagnosed hypertension



\* ACE inhibitors and angiotensin II receptor antagonists have been shown to be equally efficacious in prevention of cardiovascular end points, and in lowering BP.<sup>6,7,8</sup>

† Thiazide diuretics are not recommended for younger patients due to risk of diabetes associated with long-term use.<sup>4</sup>

The initial drug choice should be based on:

- the patient's age
- the presence of associated clinical conditions or end-organ damage (**Table 2**)
- the presence of other co-existing conditions that either favour or limit the use of particular drug classes (see full guidelines for more information on the choice of antihypertensive agent in patients with comorbid and associated conditions)
- potential interactions with other drugs
- implications for adherence (see full guidelines for more information on strategies for maximising adherence to the management plan)
- cost.

Most classes of antihypertensive agents used as monotherapy lower BP by a similar average amount. However, the individual response to each agent is unpredictable.

See full guidelines for information on:

- treatment considerations in patients with other cardiovascular conditions (stroke, chronic heart failure)
- managing hypertension in pregnant women.

## How to achieve target BP

For all patients, arrange regular follow-up to reassess drug treatment and adjust the management plan to achieve targets for BP and other modifiable risk factors (**Figure 4**).

If the initial agent is not tolerated, change to a drug of a different class.

If target BP is not achieved, add a second low-dose agent from a different pharmacological class (see recommended combinations) before increasing doses. If target is not achieved and both drugs are well tolerated, increase dose/s.

Use up to four antihypertensive drugs in combination, if necessary to achieve target.

Avoid these combinations:

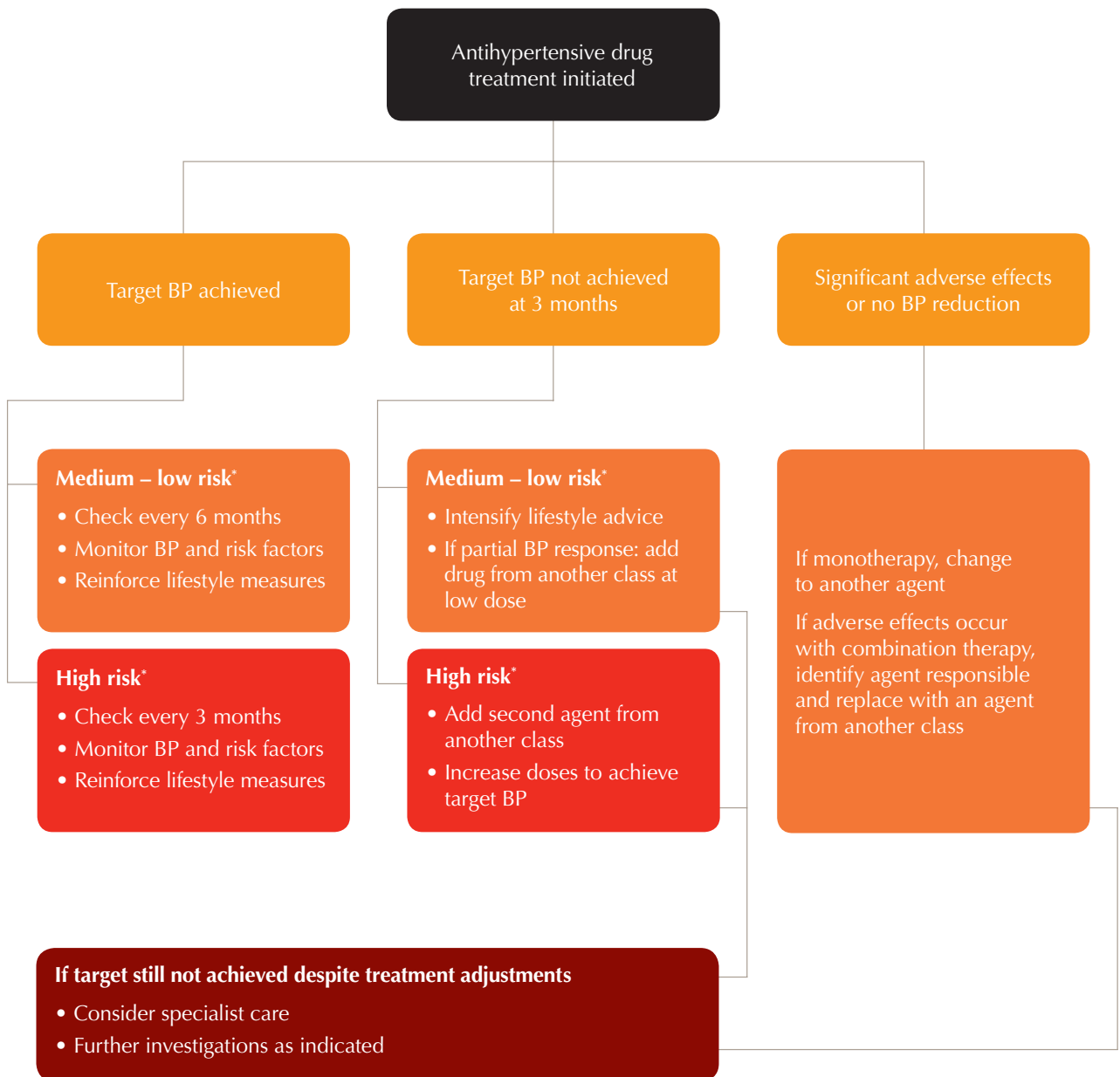
- ACE inhibitor (or angiotensin II receptor antagonist) plus potassium-sparing diuretic
- beta-blocker plus verapamil
- ACE inhibitor plus angiotensin II receptor antagonist.

Trial each regimen change for at least 6 weeks.

Attempt to reach recommended targets (**Table 3**). There is a direct linear relationship between BP and cardiovascular risk across the continuum of BP levels normally seen in clinical practice; lower BP levels have been associated with the strongest benefits.

Combination drug therapy will often be required to reach targets. Even if targets are not met, patients are likely to benefit from any BP reduction achieved.

**Figure 4.** Stabilisation, maintenance and follow-up after initiation of antihypertensive drug therapy



\* Absolute cardiovascular risk assessed clinically and/or numerically (**Figure 1**)

### Treating to BP target

- Start with the lowest recommended dose of selected first-line agent (see full guidelines for information on recommended doses for antihypertensive drugs).
  - If the initial drug is not well tolerated, change to a drug of a different class, starting with the smallest recommended dose.
  - If target BP not reached or there is no significant reduction with initial monotherapy, add a second agent from a different pharmacological class at a low dose, rather than increasing the dose of the first agent. This approach maximises antihypertensive efficacy while minimising adverse effects, and is recommended pending further evidence clarifying the role of fixed-combination regimens.
  - If BP is still above target and both antihypertensive agents have been well tolerated, increase the dose of one agent (other than a thiazide diuretic) incrementally to maximal recommended dose before increasing the dose of the other agent.
  - Trial each dose regimen for at least 6 weeks before altering doses, because a stable response to a particular dose takes at least 3–4 weeks.
- Choose long-acting drugs to provide 24-hour efficacy with once daily administration.
  - Once a combination regimen is established as long-term therapy, it may be more convenient for the patient to use a combined preparation (e.g. ACE inhibitors/thiazide diuretics, angiotensin II receptor antagonists/thiazide diuretics, ACE inhibitors/calcium channel blockers).
  - Encourage full adherence to medications (see full guidelines for more information) and assess adherence regularly.
  - Targets may be difficult to achieve or may not be tolerated in some patients (e.g. the very elderly, those with a superimposed 'white-coat' effect or those with critical carotid stenosis).

### Combination therapy

An estimated 50–75% of patients with hypertension will not achieve BP targets with monotherapy.<sup>9</sup> For most patients, a combination of antihypertensive drugs from two or more pharmacological classes is needed. Occasionally a combination of more than three antihypertensive drugs may be required to achieve adequate BP control.

### Based on the best available evidence, the most effective combination is:

ACE inhibitor or angiotensin II receptor antagonist*	<b>plus</b>	calcium channel blocker	<i>(particular role in the presence of diabetes or lipid abnormalities)<sup>10</sup></i>
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### Other effective combinations include:

ACE inhibitor or angiotensin II receptor antagonist*	<b>plus</b>	thiazide diuretic	<i>(particular role in the presence of heart failure or post stroke)</i>
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ACE inhibitor or angiotensin II receptor antagonist*	<b>plus</b>	beta-blocker	<i>(recommended post myocardial infarction or in people with heart failure)</i>
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beta-blocker	<b>plus</b>	dihydropyridine calcium channel blocker	<i>(particular role in the presence of coronary heart disease)</i>
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thiazide diuretic	<b>plus</b>	calcium channel blocker	
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thiazide diuretic	<b>plus</b>	beta-blocker	<i>(not recommended in people with glucose intolerance, metabolic syndrome, or established diabetes)</i>
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### Avoid the following combinations:

ACE inhibitor or angiotensin II receptor antagonist	<b>plus</b>	potassium-sparing diuretic	<i>(due to risk of hyperkalaemia)</i>
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verapamil	<b>plus</b>	beta-blocker	<i>(due to risk of heart block)</i>
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ACE inhibitor	<b>plus</b>	angiotensin II receptor antagonist	<i>(in a large trial<sup>6</sup> combination therapy did not reduce cardiovascular death or morbidity in patients with vascular disease or diabetes, but increased the risk of hypotensive symptoms, syncope and renal dysfunction)<sup>†</sup></i>
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\* ACE inhibitors and angiotensin II receptor antagonists have been shown to be equally efficacious in prevention of combined end points of cardiovascular disease death, myocardial infarction, stroke and heart failure admissions in patients at high risk due to past cardiovascular events.<sup>6</sup>

† Combination therapy reduces proteinuria. Trials to determine the effect of combination therapy on progression of renal disease in subjects with proteinuria are underway.<sup>11</sup>

## Managing inadequate response to treatment

If BP remains elevated despite maximal doses of at least two appropriate agents, reassess for:

- non-adherence
- undiagnosed secondary hypertension
- hypertensive effects of other drugs
- treatment resistance due to sleep apnoea
- undisclosed use of alcohol or recreational drugs
- unrecognised high salt intake (particularly in patients taking ACE inhibitors or angiotensin II receptor antagonists)
- 'white coat' hypertension
- technical factors affecting measurement
- volume overload, especially chronic kidney disease.

Failure of response to initial therapy or loss of initial BP control occurs due to a wide range of prescriber-related, patient-related and drug-related factors.

First, check that treatment has followed recommended prescribing guidelines for achieving BP targets. If BP remains above target despite maximal doses of at least two appropriate agents after a reasonable period, consider the potential explanations listed above.

See full guidelines for more information on causes of treatment resistance, including medications that may increase BP.

In some patients (e.g. the very elderly), recommended target levels may not be tolerable or achievable. In this case, comorbidities and individual cardiovascular risks should be considered when planning management.

## Long-term management

Arrange recall and annual review for people with hypertension to ensure early detection of end-organ damage.

Once initiated, antihypertensive drug therapy is usually considered life-long unless the diagnosis is in doubt or the patient requests a trial cessation of treatment.

Withdrawal of antihypertensive drug therapy should not be attempted in patients at high absolute risk for a cardiovascular event, e.g. those with associated clinical conditions (stroke, diabetes or chronic kidney disease), end-organ disease or other adverse cardiovascular disease risk factors. Withdrawal of antihypertensive drugs may be appropriate in patients who have achieved BP targets with low doses and agree to:

- continue behaviours to reduce lifestyle risk factors
- undergo regular BP monitoring
- restart drug therapy if BP increases.

A practice register is recommended to assist in the monitoring of patients with hypertension.

Factors associated with successful maintenance of normotension after ceasing antihypertensive medication include younger age, single antihypertensive drug therapy, lower pre-treatment BP, and a willingness to accept or maintain lifestyle modifications such as salt restriction and loss of weight (where indicated).



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The full guideline from which this quick reference guide is derived has been endorsed by:



Suggested citation:

National Heart Foundation of Australia (National Blood Pressure and Vascular Disease Advisory Committee). Guide to management of hypertension 2008. Quick reference guide for health professionals. Updated December 2010.

© 2008–2010 National Heart Foundation of Australia ABN 98 008 419 761

ISBN: 978-1-921748-15-8

PRO-104.01 5th edition December 2010 IPM 12/10

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