Hypertension

Hypertension is a major risk factor for stroke and heart disease and is therefore one of the most important preventable causes of premature morbidity and mortality in developed and developing countries.

Epidemiology

In the UK, hypertension is the second biggest risk factor for premature death and disability, smoking being the first\(^1\). Worldwide, it is considered the leading risk factor for premature death, stroke and heart disease\(^2\).

Over a quarter of adults in the UK have hypertension. Prevalence is rising as the population ages\(^3\). Overall, the prevalence of hypertension (at least ≥140/90 mm Hg or on treatment for hypertension) in those aged over 35 years in the 2010 health survey for England was 31% in men and 28% in women\(^4\). The prevalence significantly increased with age in both sexes:

- About 33% of men and 25% of women aged 45-54 years have hypertension.
- About 66% of men and 78% of women aged ≥75 years or older have hypertension.

Surveys continue to show that hypertension remains underdiagnosed, undertreated and poorly controlled in the UK, although significant improvement has been demonstrated over the past 20 years\(^1,5\).

Aetiology

Essential hypertension (primary, cause unknown) accounts for the majority of cases, particularly in the older patient.

Secondary hypertension is commonly caused by renal disease, endocrine conditions or pregnancy\(^6\):

- Renal disease is the most common cause of secondary hypertension\(^7\). This may be intrinsic renal disease (glomerulonephritis, polyarteritis nodosa, systemic sclerosis, chronic pyelonephritis, or polycystic kidneys) or renovascular disease (atheromatous or fibromuscular dysplasia).
- Endocrine disease:
  - Cushing's syndrome
  - Conn's syndrome
  - Thyroid dysfunction
  - Phaeochromocytoma
  - Acromegaly
  - Hyperparathyroidism
- Coarctation of the aorta.
- Obstructive sleep apnoea.
- Pre-eclampsia and hypertension in pregnancy.
- Pharmacological substances and toxins - eg, alcohol, cocaine, amphetamines, antidepressants, the combined oral contraceptive (COC) pill, ciclosporin, tacrolimus, erythropoietin, adrenergic medications, decongestants containing ephedrine and herbal remedies containing licorice or ginseng.

Risk factors\(^1\)

Modifiable risk factors include:

- Excess weight.
- Excess dietary salt intake.
- Lack of physical activity.
Non-modifiable risk factors include:

- Older age.
- Family history.
- Ethnicity.
- Gender: blood pressure (BP) tends to be higher in men than in women up to the age of 65 years, whereas the opposite tends to be true over the age of 65 years.

Defining hypertension[7]

BP has a skewed normal distribution within the population and the currently accepted model assumes risk is continuously related to BP. The National Institute for Health and Care Excellence (NICE) recommends the following definitions:

- **Stage 1 hypertension** - BP in surgery/clinic is ≥140/90 mm Hg and ambulatory blood pressure monitoring (ABPM) or home blood pressure monitoring (HBPM) is ≥135/85 mm Hg.
- **Stage 2 hypertension** - BP in surgery/clinic is ≥160/100 mm Hg and ABPM or HBPM is ≥150/95 mm Hg.
- **Severe hypertension** - BP in surgery/clinic is ≥180/110 mm Hg or higher.

Screening for hypertension[7]

Hypertension is often symptomless, so screening is vital - before damage is done. All adults should have their BP measured, at least every five years up to the age of 80 year, and at least annually thereafter.

Measuring blood pressure

- Use a correctly calibrated and maintained machine (manual or automatic).
- Seated BP is adequate except in elderly patients or those with diabetes who may have orthostatic hypotension (standing BP is needed as well - after at least one minute’s standing). If standing systolic blood pressure (SBP) is 20 mm Hg or lower than when seated, review medication, and measure all subsequent blood pressures with the person standing (consider specialist referral if postural hypotension symptoms persist).
- Remove tight clothing and support the arm with the hand relaxed and the cuff (of appropriate size) at heart level.
- Initially, measure BP in both arms; if there is a persistent difference of >20 mm Hg between arms then ensure subsequent blood pressures are taken in the arm with the higher reading.

Use an automated machine or the following manual method (if the pulse is irregular (eg, in atrial fibrillation), always use the manual method):

- Inflate the cuff whilst palpating the brachial artery, until the pulse disappears. This provides an estimate of systolic pressure.
- Inflate the cuff until 30 mm Hg above systolic pressure, then place a stethoscope over the brachial artery. Deflate the cuff at 2 mm Hg per second.
- Systolic pressure: the appearance of sustained repetitive tapping sounds (Korotkov I). Diastolic pressure: usually the disappearance of sounds (Korotkov V). However, in some individuals (eg, pregnant women) sounds are present until the zero point. In this case the muffling of sounds (Korotkov IV) should be used.
- Record to the nearest 2 mm Hg.
- If initial BP is ≥140/90 mm Hg, take a second or even third reading and record the lowest (discard the initial reading) as the clinic BP.

If BP in the GP surgery is ≥140/90 mm Hg then offer ABPM to confirm the suspected hypertension, or HBPM if ABPM is not available or not tolerated.
If using ABPM - take ≥2 readings every waking hour, and average at least 14 measurements when deciding whether hypertension is present.
If using HBPM - on each occasion take two consecutive BP measurements (<1 minute apart), with the person seated. Take readings twice daily (morning and evening) over ≥4 days (ideally 7 days) - disregard the first day and then average the rest.

Those with high normal values (130-139/85-89 mm Hg) subsequently should be checked annually.

While waiting for further BP readings to confirm diagnosis of hypertension, look for target organ damage - look for hypertensive retinopathy, left ventricular hypertrophy on ECG; perform blood tests (serum electrolytes, creatinine, eGFR, fasting glucose and lipids) and urinalysis for albuminuria, proteinuria or haematuria ± albumin:creatinine ratio. Carry out a cardiovascular risk assessment with a suitable assessment tool.

Other considerations

- **Hypertensive crisis**: there are two types:
  - **Malignant (accelerated) hypertension**: this is a syndrome characterised by severe hypertension (eg, systolic >200 mm Hg, diastolic >130 mm Hg) accompanied by end-organ damage - eg, encephalopathy, dissection, pulmonary oedema, nephropathy, eclampsia, papilloedema and/or angiopathic haemolytic anaemia. **Accelerated hypertension** needs urgent (same-day) assessment and immediate treatment to reduce the BP within minutes to hours[7]. This is also termed hypertensive emergency.
  - **Hypertensive urgency**: a systolic blood pressure (SBP) ≥180 mm Hg or a diastolic blood pressure (DBP) ≥120 mm Hg without impending end-organ damage. Treatment should safely reduce BP over a few days.

- **Suspected phaeochromocytoma**: consider this diagnosis if there is labile or postural hypotension, headache, palpitations, pallor and profuse sweating - refer for urgent (same-day) assessment[7, 8].
- **Systolic or diastolic pressure**: for many years diastolic pressure was considered to be more important than systolic pressure. They are both important determinants of cardiovascular risk.
- **Hypertension in the elderly**: although age-related rise in systolic pressure can be considered part of the ‘normal’ ageing process, isolated systolic hypertension (ISH) in the elderly should not be ignored as it is associated with significant morbidity and mortality[9]. Uncertainties remain regarding treatment of hypertension in the elderly; however, NICE guidelines in the UK recommend the same treatment in those aged over 80 years as in those aged 55-80 years, taking into account comorbidity[7, 10].

Presentation

High BP is usually asymptomatic, except where there is accelerated hypertension.

All patients need a full history and physical examination. Look for a cause (renal, endocrine, etc, as above), particularly in the young, the severely hypertensive and those with resistant hypertension[8].

- Take a full medication history (non-steroidal anti-inflammatory drugs (NSAIDs), oral contraceptives, steroids, licorice, sympathomimetics, ie cold cures).
- Ask if they are aware of the hypertension. Episodic feelings ‘as if about to die’ or headaches, or paroxysmal sweats or palpitations, suggest phaeochromocytoma.
- Consider renal causes: whether there is a present, past or family history of renal disease; whether the kidneys are palpable, or there is an abdominal or loin bru; (renovascular disease) or delayed or weak femoral pulses (coarctation).
- Consider whether the patient looks Cushingoid or whether he or she might have **Conn's syndrome** (tetany, weak muscles, polyuria, hypokalaemia).
- Look for signs of thyroid disease.
Assess the degree of end-organ damage or complications of hypertension - eg, previous stroke or transient ischaemic attack (TIA), dementia, known left ventricular hypertrophy (LVH)/left ventricular (LV) strain, coronary heart disease (CHD), peripheral arterial disease, or renal impairment. Perform ophthalmoscopy to assess for retinopathy; ideally, dilate the pupils to do so.

**Investigations**[8]

- **Looking for target-organ damage:**
  - Urine dipstick test for protein and blood.
  - Serum creatinine and electrolytes and eGFR.
  - Renal ultrasound scan.
  - 12-lead ECG (looking for LVH or signs of CHD).
  - Echocardiography.

- **Cardiovascular disease prevention:**
  - Fasting blood glucose.
  - Fasting serum total and high-density lipoprotein (HDL) cholesterol.

- **Specific investigations for a suspected secondary cause:**
  - 24-hour urinary metanephrines.
  - Urinary free cortisol and/or dexamethasone suppression test.
  - Renin/aldosterone levels.
  - Plasma calcium.
  - Magnetic resonance imaging of the renal arteries.

Referral to a specialist may be necessary for some of these tests where they seem appropriate.

**Indications for referral to a specialist**

- **Urgent treatment is needed:** accelerated hypertension, severe hypertension (>220/>120 mm Hg), suspected phaeochromocytoma with severe hypertension, or impending complications (eg, TIA, LV failure).
- **Possible underlying cause:** low K+, Na+ elevated (possible Conn’s syndrome); elevated creatinine, proteinuria or haematuria; sudden-onset or rapidly worsening or resistant hypertension (ie needs >4 therapeutic agents); young age (consider specialist assessment for those under the age of 40 years[7]).
- **Therapeutic problems:** unusual BP variability, intolerance to multiple medications or contra-indications, persistent non-adherence or treatment refusal.
- **Hypertension in pregnancy[12]**

**Management**

For a full discussion on cardiovascular disease risk assessment, treatment thresholds and their modification dependent on target organ damage and concurrent diseases, see separate Management of Hypertension article. See also the separate articles Hypertension in Pregnancy and Hypertension in Childhood.

**Further reading & references**

- Hypertension; NICE Quality Standards, March 2013
- Tackling high blood pressure - from evidence to action; Public Health England (PHE), November 2014
- Hypertension - Health Survey for England (2011); Health and Social Care Information Centre
- Hypertension: management of hypertension in adults in primary care; NICE Clinical Guideline (August 2011)
8. Guidelines for the management of arterial hypertension; ESH/ESC Clinical Practice Guidelines, European Society of Cardiology (2013)


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