MANAGEMENT OF HYPERTENSION IN ADULTS IN PRIMARY CARE

- This is an updated guideline in line with new guidance from NICE.
- Thiazides remain first-line in most people needing treatment for raised blood pressure.
- Accurate, repeat measurements are needed before a diagnosis of hypertension is made.
- It is essential that all sphygmomanometers are serviced and calibrated regularly. Machines and cuffs need to be checked either annually or every 6 months depending on the model. Medical Engineering provide this service through service level agreements and can be contacted on 01629 817917.
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A patient information leaflet is available at www.patient.co.uk/showdoc/23068761/
Management of hypertension in adults in primary care

**Key priorities for implementation**

**Measuring blood pressure**

- To identify hypertension (persistent raised blood pressure above 140/90 mmHg), ask the patient to return for at least two subsequent clinic appointments where blood pressure can be assessed from two readings under the best conditions available.
- Routine use of automated ambulatory blood pressure monitoring or home monitoring devices in primary care is not currently recommended because their value has not been adequately established; appropriate use in primary care remains an issue for further research.

**Lifestyle interventions**

- Lifestyle advice should be offered initially and then periodically to patients undergoing assessment or treatment for hypertension.

**Cardiovascular risk**

- If raised blood pressure persists and the patient does not have established cardiovascular disease (CVD), discuss with them the need to formally assess their cardiovascular risk. Tests may help identify diabetes, evidence of hypertensive damage to the heart and kidneys and secondary causes of hypertension such as kidney disease.
- Consider the need for specialist investigation of patients with signs and symptoms suggesting a secondary cause of hypertension. Accelerated hypertension, malignant hypertension, and suspected phaeochromocytoma require immediate referral.

**Pharmacological interventions**

- Drug therapy reduces the risk of cardiovascular disease and death. Offer drug therapy to:
  - patients with persistent high blood pressure of 160/100 mmHg or more
  - patients at raised cardiovascular risk (10-year risk of CVD of 20% or more or existing CVD or target organ damage) with persistent blood pressure of more than 140/90 mmHg.
- In hypertensive patients aged 55 or older, or black patients of any age, or diabetes without microalbuminuria (any age), the first choice for initial therapy should be a thiazide diuretic. For this recommendation, black patients are considered to be those of African or Caribbean descent, not mixed-race, Asian or Chinese.
- In hypertensive patients younger than 55 or diabetes with microalbuminuria (any age), the first choice for initial therapy should be an angiotensin-converting enzyme (ACE) inhibitor.

**Continuing treatment**

- Provide an annual review of care to monitor blood pressure, provide patients with support and discuss their lifestyle, symptoms and medication.
- Patients may become motivated to make lifestyle changes and want to stop using antihypertensive drugs. If at low cardiovascular risk and with well controlled blood pressure, these patients should be offered a trial reduction or withdrawal of therapy with appropriate lifestyle guidance and ongoing review.
- It may take a year or more before blood pressure starts rising after withdrawing treatment. It is therefore important to follow up patients for a sufficient length of time.
Key points

Hypertension is a major modifiable risk factor for cardiovascular disease (CVD). However, treating hypertension should not be viewed in isolation. Other interventions, such as statins and aspirin, should be considered, where appropriate, based on a person’s history of CVD or an assessment of their CVD risk.

- BP-measuring devices should be properly validated, maintained and regularly re-calibrated.
- Clinicians should refresh and, if needed, update their BP measuring technique.
- The majority of people being treated for hypertension should have several BP recordings in their notes before the commencement of antihypertensive therapy.
- Health professionals should be using the latest CVD risk assessment charts as listed in the current BNF, or another validated risk assessment tool, to assess CVD risk.
- Accurate measurement of BP needs good clinical technique using properly validated, maintained and regularly re-calibrated devices.
- Several BP measurements are required before hypertension is diagnosed. Patients with initial BP >140/90mmHg should be asked to return for at least two further visits where BP should be measured twice under the best possible conditions.
- Lifestyle advice should be offered to all patients on an on-going basis, along with support and guidance for adherence.
- Patients at highest baseline CVD risk have the most to gain from lowering of BP. Although it may not be possible to achieve target in all patients, any lowering of BP is beneficial. **Aim to achieve the largest reduction possible towards target taking into account tolerability and concordance for each individual patient.**
- Actively review patients’ response to treatment. Any changes to treatment should respect patient views.
- All patients should have annual review of care.
Estimating CVD risk

Health professionals should use a validated risk assessment tool, such as that produced by the Joint British Societies (JBS), as an aid for deciding when treatment is necessary. The latest version of the JBS chart is available in the current BNF.

Measurement of blood pressure (BP)

Accurate measurement of BP needs good clinical technique using properly validated, maintained and regularly re-calibrated devices.

Several BP measurements are usually required before hypertension is diagnosed. Patients with initial BP >140/90mmHg should be asked to return for at least two further visits. BP should be measured twice on each occasion under the best possible conditions. Patients with more severely raised BP should be re-evaluated more urgently.

Lifestyle advice

Lifestyle advice should be offered to all patients on an on-going basis. Support and guidance should be given to make appropriate changes in lifestyle and to maintain these changes in the long-term.

When to initiate drug treatment

Drug therapy should be offered to patients with persistent high BP of 160/100mmHg or more, and patients at raised CVD risk (10-year risk of CVD of 20% or more, or existing CVD or target organ damage) with persistent BP of >140/90mmHg.

Treatment targets

NICE guidance recommends a BP treatment target of <140/90mmHg for non-diabetic patients. Lower BP targets are recommended for those with diabetes in the NICE diabetes guidelines (type 2 diabetes: <140/80mmHg, or <135/75mmHg if microalbuminuria or proteinuria is present; type 1 diabetes: <135/85mmHg, or <130/80mmHg with nephropathy).

Patients who are at highest baseline risk of CVD have the most to gain from lowering of BP. Although it may not be possible to achieve target in all patients, any lowering of BP is beneficial. Aim to achieve the largest reduction possible towards the target, taking into account tolerability and concordance for each individual patient.

Tests to assess risk

- Urine test for protein (using test strip).
- Plasma glucose, electrolytes, creatinine, serum total cholesterol and HDL cholesterol
- 12-lead electrocardiography
Measuring blood pressure
(see appendix 1 for MHRA ‘Top Ten Tips’)

- Healthcare professionals taking blood pressure measurements need adequate initial training and should have their performance reviewed periodically.

- Devices for measuring blood pressure must be properly validated, maintained and regularly recalibrated according to manufacturers’ instructions.
- A list of those BP measuring devices that meet BHS validation criteria is available at www.bhsoc.org/blood_pressure_list.stm
- Consider using validated automated BP monitors rather than aneroid devices.

Taking the measurements
- Where possible, standardise the environment when measuring blood pressure: the environment should be relaxed, quiet and warm, and the patient seated with their arm outstretched and supported.
- If the first measurement exceeds 140/90 mmHg, take a second confirmatory reading at the end of the consultation if possible.
- Measure blood pressure on both of the patient’s arms and use the arm with the higher value as the reference arm for future measurements.
- If the patient has symptoms of postural hypotension (falls or postural dizziness), measure blood pressure while they are standing.
- To identify hypertension (persistent raised blood pressure above 140/90 mmHg), ask the patient to return for at least two more appointments; check blood pressure twice on each occasion, under the best conditions available.
- Take measurements at monthly intervals – but if the patient has severe hypertension re-evaluate him or her earlier.
- Routine use of automated ambulatory blood pressure monitoring or home monitoring devices in primary care is not recommended.

Estimating BP by auscultation
- Standardise the environment as much as possible: relaxed, temperate setting, patient seated, arm out-stretched in line with mid-sternum and supported.
- Correctly wrap a cuff containing an appropriately sized bladder around the upper arm and connect to the manometer.
- Palpate the brachial pulse in the antecubital fossa of that arm.
- Rapidly inflate the cuff to 20mmHg above the point where the brachial pulse disappears.
- Deflate the cuff and note the pressure at which the pulse re-appears: the approximate systolic BP.
- Re-inflate the cuff to 20mmHg above the point at which the brachial pulse disappears.
- Using one hand, place the stethoscope over the brachial artery ensuring complete skin contact with no clothing in between.
- Slowly deflate the cuff at 2-3mmHg per second listening for Korotkoff sounds.
  - Phase I: First appearance of faint repetitive clear tapping sounds gradually increasing in intensity and lasting for at least 2 consecutive beats: note the systolic BP.
  - Phase II: A brief period may follow when sounds soften or ‘swish’.
  - Auscultatory gap: In some patients the sounds disappear completely.
  - Phase III: Return of sharper sounds becoming crisper for a short time.
  - Phase IV: Distinct, abrupt muffling sounds, becoming soft and blowing.
  - Phase V: Point at which all sounds disappear completely: note the diastolic BP.
- When the sounds have disappeared, quickly deflate the cuff completely if repeating measurement.
- When possible, take readings at the beginning and end of consultations.
Lifestyle interventions to reduce blood pressure

- Ask patients about their diet and exercise patterns, and offer guidance and written or audiovisual information.
- Ask about alcohol consumption and encourage patients to cut down if they drink excessively.
- Discourage excessive consumption of coffee and other caffeine-rich products.
- Encourage patients to reduce their salt intake or use a substitute.
- Offer smokers advice and help to stop smoking.
- Tell patients about local initiatives (for example, run by healthcare teams or patient organisations) that provide support and promote lifestyle change.

### Key lifestyle advice for patients and associated BP reductions

<table>
<thead>
<tr>
<th>Advice</th>
<th>SBP and DBP reductions in trials</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adopt a healthy low calorie diet.</td>
<td>5-6mmHg</td>
</tr>
<tr>
<td>Take aerobic exercise for 30-60 minutes, three to five times each week.</td>
<td>2-3mmHg</td>
</tr>
<tr>
<td>Limit alcohol consumption to no more than 21 units/week (men) and 14 units/week (women), with intake spread out over the week.</td>
<td>3-4mmHg</td>
</tr>
<tr>
<td>Reduce dietary sodium intake to less than 2.4g (100mmol) per day. This is equivalent to 6g of salt.</td>
<td>2-3mmHg</td>
</tr>
<tr>
<td>Avoid excessive consumption of coffee (&gt;5 cups) and other caffeine-rich products that can raise BP.</td>
<td></td>
</tr>
<tr>
<td>Stop smoking. This has benefits on CVD, if not directly on high blood pressure.</td>
<td></td>
</tr>
<tr>
<td>The best evidence does not support the use of calcium, magnesium or potassium supplementation alone or in combination to achieve a worthwhile reduction in BP. Relaxation therapies (e.g. stress management, meditation, etc.) can reduce BP, but routine provision by primary care teams is not currently recommended.</td>
<td></td>
</tr>
</tbody>
</table>

### Thresholds and targets in the NICE hypertension and diabetes guidelines

#### Thresholds for initiating treatment (either systolic or diastolic within ranges)

<table>
<thead>
<tr>
<th>Patients without diabetes</th>
<th>Treat if persistent BP &gt;140-159/90-99mmHg and 10-year CVD risk &gt;20% or existing CVD or target organ damage</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Treat all patients with persistent BP &gt;160/100mmHg</td>
</tr>
<tr>
<td>Patients with type 2 diabetes</td>
<td>Treat if persistent BP &gt;140-159/80-99mmHg and 10-year CVD risk &gt;20% or concomitant microalbuminuria or proteinuria</td>
</tr>
<tr>
<td></td>
<td>Treat all patients with persistent BP &gt;160/100mmHg</td>
</tr>
<tr>
<td>Patients with type 1 diabetes</td>
<td>Treat if persistent BP &gt;135/85mmHg</td>
</tr>
<tr>
<td></td>
<td>Treat if persistent BP &gt;130/80mmHg and abnormal albumin excretion rate or two or more features of the metabolic syndrome</td>
</tr>
</tbody>
</table>

#### Targets for treatment (both systolic and diastolic BP to be achieved)

<table>
<thead>
<tr>
<th>Patients without diabetes</th>
<th>≤140/90mmHg</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patients with type 2 diabetes</td>
<td>≤140/80mmHg or ≤135/75mmHg if microalbuminuria or proteinuria present</td>
</tr>
<tr>
<td>Patients with type 1 diabetes</td>
<td>&lt;135/85mmHg or &lt;130/80mmHg if nephropathy</td>
</tr>
</tbody>
</table>
Choosing drugs to lower blood pressure and reduce cardiovascular risk

Thiazides remain first-line in most people needing treatment for raised blood pressure

Younger than 55 years
Diabetes with microalbuminuria (any age)

55 years or older
Black patients of any age
Diabetes without microalbuminuria (any age)

**Step 1**
ACE Inhibitor*

Add

**Step 2**
Thiazide

ACE Inhibitor*

Add

**Step 3**
Calcium channel blocker

**Step 4**
Beta-blocker (or alpha-blocker)

* use angiotensin-II antagonist if ACEI intolerant (as the evidence for using an ACEI first-line in those aged <55 years is not strong, a thiazide could be considered in this group of patients before changing to an A-II antagonist)

ACEIs and A-II antagonists are contraindicated in pregnancy and should be avoided in women of childbearing potential (or ensure effective contraception)

** use calcium channel blocker if thiazide contraindicated or not tolerated (except in diabetes – straight to step 2 if cannot use thiazide)

Most drugs take 6-8 weeks to attain maximum benefit. Reassess 2 months after starting treatment before modifying medication, unless urgent intervention is needed (e.g. malignant hypertension).

**Beta-blockers**
- are no longer preferred as a routine initial therapy for hypertension
- may be appropriate for those who have another indication for beta-blocker therapy – angina, previous MI, heart failure
- should be considered for some younger people, particularly:
  - women of childbearing potential
  - patients with evidence of increased sympathetic drive
  - patients with intolerance of or contraindications to ACE inhibitors and angiotensin-II antagonists

**Target clinic BP**
The aim is to reduce blood pressure to target if possible, adding drugs as needed, *taking account of tolerability and concordance for each individual patient.*

No diabetes – 140/90 mmHg or less
With type 2 diabetes – less than 140/80 mmHg
Type 2 diabetes with microalbuminuria/proteinuria (ACE inhibitor first-line [or A-II antagonist if not tolerated]) – 135/75 mmHg or less
When to refer

- Refer immediately if the patient has signs of:
  - accelerated (malignant) hypertension (blood pressure more than 180/110 mmHg with signs of papilloedema and/or retinal haemorrhage)
  - suspected phaeochromocytoma (possible signs include labile or postural hypotension, headache, palpitation, pallor and diaphoresis).

- Consider referral if:
  - the patient has unusual signs and symptoms
  - the patient has signs or symptoms suggesting a secondary cause
  - the patient’s management depends critically on the accurate estimation of their blood pressure
  - the patient has symptoms of postural hypotension, or a fall in systolic blood pressure when standing of 20 mmHg or more.

NICE recommendations for patients already receiving a regimen that includes a β-blocker

- If BP is controlled, consider long-term management at their routine review. There is no absolute need to replace the β-blocker with an alternative agent.

- If BP is not controlled, revise treatment according to the treatment algorithm.

- When a β-blocker is withdrawn, step the dose down gradually.

- Do not withdraw the β-blocker if there is a compelling indication for being treated with one, such as symptomatic angina or a previous myocardial infarction.

References

Appendix 1

MHRA ‘Top Ten Tips’ for measuring blood pressure

1. **Ensure that only clinically validated equipment is purchased for use and that all sphygmomanometers are regularly checked – mercury devices at least annually and aneroid devices at least twice a year.** Automated devices should only be used if re-calibration is undertaken in accordance with the manufacturer’s instructions. It is good practice to delegate the task of ensuring regular calibration checks and maintenance to a designated individual.

2. **Ensure each consulting room has both large and regular cuffs as this reduces the likelihood of cuffs being inappropriately used.** ‘Miscuffing’ can introduce large errors in measurement. ‘Undercuffing’ (either too narrow or too short a bladder) can lead to over-estimation of BP, while ‘overcuffing’ (too wide or too long a bladder) may lead to underestimation.

3. **Raised BP should not be discounted on the basis of suspected anxiety.** If there is doubt about the relevance of readings during a consultation, the measurements should be repeated on a couple of occasions. The patient should be allowed to rest, sitting for at least 5 minutes before undertaking the initial measurements. While measuring BP, the patient should not be talking or have their legs crossed. Three measurements should usually be taken, discarding the first. If there is still a large discrepancy (>10mmHg systolic) then ambulatory BP monitoring (ABPM) should be considered.

4. **BP should initially be measured in both arms and the arm with the higher values should be used for subsequent measurements.** A difference in BP between the arms can be expected in about 20 per cent of patients. If the difference between the arms is more than 20mmHg for systolic or 10mmHg for diastolic pressure on three consecutive readings the patient should be considered for referral for further evaluation.

5. **Arm support is very important.** Muscle contraction in an unsupported arm can raise diastolic BP by as much as 10 per cent while raising the arm above heart level leads to an underestimation by as much as 10mmHg. The arm should be supported in a horizontal position with the cuff at the level of the heart as denoted by the midsternal level.

6. **Try to measure BP at the same time of day where practically possible.** BP rises with waking and then tends to fall through the day. Current guidelines do not make specific recommendations regarding the time when it should be measured but it seems sensible to try to measure it at a consistent time.

7. **When interpreting the results of ABPM it should be remembered that average daytime values are approximately 10/5 mmHg lower than surgery measurements.** Thresholds and targets for treatment, which are based on clinic values should be adjusted accordingly.

8. **Be alert to ‘white coat effect’.** BP readings can increase in both normotensive and hypertensive patients, (untreated and treated) when the measurement is taken by a healthcare professional.

9. **Remember BP variability is large and studies have shown it can vary from the mean by a standard deviation of 12/8mmHg in the same patient on different days.** In one study, 15 readings (over five different days, three readings per occasion) were required to reduce variability by 80 per cent.

10. **Measurement of BP by any method is less reliable in the presence of arrhythmias such as atrial fibrillation.** This is because there can be large beat-to-beat variation when heart rhythm is irregular. Although current guidelines do not recommend auscultatory endpoints in these situations, using a greater than usual number of readings may not only improve precision but also increase the agreement between oscillometric and mercury measured BPs.
Appendix 2

**Ambulatory BP monitoring**

The bulk of our knowledge about the risks of hypertension (HTN) and the benefits of treating it is based on the traditional method of taking a small number of BP readings with the auscultatory technique in a medical setting. Ambulatory monitoring was not available when the Framingham study started, and hence it is not appropriate to use ambulatory readings directly with CV risk charts based on Framingham.

It is claimed that ambulatory BP predicts CV events better than clinic blood pressure does, but it is uncertain which component of the 24-hour BP profile gives the best prediction of risk\(^1\). NICE recommends that “routine use of automated ambulatory blood pressure monitoring or home monitoring devices in primary care is not currently recommended because their value has not been adequately established; appropriate use in primary care remains an issue for further research"\(^2\).

BHS IV\(^3\) suggests the following potential indications for the use of ambulatory BP monitoring:

- Unusual BP variability
- Possible ‘white-coat’ HTN
- Informing equivocal treatment decisions
- Evaluation of nocturnal HTN
- Evaluation of drug-resistant HTN
- Determining efficacy of drugs over 24 hours
- Diagnosis/treatment of HTN in pregnancy
- Evaluation of symptomatic hypotension

The daytime level of ambulatory BP that is usually considered the upper limit of normal is 135/85mmHg\(^1\). This corresponds approximately to a clinic BP of 140/90\(^1\).

**White-coat hypertension (WCH)**

WCH is the only indication for ambulatory BP monitoring approved by Medicaid and Medicare Services in the U.S. Suspected WCH is defined as clinic BP of 140/90 or higher on at least 3 occasions, with at least 2 sets of measurements of less than 140/90 in non-clinic settings, plus the absence of target-organ damage\(^1\). Studies have shown that drug treatment of WCH reduces the clinic BP but has negligible effect on ambulatory BP, which is by definition normal. In addition, the only study to investigate the effects of treating WCH on morbid events found no significant benefit\(^1\). Sustained hypertension may develop in some patients with WCH and long-term follow-up with repeated ambulatory BP monitoring or home monitoring has been recommended\(^1\). WCH does not warrant antihypertensive drug treatment\(^1\) and as Little points out “the overzealous initiation and maintenance of treatment for WCH represents an enormous opportunity cost for health professionals and for patients, in addition to the associated iatrogenesis – particularly unnecessary anxiety and side effects"\(^4\).

Little found that BP readings made by doctors were much higher than ambulatory systolic pressure by a mean of 18.9mmHg (confirming the “white coat” effect) and recommended that it is time to stop using high BP readings documented by GPs to make treatment decisions\(^4\). If ambulatory or home measurements are not available, repeated measurements by the nurse or patient should result in considerably less unnecessary monitoring, initiation, or changing of treatment, he adds.

NICE recommends that patients with persistent high clinic blood pressure of 160/100 or more need drug treatment to be started\(^2\). Little suggests that this level corresponds to an ambulatory BP of greater than 145/95 mmHg\(^4\). BHS IV advises that when using ambulatory BP readings, mean
daytime pressures are preferred and this value would be expected to be approximately 10/5 mmHg lower than the office BP equivalent for both thresholds and targets.

What should we do?

Clinic BP measurements should be carried out as advised by NICE\(^2\) by a trained health professional (preferably a nurse)\(^4\) using a validated and properly maintained device, and where possible, in a standardised environment. Take the mean of 2 readings on several occasions.

Use ambulatory BP monitoring if white coat hypertension is suspected. If the mean of daytime ambulatory BP is less than 135/85, no treatment is required but annual follow-up may be appropriate. If the mean of daytime ambulatory BP is 135/85 or greater, treatment should be considered in the context of overall cardiovascular risk. Add 10/5 to the value and use the standard risk assessment tool to calculate overall risk.

2. NICE Clinical Guideline 18. August 2004
3. BHS IV. BMJ 2004; 328:634-40
Appendix 3

Hypertension formulary (Cost per 28 days at November 2006)

Refer to the PACEF ‘Monitoring Drug Therapy’ document for appropriate monitoring of these drugs.

<table>
<thead>
<tr>
<th>Category</th>
<th>Example:</th>
<th>Cost per 28 days at November 2006</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Thiazide</strong></td>
<td>Bendroflumethiazide 2.5mg in the morning</td>
<td>£1.15</td>
</tr>
<tr>
<td><strong>ACE inhibitors</strong></td>
<td>Enalapril 5 – 40mg daily</td>
<td>£1.54 - £3.78</td>
</tr>
<tr>
<td></td>
<td>Ramipril caps 1.25 – 10mg daily</td>
<td>£1.76 - £2.79</td>
</tr>
<tr>
<td><strong>Dihydropyridine calcium channel blockers</strong></td>
<td>Amlodipine 5 – 10mg daily</td>
<td>£2.14 - £2.58</td>
</tr>
<tr>
<td></td>
<td>Felodipine 5 – 10mg daily</td>
<td>£4.47 - £6.01</td>
</tr>
<tr>
<td><strong>'Rate-limiting' calcium channel blocker</strong></td>
<td>Slozem (diltiazem m/r) 120 – 300mg daily</td>
<td>£7.00 - £8.50</td>
</tr>
<tr>
<td><strong>Beta-blocker</strong></td>
<td>Atenolol 25 – 50mg daily</td>
<td>£1.22 - £1.25</td>
</tr>
<tr>
<td><strong>Angiotensin II antagonist</strong></td>
<td>Candesartan 4 – 16mg daily</td>
<td>£8.15 - £12.72</td>
</tr>
<tr>
<td><strong>Alpha-blocker</strong></td>
<td>Doxazosin 1 – 16mg daily</td>
<td>£1.62 - £17.64</td>
</tr>
</tbody>
</table>