Hypertension

Disclaimer

COVID-19 note

Medication

Patients should continue to take ACE inhibitors and angiotensin-II receptor antagonists as part of optimal management of heart failure during the COVID-19 pandemic. For more details, see Medicines and COVID-19.

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Red Flags

- Hypertensive emergency (blood pressure > 200/140 mmHg)
- Severe hypertension (systolic > 180 mmHg) with symptoms, e.g. headache, visual disturbance, confusion, seizure, proteinuria
- Pre-eclampsia with uncontrolled severe hypertension

Background – About Hypertension

- Hypertension is common in Australia, affecting 1 in 3 adults and almost 90% of patients aged > 85.
- High blood pressure is an important contributor to cardiovascular disease.
- End-organ damage and other clinical outcomes are more closely associated with ambulatory blood pressure than in-practice or casual blood pressure measurements.
- Diagnosis of hypertension is important because treatment is typically life-long.
- Treatment decisions need to be individualised for each patient and based on an assessment of overall cardiovascular risk.
- Consider secondary causes (< 5% of all cases) especially in the younger age group, including:
  - hyperthyroidism
  - primary aldosteronism, renal disease, and renal artery stenosis
  - Cushing’s syndrome
  - phaeochromocytoma
  - obstructive sleep apnoea
  - recreational drug use.

Assessment

Practice Point

Avoid over-diagnosis

In the absence of end-organ damage, do not diagnose mild hypertension before several visits and measurements.

1. Take history. Look for symptoms of high blood pressure and contributing factors, including salt and alcohol intake, obstructive sleep apnoea, obesity, and family history of hypertension in first degree relatives.

   Symptoms
   - Usually asymptomatic. It is a common misconception that high blood pressure is associated with symptoms such as headache, neck pain, epistaxis, or restlessness.
   - Severe hypertension (>180/110) can be associated with symptoms such as headaches, confusion, blurred vision, reduced level of consciousness, and seizures.
   - Consider if antihypertensive treatment may be causing symptoms that the patient is attributing to high blood pressure.
2. Check for *medications and substances* associated with hypertension, intolerance to any antihypertensive medication, and non-adherence.

**Medications and substances**

*Medications:*
- NSAIDs
- Stimulants (*dexamphetamine, modafinil*)
- Oestrogen-containing contraceptives and HRT
- Corticosteroids
- SNRIs and monoamine oxidase inhibitors
- Clozapine
- Bupropion
- Decongestants
- Diet pills

*Substances:*
- Excessive alcohol consumption
- Liquorice
- Caffeine pills and products
- Energy drinks and guarana
- Cocaine and amphetamine

3. If *white coat* or *masked hypertension* suspected, consider ambulatory blood pressure monitoring.

**White coat hypertension**
- Elevated in-practice blood pressure measurements with normal home or ambulatory blood pressures.
- Affects 10 to 20% of the general population.
- Associated with increased risk for developing true hypertension and impaired glucose tolerance.
- Consider in patients with wide discrepancy between in-practice and home blood pressures, a long history of hypertension without end-organ damage, and in patients with symptoms of hypotension after starting treatment.

**Masked hypertension**
- Normal in-practice blood pressure measurements with consistently elevated ambulatory blood pressure readings.
- Affects 10% of the general population.
- Consider in patients with normal in-practice blood pressures with evidence of end-organ damage.

4. Measure blood pressure using *practice-based, ambulatory, or home measurements* (ask about home monitoring). Note that atrial fibrillation may interfere with automated devices. See American College of Cardiology/American Heart Association – [Checklist for Accurate Measurement of BP](#).

**In-practice measurement**

*Cuff use:*
- Use an appropriate size – if in doubt use a larger cuff.
- Place at heart level.

*Automated measurements:*
- Use a [monitor validated for clinical use](#) (subscription required).
- Use an appropriate cuff size – if in doubt use a larger cuff.
• The cuff should be at heart level.
• Before measuring, ask patient to rest alone for 5 minutes in a quiet room.
• Take three measurements. Discard the first and average the second and third readings.

Manual measurements:
• Use to confirm extremes of blood pressure or when automated readings are unsuccessful.
• Identify systolic pressure first by palpation, then confirm by auscultation.
• Diastolic pressure is defined by the disappearance of sound (Korotkoff phase V).

**Ambulatory blood pressure monitoring**
• Patients wear a [portable blood pressure monitor](https://www.nationalhealthcaregroup.com) for 24 hours and measurements are taken regularly during that time.
• Reporting and interpretation is not standardised although [guidelines](https://www.nationalheartfoundation.org.au) exist.
• No MBS rebate for this test and patient will have some out-of-pocket costs.

**Home blood pressure monitoring**
• Check patients use a [monitor validated for home use](https://www.nationalheartfoundation.org.au) and an appropriate cuff size. Most other home-based methods are not considered accurate enough e.g., finger or wrist cuffs, smart-phone apps, or non-validated monitors.
• Measurements should be taken in a structured way:
  o Morning measurements:
    ▪ Before medications
    ▪ After sitting for 5 minutes following taking medications
  o Evening measurements:
    ▪ After sitting for 5 minutes following taking medications
    ▪ Before retiring
  o Take 2 consecutive measurements, 1 minute apart.
• Record values with notes about obvious confounders, such as drinking coffee before measurement.
• Give patient Heart Foundation – [Measuring Your Blood Pressure At Home](https://www.nationalheartfoundation.org.au) information sheet.

5. **Classify** the blood pressure (BP) based on practice-based readings. The definition of hypertension is lower for **home or ambulatory** readings.

**Classification**

<table>
<thead>
<tr>
<th>Category</th>
<th>Systolic</th>
<th>Diastolic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Optimal</td>
<td>&lt; 120</td>
<td>and</td>
</tr>
<tr>
<td>Normal</td>
<td>120 to 129</td>
<td>and/or</td>
</tr>
<tr>
<td>High normal</td>
<td>130 to 139</td>
<td>and/or</td>
</tr>
<tr>
<td>Grade 1 hypertension</td>
<td>140 to 159</td>
<td>and/or</td>
</tr>
<tr>
<td>Grade 2 hypertension</td>
<td>160 to 179</td>
<td>and/or</td>
</tr>
<tr>
<td>Grade 3 hypertension</td>
<td>≥ 180</td>
<td>and/or</td>
</tr>
<tr>
<td>Isolated systolic hypertension</td>
<td>≥ 140</td>
<td>and</td>
</tr>
</tbody>
</table>

Source: Adapted from National Heart Foundation of Australia – [Classification of Clinic Blood Pressure Levels in Adults](https://www.nationalheartfoundation.org.au).
**Definition of hypertension for out-of-practice readings**

<table>
<thead>
<tr>
<th>Category</th>
<th>Systolic BP (mmHg)</th>
<th>Diastolic BP (mmHg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>In-practice BP</td>
<td>≥ 140</td>
<td>and/or</td>
</tr>
<tr>
<td>Ambulatory BP:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Daytime (or awake)</td>
<td>≥ 135</td>
<td>and/or</td>
</tr>
<tr>
<td>Night-time (or asleep)</td>
<td>≥ 120</td>
<td>and/or</td>
</tr>
<tr>
<td>Over 24 hours</td>
<td>≥ 130</td>
<td>and/or</td>
</tr>
<tr>
<td>Home BP</td>
<td>≥ 135</td>
<td>and/or</td>
</tr>
</tbody>
</table>

Source: Adapted from National Heart Foundation of Australia – *Criteria for Diagnosis of Hypertension Using Different Methods of Blood Pressure Measurement*.

**If hypertension confirmed**

1. Check for other cardiovascular **risk factors**, diabetes, and symptomatic **cardiovascular or renal disease**.

**Risk factors**
- Male
- Increasing age
- Smoking
- Dyslipidaemia
- Impaired fasting glycaemia or abnormal glucose tolerance test
- Diabetes
- Obesity (BMI ≥ 30)
- Family history of premature cardiovascular disease in men aged < 55 years, or women aged < 65 years

**Cardiovascular or renal disease**
- Stroke or transient ischaemic attack
- Coronary heart disease, including angina and previous coronary artery bypass grafting (CABG) or percutaneous coronary intervention (PCI)
- Heart failure, including heart failure with preserved ejection fraction (EF)
- Peripheral vascular disease
- Chronic kidney disease with eGFR < 45 mL/min/1.73m²
- Macroalbuminuria (urinary albumin creatinine ratio (ACR) > 25 mg/mmol for males and > 35 mg/mmol for females)
- Advanced retinopathy

Calculate **absolute cardiovascular disease risk**.

2. Identify **possible organ damage** by cardiovascular examination, kidney health check and ECG and/or echocardiography:

**Possible organ damage**
- Arrhythmias especially atrial fibrillation
- Left ventricular hypertrophy
- Carotid wall thickening or plaque
- Peripheral vascular disease
• Chronic kidney disease (CKD)
• Microalbuminuria

**Cardiovascular examination**
• Carotid bruits
• Left ventricular enlargement
• Renal or abdominal bruits
• Absent peripheral pulses in the lower limbs
• Retinopathy or papilloedema on fundoscopy
• Evidence of cardiac failure

**Kidney health check**
• Blood pressure
• Electrolytes, urea, and creatinine (EUC) and eGFR
• Urine albumin:creatinine ratio (ACR) – preferably on morning spot urine. If macroalbuminuria is detected, a 24-hour protein level is recommended.

3. If there are clinical indicators of secondary hypertension, consider limited additional investigations.

**Management**

1. Arrange transfer to the Emergency Department for patients who need urgent referral and management:
   • Hypertensive emergency (blood pressure > 220/140).
   • Severe hypertension with systolic blood pressure > 180 mmHg with any symptoms or signs:
     o Headache
     o Confusion
     o Blurred vision
     o Retinal haemorrhage
     o Reduced level of consciousness
     o Seizure(s)
     o Proteinuria
     o Papilloedema

     o Pregnant women with pre-eclampsia with uncontrolled severe hypertension i.e.:
       ▪ diastolic blood pressure > 110 mmHg, or
       ▪ systolic blood pressure > 170 mmHg, or
       ▪ systolic blood pressure > 160 mmHg on 2 occasions.
2. For all other patients, consider general principles:
   - Individualise treatment decisions based on blood pressure, risk factors, asymptomatic organ damage, and established cardiovascular disease.
   - Prioritise lifestyle interventions according to relevance and likely impact on blood pressure control.
   - Use ACE inhibitor or ARBs, calcium channel blockers, or thiazide diuretics for first-line therapy of uncomplicated hypertension.
     - Combine drugs from different classes to achieve control.
     - With blood pressure lowering medication, start low and go slow, especially if uncertain of the duration of high blood pressure.
   - Avoid using ACEI and ARB together
   - Avoid the potential for the triple whammy:
     - Significant kidney injury, especially if elderly, volume depleted or CKD present, can result from the use of 2 or more of the following medications:
       • ACE inhibitor and/or angiotensin receptor blockers (ARB)
       • diuretics
       • NSAIDs
       • COX-2 inhibitors, except aspirin.
     - Exercise extreme care when prescribing analgesics in patients on these drugs.

3. When combining blood pressure lowering medications, follow recommendations.
   - Avoid these combinations:
     - ACE Inhibitor and ARB – increased risk of hypotensive symptoms, syncope, and renal dysfunction.
     - ACE Inhibitor or ARB, and potassium-sparing diuretic – risk of hyperkalaemia
     - Beta blocker, and Verapamil or diltiazem – risk of heart block
     - Thiazide diuretic and beta blocker – not recommended in people with glucose intolerance, metabolic syndrome, or established diabetes
   - Effective combinations:
     - ACE Inhibitor or ARB, and CCB – for diabetes or lipid abnormalities
     - ACE Inhibitor or ARB, and thiazide diuretic – for heart failure or post stroke
     - ACE Inhibitor or ARB, and beta blocker – for post myocardial infarction (MI) or heart failure
     - Beta blocker and dihydropyridine CCB – for symptomatic coronary heart disease
4. Treat hypertension (HT) as follows:

<table>
<thead>
<tr>
<th>Other risk factors, asymptomatic organ damage, or disease</th>
<th>Blood pressure (mmHg)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>High normal:</strong> • systolic blood pressure (SBP) 130 to 139, or • diastolic blood pressure (DBP) 85 to 89</td>
<td><strong>Grade 1 HT:</strong> • SBP 140 to 159, or • DBP 90 to 99</td>
</tr>
<tr>
<td><strong>Grade 2 HT:</strong> • SBP 160 to 179, or • DBP 100 to 109</td>
<td><strong>Grade 3 HT:</strong> • SBP ≥ 180, or • DBP ≥ 110</td>
</tr>
</tbody>
</table>

No other risk factors e.g:
- Male
- Increasing age
- Smoking
- Dyslipidaemia
- Impaired fasting glycaemia or abnormal glucose tolerance test
- Diabetes
- Obesity (BMI ≥ 30)
- Family history of premature cardiovascular disease in men aged < 55 years, or women aged < 65 years

- No BP intervention
- Lifestyle changes for several weeks
- Then add BP drugs targeting < 140/90
- Lifestyle changes for several months
- Then add BP drugs targeting < 140/90
- Lifestyle changes
- Immediate BP drugs targeting < 140/90

1 to 2 risk factors
- Lifestyle changes
- No BP intervention
- Lifestyle changes for several weeks
- Then add BP drugs targeting < 140/90
- Lifestyle changes
- BP drugs targeting < 140/90
- Lifestyle changes
- Immediate BP drugs targeting < 140/90

≥ 3 risk factors
- Lifestyle changes
- No BP intervention
- Lifestyle changes for several weeks
- Then add BP drugs targeting < 140/90
- Lifestyle changes
- BP drugs targeting < 140/90
- Lifestyle changes
- Immediate BP drugs targeting < 140/90

Diabetes, CKD stage 3, or asymptomatic organ damage
- Lifestyle changes
- No BP intervention
- Lifestyle changes
- BP drugs targeting < 130/80
- Lifestyle changes
- BP drugs targeting < 130/80
- Lifestyle changes
- Immediate BP drugs targeting < 130/80

Diabetes with organ damage, CKD stage ≥ 4, or symptomatic cardiovascular disease (CVD)
- Lifestyle changes
- No BP intervention
- See high absolute cardiovascular risk below
- Lifestyle changes
- BP drugs targeting < 130/80
- See high absolute cardiovascular risk below
- Lifestyle changes
- BP drugs targeting < 130/80
- See high absolute cardiovascular risk below
- Lifestyle changes
- Immediate BP drugs targeting < 130/80
- See high absolute cardiovascular risk below
5. Consider special groups:

- **High absolute cardiovascular risk**
  - Following the SPRINT trial, the national guideline now acknowledges that a lower target of < 120 mmHg systolic blood pressure be considered to improve cardiovascular outcomes.
  - In selected high risk populations where treatment is aimed at < 120 mmHg systolic blood pressure, close follow-up is recommended to identify treatment-related adverse effects, including:
    - hypotension
    - syncope
    - electrolyte abnormalities
    - acute kidney injury.

- **Hypertension in the elderly**
  - Clinical trials of hypertension in the elderly have consistently demonstrated benefit from antihypertensive therapy, including in patients aged > 80 years.
  - A systolic blood pressure target of ≤ 140 is generally recommended. However, if treatment is well tolerated in fit patients aged ≥ 75 years, consider a target of < 120 except in diabetes where the action to control cardiovascular risk in diabetes (ACCORD) trial supported a treatment target of 140/90 mmHg.
  - Close follow-up is recommended to identify treatment-related adverse effects, including:
    - hypotension
    - syncope
    - electrolyte abnormalities
    - acute kidney injury
  - In frail elderly patients, use clinical judgement and consider risks of treatment e.g., orthostatic hypotension, falls, and interactions. Polypharmacy is a particular risk. Consider use of a home medication management review (HMMR) or residential medication management review (RMMR) if concerns.

- **Isolated systolic hypertension**
  - Predominantly a problem in older patients.
  - Use first-line diuretics or calcium channel blockers.

- **Hypertension with proteinuria**
  - Hypertension is a driver for progressive renal failure in chronic kidney disease.
  - Use ACE inhibitor or ARB and titrate to the maximum tolerated dose.
  - Consider a lower systolic blood pressure target of < 130 in the following groups:
    - Urine albumin-to-creatinine ratio ≥ 30 mg/mmol
    - Albuminuria > 300 mg/24 hours
    - Proteinuria > 300 mg/24 hours
    - Monitor eGFR in these groups.

- **Resistant hypertension**
  - Failure to achieve target despite appropriate lifestyle measures and 3 drugs from different classes, including a diuretic, at adequate doses.
  - Exclude "pseudoresistance" due to non-adherence, white-coat hypertension, or use of small blood pressure cuffs.
  - Use a multi-modal approach:
▪ Check ambulatory or home blood pressures.
▪ Ensure a secondary cause has not been missed, particularly underlying renal disease.
▪ Review lifestyle interventions for unaddressed factors.
  o If resistant hypertension is confirmed, consider a trial of spironolactone 25 mg to 50 mg daily.
  o It is twice as effective in this setting compared with beta blockers or long-acting alpha-blockers, with approximately 8 versus 4 mmHg reductions respectively.\textsuperscript{9} Watch for hyperkalaemia.
  o Nephrology referral is recommended.
  o Refer for consideration of invasive treatments e.g., renal artery stenosis or phaeochromocytoma surgery, renal denervation.

6. Arrange regular patient monitoring 1 to 4 weekly, depending on severity of hypertension.

7. Refer for urgent or routine cardiology assessment or urgent or routine nephrology assessment if patient has:
  o severe persistent hypertension > 180/110.
  o refractory hypertension (blood pressure > 140/90) in patients:
    o taking ≥ 3 antihypertensive medicines.
    o unable to tolerate maximum treatment.

8. Refer for urgent or routine nephrology assessment if patient has:
  o suspected secondary cause for hypertension e.g., renal disease or renal artery stenosis.
  o hypertension with chronic kidney disease.

9. If endocrine cause for hypertension is diagnosed, refer for urgent or routine endocrinology assessment.

Referral

- Identify and arrange transfer to the Emergency Department for patients who need urgent referral and management:
  o Hypertensive emergency (blood pressure > 220/140).
  o Severe hypertension with systolic blood pressure > 180 mmHg with any symptoms or signs.
  o A pregnant woman with pre-eclampsia with uncontrolled severe hypertension i.e. diastolic blood pressure > 110 mmHg or systolic blood pressure > 170 mmHg.
- Refer for urgent or routine cardiology assessment or urgent or routine nephrology assessment if patient has:
  o severe persistent hypertension > 180/110.
  o refractory hypertension (blood pressure > 140/90) in patients:
    ▪ taking ≥ 3 antihypertensive medicines.
    ▪ unable to tolerate maximum treatment.
- Refer for urgent or routine nephrology assessment if patient has:
  o suspected secondary cause for hypertension e.g., renal disease or renal artery stenosis.
  o hypertension with chronic kidney disease.
- If endocrine cause for hypertension is diagnosed, refer for urgent or routine endocrinology assessment.
• If polypharmacy, consider referral for a home medication management review (HMMR) or residential medication management review (RMMR).

**Information**

**For health professionals**

**Further information**
- Heart Foundation of Australia – Hypertension
- NPS MedicineWise – Blood Pressure
- RACGP:
  - DASH Eating Plan
  - Red Book Hypertension

**For patients**
- Concord Hospital Renal Unit – Home Blood Pressure Monitoring Sheet
- Health Direct – Hypertension
- Heart Foundation Australia:
  - Blood Pressure Information and Resources
  - Measuring Your Blood Pressure at Home
- RACGP – DASH Eating Plan
- The George Institute – Food Switch

**References**


5. NPS Medicinewise. NPS MedicineWise. [place unknown]: NPS Medicinewise; Blood Pressure: Measure, Manage, Monitor. 2016.


Select bibliography


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