Hypertension in Adults: Part 2. Assessment and management

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Assessment

Include the following:

- Confirmation of hypertension
- Risk factors for cardiovascular disease
- Underlying cause(s)
- End organ damage
- Indications and contraindications for anti-hypertensive drugs

History

A thorough history is essential - note particularly:

1. Age, gender, family history
2. Drugs: non-steroidal anti-inflammatory drugs, oral contraceptives, steroids, liquorice, sympathomimetics e.g. cocaine or epinephrine contained in cold remedies and cough medicines.
3. Renal disease:
   - present, past and family history
   - history of haematuria and /or proteinuria
4. Paroxysmal (intermittent) symptoms (?phaeochromocytoma)
5. Muscle weakness, polyuria (?Conn's syndrome)
6. Rounded face and abdominal obesity (?Cushing's syndrome)
7. Cardiovascular risk factors and co-morbidities:
   - Overweight
   - Excess alcohol intake (>3 units/day for men, >2 units/day for women)
   - Cigarette smoking
   - Excess salt intake (≥10g/day)
   - Diabetes mellitus
   - Dyslipidaemia (arcus cornealis, xantholasmata).
8. Complications or end organ damage:
   - "Stroke", transient ischaemic attack (TIA)
   - Coronary artery disease, heart failure
   - Peripheral vascular disease
   - Visual problems
   - Renal disease.

Physical examination

1. Confirm the hypertension with **repeated measurements** over about four weeks. This may not be feasible where travelling to clinics is difficult - and may not be needed if there is end organ damage and malignant hypertension.
2. Look for secondary causes (see Part 1).
3. Record cardiovascular abnormalities:
   - Peripheral pulses
   - Radio-femoral delay, diminished femoral pulses with low femoral blood pressure (BP) (aortic coarctation)
   - Carotid and abdominal arterial bruits
   - Aortic aneurysm.
4. Identify end organ damage:
   - Brain: motor or sensory defects
   - Retinal fundoscopic abnormalities
   - Heart: displacement of apical impulse, dysrhythmias, sounds and murmurs, ventricular gallop, pulmonary rales, peripheral oedema
   - Peripheral arterial pulses: absence, reduction or asymmetry, ischaemic skin lesions.
5. Identify other conditions (co-morbidities):
   - High Body Mass Index (BMI). [BMI = weight in kg/height in meters^2] BMI ≥25 = overweight; BMI ≥30 = obesity
   - High abdominal girth measured through the umbilicus. A value of >88centimetres for females and >102centimetres for males is considered an independent risk factor for cardiovascular disease
   - Bronchial asthma and chronic obstructive pulmonary disease (COPD): These are considered contraindications to beta blocker use. COPD is rare in black populations.

Investigations

Routine Tests

These should be available in most health centres:

- Haemoglobin, haematocrit, ESR.
- Urine "stix" test for proteinuria, haematuria, and glycosuria.

The following are desirable but are less likely to be available:

- Blood glucose (preferable fasting)
- Serum urea and creatinine
- Electrolytes, calcium and phosphate
- Estimated creatinine clearance
- Serum uric acid
- Lipid profile
- Electrocardiogram for cardiac rhythm and evidence of left ventricular hypertrophy
- Echocardiogram if cardiac structural abnormalities suspected.

Consider referral to a specialist for extended evaluation if there are these conditions:

- Age <40 years

- Severe hypertension with end organ damage
- Poorly controlled hypertension
- Suspected secondary hypertension.

Indications for drug therapy

1. Sustained systolic blood pressure (BP) ≥160mmHg or sustained diastolic BP ≥100mmHg despite non-pharmacological measures.
2. Sustained systolic BP 140–159mmHg or diastolic blood pressure 90–99mmHg if there is:
   - end organ damage or
   - diabetes mellitus.

A target systolic BP ≤140mmHg and diastolic blood pressure ≤85mmHg is ideal. For patients with diabetes mellitus a target of 130/80mmHg is ideal.

Non - pharmacological measures

Attempt non-pharmacological methods of lowering BP in patients with mild hypertension but no cardiovascular complications or end organ damage. Start non-pharmacological measures in parallel with drug therapy in patients with severe hypertension (see British Hypertension Society guidelines – see website below).

Benefits of non-pharmacological measures

- Lowers BP as much as drug monotherapy
- Reduces the need for drug therapy
- Enhances the antihypertensive effect of drugs
- Reduces the need for multiples drug regimens
- Reduces overall cardiovascular risk.

Non-pharmacological measures recommended by the British Hypertension Society

That lower BP:

- Weight reduction – aim for Body Mass Index 20-25 Kg/m²
- Reduced salt intake to <100 mmol/day (<6g NaCl or <2.4 g Na+/day. One flat teaspoonful = ~6g salt)
- Reduced alcohol consumption to ≤ 3 units/day for men and ≤ 2 units/day for women (500 ml beer = ~2 units)
- Regular aerobic exercise (brisk walking rather than weightlifting for ≥30 minutes per day), on at least three days each week
- At least five portions of fruit and vegetable each day (e.g. banana, mango, tomato, green leaves)
- Reduced total fat and saturated fat intake. Saturated fats come mainly from animal foods such as milk and meat.

That reduce cardiovascular risk:

- Stopping smoking
- Reducing total fat intake and replacing saturated fats with unsaturated fats. Unsaturated fats and oils come from plant foods and fish.

Pharmacological therapy

Classes of antihypertensive drugs

The main purpose of treating hypertension is to reduce the incidence of cardiovascular (especially left ventricular failure), cerebrovascular disease ("stroke") and renal failure. The five major classes of antihypertensive drugs are:

- Diuretics (e.g. thiazide diuretics)
- Calcium channel blockers (e.g. nifedipine)
- Angiotensin converting enzyme inhibitors (ACEI) (e.g. lisinopril)
- Angiotensin receptor antagonists (e.g. losartan)
- Beta blockers (e.g. atenolol)

Other antihypertensive drugs are:

- Alpha receptor antagonists (e.g. prazosin)
- Vasodilators (e.g. hydralazine)
- Mineralocorticoid receptor antagonists (e.g. spironolactone)
- Sympatholytics (e.g. clonidine, alpha methyldopa).

The choice of antihypertensive drug (s)

Factors influencing the choice of antihypertensive drug (s) are:

- Age
- Ethnicity
- Co-morbidities e.g. diabetes mellitus, renal disease, peripheral arterial disease, "stroke", prostate disease, obesity, pregnancy
- Contraindications e.g. beta blockers in bronchial asthma
- Cardiovascular risk profile e.g. ischaemic heart disease
- Severity of hypertension and presence of end organ damage
- Etiology of hypertension – e.g. Cushing's disease, renal artery stenosis
- Side effects to previous treatment e.g. angio-oedema with an ACEI
- Drug compliance of patient
- Socio-economic status
- Economic factors and sustainable supply of drug(s) chosen.
- Patient's choice.

The ideal drug is one that is given once each day, lowers the BP satisfactorily without significant side effects, has a sustainable supply and is not expensive.

"ABCD" treatment Algorithm

Most patients require more than one drug to control BP. The British Hypertension Society recommends an algorithm based on the AB/CD rule to assist with the selection of drug schedules. The idea of the AB/CD algorithm is based upon the broad classification of hypertension into:

1. High renin hypertension

2. Low renin hypertension

Therefore BP is best initially treated by one of 2 categories of drugs:

1. Drugs which inhibit the renin-angiotensin system (e.g. **A**CE inhibitors, **A**ngiotensin receptors blockers or **B**eta blockers) or
2. Drugs which do not inhibit the renin-angiotensin system (e.g. **C**alcium antagonists or **D**iuretics).

Because African (black) patients of all ages tend to have low renin levels, initial therapy should be a calcium-channel blocker or a thiazide diuretic. If a second drug is required, add an ACE inhibitor (or an angiotensin-II receptor antagonist if an ACE inhibitor is not tolerated).

If treatment with **three drugs** is required, use a combination of ACE inhibitor (or angiotensin-II receptor antagonist), calcium-channel blocker and thiazide diuretic.

If blood pressure remains uncontrolled on adequate doses of three drugs, consider adding a fourth and/or seeking expert advice.

If a **fourth drug** is required, consider one of the following:

- Beta-blocker
- Selective alpha-blocker.

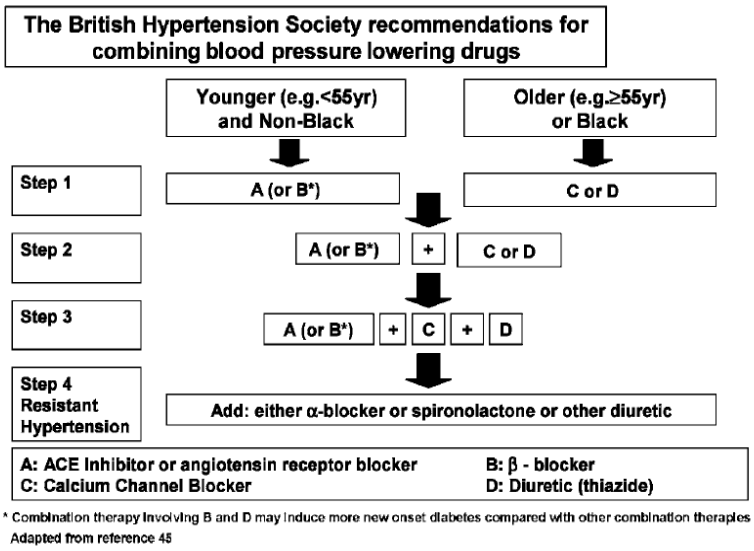
Beta-blockers are not a preferred initial therapy as they are less effective in reducing major cardiovascular and cerebrovascular events. However, beta-blockers may be considered in younger people, particularly:

- Those with an intolerance or contraindication to ACE inhibitors and Angiotensin-II receptor antagonists or
- Women of child-bearing potential or
- People with evidence of increased sympathetic drive.

If therapy is initiated with a beta-blocker and a second drug is required, add a calcium-channel blocker. However if a beta-blocker is withdrawn, the dose should be stepped down gradually.

Offer patients with isolated systolic hypertension (systolic BP 160 mmHg or more) the same treatment as patients with both raised systolic and diastolic blood pressure.

Offer patients over 80 years old the same treatment as other patients over 55 years, taking account of any co-morbidity and their existing burden of drug use.



Other medications for hypertensive patients

Prevention of arterio-vascular disease[1]

Primary

1. **Aspirin**: use 75 mg daily if patient is aged ≥50 years with BP controlled to <150/90 mmHg and end organ damage, diabetes mellitus, or 10 year risk of cardiovascular disease of ≥20%. (Measured by using the new Joint British Societies cardiovascular disease risk chart – see http://www.bhsoc.org/resources/prediction_chart.htm).
2. **Statin**: use sufficient doses to reach cholesterol targets if patient is aged up to 80 years, with a 10 year risk of cardiovascular disease of ≥20% and with total cholesterol concentration ≥3.5mmol/l.

Secondary (including patients with type 2 diabetes)

1. **Aspirin**: use for all patients unless contraindicated.

[1] This advice is based on Western studies and how far this practice should be extended in Africa is uncertain. Facilities for the measurement of blood cholesterol levels and supplies of a statin (e.g. simvastatin) are unlikely to be available so the management of hyperlipidaemia is not usually an option.

2. **Statin**: use sufficient doses to reach cholesterol targets if patient is aged up to 80 years with a total cholesterol concentration ≥3.5 mmol/l.

Hypertension in black patients is different

Hypertension occurs more frequently in black populations and is associated with:

- a higher incidence of cerebrovascular and renal complications (end-stage renal failure is up to 20 times more common)
- a two-fold higher incidence of left ventricular hypertrophy with an increased risk of left ventricular failure.

Salt (sodium) handling is different and associated with an expanded plasma volume and a higher prevalence of low plasma renin activity.

Management of hypertension in black patients

Non-pharmacological management

Lifestyle and non-pharmacological interventions may significantly reduce blood pressure hence minimising the need for antihypertensive drugs.

So advise patients to:

- **Eat less salt:** Sodium restriction to an intake of <100 mmol day (i.e. total of one teaspoon/day) may have the same effect as a low-dose thiazide diuretic.
- **Lose weight:** Black hypertensives are often obese and a fall in weight usually leads to a reduced blood pressure.
- **Drink less alcohol:** Even moderate alcohol ingestion (three to five drinks daily) is associated with a raised blood pressure in black patients.
- **Take more exercise.**

Pharmacological management

Diuretics: A thiazide diuretic (e.g. bendroflumethiazide 2.5mg daily) is the first-line treatment in most black hypertensives. However the clinician should be aware of potential adverse metabolic effects: hypokalaemia, hyperlipidaemia and glycaemic control in diabetics.

Beta-blockers: Beta-blockers (e.g. atenolol) are less effective in black hypertensives although younger patients may be more responsive than elderly ones.

Angiotensin-converting enzyme (ACE) inhibitors: ACE inhibitors (e.g. captopril) appear less effective when used alone in black patients although this is eliminated by the addition of a diuretic. ACE inhibitors remain the first-line anti-hypertensive agents in patients with diabetic nephropathy, particularly in the presence of proteinuria. The complication of ACE-inhibitor-induced angio-oedema is more common in black patients.

Calcium channel blockers: Calcium channel blockers (e.g. nifedipine) are highly effective. Verapamil is also a calcium channel blocker. It must never be used with a beta blocker because the two together may have a serious negative effect on cardiac function.

Alpha-blockers: Alpha-receptor-blocking agents (e.g. doxazocin) reduce blood pressure by reducing peripheral vascular resistance. However, the addition of a diuretic is often required.

Angiotensin receptor antagonists: There is limited information concerning the efficacy and tolerability of the angiotensin receptor antagonists (e.g. losartan) in black patients.

In view of the high prevalence of hypertension and associated complications in the black population consider starting effective screening programmes.

Further reading

1. Sern Lim et al, *Clinical hypertension in practice, 2nd ed, 2007,* Royal Society of Medicine Press Ltd.
2. Gibbs CR, Beevers DG and Lip GYH. *The management of hypertensive disease in black patients* Q J Med 1999; 92: 187-192
3. Williams B, Poulter NR. *British Hypertension Society Guidelines for management of hypertension, Report of the 4th Working Party of the British Hypertension Society,* 2004-BHS IV. J. Human Hypertension 2004; 18: 139-185 www.bhsoc.org/Latest_BHS_management_Guidelines.stm
4. *Hypertension: management of hypertension in adults in primary care (NICE clinical guideline 34), 2006*. http://www.nice.org.uk/CG034
5. *The Drug Treatment of Hypertension*, Factfile 07/2204, British Heart Foundation.
6. Harrisons *Principles of Internal Medicine,* 16th edition, 2005.

Website

British Hypertension Society www.bhsoc.org

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