

# HYPERTENSION AND ITS MANAGEMENT: WHAT A FAMILY PHYSICIAN NEEDS TO KNOW

*The management of uncomplicated hypertension falls squarely into the domain of the family doctor.*

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Professor Mhlongo studied medicine at Charing Cross Hospital Medical School, University of London, and graduated MB BS in 1970. As a registrar in medicine at Mayday Hospital, Croydon, he developed an interest in cardiology. Between 1975 and 1976 he was a resident in cardiology at the hospital at the University of Pennsylvania, USA. In 1978 he returned to the UK where he did vocational training in

general practice and obtained his MRCP in 1980. In 1991 he was awarded the MSc Med – his dissertation was on hypertension. From 1991 until his return to South Africa in 1998 he was a senior lecturer in general practice at St Mary's Hospital Medical School, University of London. His interests in cardiology, hypertension and diabetes continue.

## **MEASURING BLOOD PRESSURE**

The accurate diagnosis of hypertension is essential and the following are the recommendations of the South African Hypertension Guideline 2006:

*'Blood pressure (BP) is recorded using an approved device with the patient in a sitting position (with the back supported, arm bared and resting on a surface at heart level) for at least 5 minutes before measurement. Patients should not have smoked, ingested caffeine-containing beverages or had food in the previous 30 minutes. In people aged over 60 years, those with diabetes mellitus and those at high risk of hypertension, the BP should also be recorded after standing for 1 minute to document postural hypotension.*

*'An appropriate size cuff should be used: a standard cuff (12 cm) for a normal arm, and a larger cuff (15 cm) for an arm with a mid-upper circumference > 33 cm (the bladder within the cuff should encircle 80% of the arm). If an undersized cuff is used, the BP can be overestimated (undercuffing), and if the cuff and bladder are too large the BP can be underestimated (overcuffing).*

*'Both systolic blood pressure (SBP) and diastolic blood pressure (DBP) should be recorded. At the initial consultation BP should be measured in both arms, and if there is any*

*discrepancy it should be taken thereafter in the arm with the higher BP. The SBP should first be estimated by palpation to avoid missing the auscultatory gap. SBP is measured at the first appearance of sound (phase I) and DBP is measured at the disappearance of the sounds (phase V). Phase V is also recommended in pregnancy. In cardiac arrhythmias (e.g. atrial fibrillation) the highest phase I and lowest phase V are recorded as the SBP and DBP, respectively. There are circumstances when both phase IV (muffling) and phase V should be recorded, e.g. aortic regurgitation, pregnancy, and severe anaemia.*

*'The BP recorded should be the average of 2 readings taken 1 minute apart. If the first 2 readings differ by > 5 mmHg, additional readings should be taken. Repeat measurements should be performed on 3 separate occasions when either the initial SBP is between 140 and 160 mmHg or the DBP is between 90 and 100 mmHg. This should occur within 2 months to determine if the patient should be diagnosed as hypertensive. All measurements should preferably be taken at the same time of the day and in the same arm.'*

Self-measurement of BP (SBPM) is recommended in the following selected circumstances and target groups:

- suspected white-coat hypertension
- to guide antihypertensive medication
- the elderly
- pregnancy

- diabetes mellitus
- refractory hypertension
- to improve compliance with treatment
- to predict outcomes
- to help patients understand their own disease or to empower patients.

The doctor should recommend a particular device and educate the patient on its use. Remember that many of the devices currently on the market have not been validated according to stringent international standards. An up-to-date list of validated devices can be found on the following independent websites: <http://www.dableducational.com> or <http://www.afssaps.sante.fr>

The subsequent diagnosis of raised BP must take into consideration the way in which it was measured. The recommendations of the South African Hypertension Society Guideline 2006 are listed in Table I.

in the morning as the patient rises, but soon subside. Other symptoms which may occur include dizziness, palpitations, atrial fibrillation, fatigue and impotence. It is however important to remember that impotence may also be the result of drug therapy in already diagnosed hypertensive patients.

In secondary hypertension the symptoms and signs are those of the underlying disease. The symptoms may be polyuria, polydipsia, muscle weakness secondary to hypokalaemia in patients with primary aldosteronism, truncal obesity, diabetes, infertility, or hirsutism in Cushing's syndrome. Patients with a pheochromocytoma may present with episodic headaches, flushing, palpitations and postural dizziness.

**PREVALENCE**

It has been suggested and shown that the prevalence of hypertension

white population.' A similar racial or ethnic trend has been observed among people of African descent in the Caribbean Islands and the UK. Hypertension in those of African descent appears to develop at a much earlier adult age than in the general population.

**CAUSES OF HYPERTENSION**

In some 95% of patients with hypertension the cause is unknown and such patients are said to have essential or idiopathic hypertension.

**Low-renin essential hypertension.** Approximately 20% of patients who by all other criteria have essential hypertension have suppressed plasma renin activity. This situation is more common in individuals of African descent than in white patients. These patients are not hypokalaemic, but their extracellular fluid volume is expanded – hence the rise in BP.

**Causes of secondary hypertension**

- Coarctation of the aorta.
- Renal disease, e.g. glomerulonephritis, chronic pyelonephritis, collagen vascular diseases, polycystic kidney disease and renal artery stenosis.
- Endocrine – pheochromocytoma, Cushing's syndrome, Conn's syndrome, hyperparathyroidism, acromegaly, hypothyroidism, congenital adrenal hyperplasia.
- Alcohol.
- Drugs, e.g. oestrogen-containing contraceptives, anabolic steroids, corticosteroids, non-steroidal anti-inflammatory drugs, carbenoxolone, sympathomimetic agents.
- Pregnancy – pre-eclamptic toxemia.

Table I. Different methods of BP measurement

	Clinic	Home	Ambulatory BP
Predicts outcome	Yes	Yes	Strongly
Initial diagnosis	Yes	Yes	Yes
Cut-off BP levels (mmHg)	140/90*	135/85*	135/85 (mean day) 135/80 (24-h)
Evaluation of treatment	Yes	Yes	Limited but valuable
Assess diurnal rhythm	No	No	Yes

\* The small difference between the clinic BP and the ambulatory blood pressure (ABP) shown in this table does not clearly reflect that there is an increasing difference between the two measurements as the clinic BP rises. As the clinic BP rises, the ABP rises much less. Therefore a clinic BP of 180/110 mmHg corresponds to an ABP of 148/94 mmHg or even 150/95 mmHg. This may result in a large difference of 30/15 mmHg between the higher clinic BP levels and the ABP.

**SYMPTOMS AND SIGNS**

The vast majority of hypertensive patients, i.e. those with essential hypertension, have neither signs nor symptoms. Headache does occur, but in most cases it is associated with extremely high pressures. Such headaches are localised in the occipital region and occur mostly

'depends on both the racial composition of the population studied and the criteria used to define the condition. In a white suburban population like that in the Framingham Study, nearly one-fifth of individuals have blood pressures > 160/95, while almost one-half have pressures > 140/90. An even higher prevalence has been documented in the non-

**PHYSICAL EXAMINATION OF THE HYPERTENSIVE PATIENT**

The physical examination of a hypertensive patient starts with the patient's general appearance as he or she walks into the consultation room.

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*It has been suggested and shown that the prevalence of hypertension 'depends on both the racial composition of the population studied and the criteria used to define the condition'.*

The following features need to be observed so that a decision can be made as to whether the hypertension is idiopathic or secondary:

- Truncal obesity of Cushing's syndrome. Measure waist circumference in all patients. The normal values are men < 102 cm, women < 88 cm.
- Is muscular development in the upper extremities out of proportion to that in the lower extremities, suggesting coarctation of the aorta?
- The next step is to compare the BPs and pulses in the two upper extremities and in the supine and standing positions. A rise in DBP when the patient stands up is most compatible with idiopathic hypertension; a fall, in the absence of treatment, suggests secondary forms of hypertension.
- The patient's height and weight are recorded so that the body mass index (BMI) is determined.
- Fundoscopy.
- Palpation and auscultation of the carotid arteries for evidence of stenosis or occlusion are important.
- Examination of the heart and lungs, evidence of left ventricular hypertrophy and decompensation should be sought. Are third and fourth heart sounds present? Are there pulmonary rales?
- Abdominal examination in search of bruits originating in stenotic renal arteries. Auscultation and palpation for possible abdominal aneurysms and for the enlarged kidneys of polycystic renal disease.

- The femoral pulses must be carefully felt and if they are decreased and/or delayed in comparison with the radial pulse, the BP in the lower extremities must be measured. An abnormality discovered in this instance would suggest coarctation of the aorta.

### INVESTIGATIONS

The following investigations must be done:

- urinalysis – protein, glucose and blood
  - urea and electrolytes, creatinine
  - random blood glucose – it should be remembered that both Cushing's syndrome and pheochromocytoma may be associated with diabetes
  - electrocardiogram – there may be changes consistent with left ventricular hypertrophy secondary to hypertension
  - In the ECG  $SV_1 + RV_5$  or  $RV_6$  (whichever is tallest) > 35 mm (Sokolow Lyon criterion)
  - random total cholesterol level.
- If indicated, the following investigations may need to be carried out:
- thyroid-stimulating hormone
  - full blood cell count
  - serum calcium and phosphate
  - chest X-ray, limited echocardiogram.

### TREATMENT/MANAGEMENT

In the management of hypertensive patients all family physicians need to familiarise themselves with patient behaviour with regard to prescribed medication and instructions. Research has shown that compliance with prescribed medication and instruction are not influenced by social class or education. The literature shows that patients do not always take their medication as prescribed. It is therefore important to communicate with all patients on therapy.

Another important element in the management of patients during these days of the Internet is for the doctor to be familiar with all the evidence regarding management of any of the conditions he or she encounters. Patients have the right and should be

encouraged to ask questions as to why certain items are being prescribed. A good family doctor should have an interest in evidence-based medicine (EBM), which he or she can use as a guide to answer patients' queries.

With regard to the management of hypertension, this can be divided into two parts – non-pharmacological management (Table II) and pharmacological management.

Table II. **Non-pharmacological management of raised BP**

#### Lifestyle modification

- Maintain ideal weight – normal BMI or waist/hip ratio
- Diet – follow a prudent eating plan (reduced salt, reduced saturated fats, increased fruit and vegetables); network with a dietitian
- Regular exercise – reduction in stress levels
- Stop smoking
- Alcohol – drink sensibly or stop

#### Pharmacological management

The recommendations in South Africa follow European and American guidelines, and recent studies such as the ASCOT trial have led to a reconsideration of the drugs of choice for the management of uncomplicated hypertension. There are 3 important antihypertensive agents for the management of persons without compelling indications:

- diuretics (thiazide-like and thiazide)
- angiotensin-converting enzyme inhibitors (ACE-I)
- calcium-channel blockers (CCBs).

Steps 2 and 3 would depend on the patient's cardiac risk factors and the costs of drugs. If there are no contraindications use either an ACE-I inhibitor (angiotensin-receptor blockers (ARBs) can be used in ACE-I intolerance) or a CCB: dihydropyridine or non-dihydropyridine.

The ASCOT trial specifically looked at the cardioprotective effect of amlodipine with perindopril versus the older regimen of atenolol with a thiazide. It showed that the



Table III. Indications and contraindications for the major classes of antihypertensive drugs\*

Class	Conditions favouring the use	Contraindications	
		Compelling	Possible
Diuretics (thiazide, thiazide-like)	<ul style="list-style-type: none"> <li>Heart failure</li> <li>Elderly hypertensives</li> <li>Isolated systolic hypertension</li> <li>Hypertensives of African origin</li> </ul>	<ul style="list-style-type: none"> <li>Gout</li> </ul>	<ul style="list-style-type: none"> <li>Pregnancy</li> <li>β-blockers (especially atenolol)</li> </ul>
Diuretics (loop)	<ul style="list-style-type: none"> <li>Renal insufficiency</li> <li>Heart failure</li> </ul>	<ul style="list-style-type: none"> <li>Not used in other hypertensives</li> </ul>	<ul style="list-style-type: none"> <li>Pregnancy</li> </ul>
Diuretics (anti-aldosterone)	<ul style="list-style-type: none"> <li>Heart failure</li> <li>Post-myocardial infarction</li> <li>Resistant hypertension</li> </ul>	<ul style="list-style-type: none"> <li>Renal failure</li> <li>Hyperkalaemia</li> </ul>	
CCB Long-acting only (dihydropyridine)	<ul style="list-style-type: none"> <li>Elderly patients</li> <li>Isolated systolic hypertension</li> <li>Angina pectoris</li> <li>Peripheral vascular disease</li> <li>Carotid atherosclerosis</li> <li>Pregnancy</li> </ul>		<ul style="list-style-type: none"> <li>Tachyarrhythmias</li> <li>Heart failure</li> </ul>
CCB non-dihydropyridine (verapamil, diltiazem)	<ul style="list-style-type: none"> <li>Angina pectoris</li> <li>Carotid atherosclerosis</li> <li>Supraventricular tachycardia</li> </ul>	<ul style="list-style-type: none"> <li>AV block (grade 2 or 3)</li> <li>Heart failure</li> </ul>	<ul style="list-style-type: none"> <li>Constipation (verapamil)</li> </ul>
ACE-I	<ul style="list-style-type: none"> <li>Heart failure</li> <li>LV dysfunction</li> <li>Post-myocardial infarction</li> <li>Non-diabetic nephropathy</li> <li>Type 1 diabetic nephropathy</li> <li>Prevention of diabetic microalbuminuria</li> <li>Proteinuria</li> </ul>	<ul style="list-style-type: none"> <li>Pregnancy</li> <li>Hyperkalaemia</li> <li>Bilateral renal artery stenosis</li> </ul>	
ARBs	<ul style="list-style-type: none"> <li>Type 2 diabetic nephropathy</li> <li>Type 2 diabetic microalbuminuria</li> <li>Proteinuria</li> <li>Left ventricular hypertrophy</li> <li>ACE-I cough or intolerance</li> </ul>	<ul style="list-style-type: none"> <li>Pregnancy</li> <li>Hyperkalaemia</li> <li>Bilateral renal artery stenosis</li> </ul>	
β-blockers	<ul style="list-style-type: none"> <li>Angina pectoris</li> <li>Post-myocardial infarction</li> <li>Heart failure (some; must up-titrate)</li> <li>Tachyarrhythmias</li> </ul>	<ul style="list-style-type: none"> <li>Asthma</li> <li>Chronic obstructive pulmonary disease</li> <li>AV block (grade 2 or 3)</li> <li>Pregnancy (atenolol)</li> </ul>	<ul style="list-style-type: none"> <li>Peripheral vascular disease</li> <li>Bradycardia</li> <li>Glucose intolerance</li> <li>Metabolic syndrome</li> <li>Athletes and physically active patients</li> <li>Non-dihydropyridine CCBs (verapamil, diltiazem)</li> </ul>

Note: In resistant (refractory) hypertension centrally acting agents (selective and non-selective) and α-blockers may be required to control BP.  
\*Adapted from the JNC7 guidelines in the South African Hypertension Guideline 2006.

amlodipine-based regimen prevented more major cardiovascular events and induced less diabetes than the atenolol-based regimen. Although the cardioprotective effect may not be explained entirely by better control of blood pressure, the evidence is sufficiently compelling to say that a beta-blocker should not be used in combination with a thiazide, particularly where there is abdominal obesity combined with hypertension, as both classes of drugs have metabolic side-effects and increase the risk of new diabetes.

For a full discussion of antihypertensive treatment see the recent South African Hypertension Society Guideline 2006. As pointed out, the South African guidelines largely follow the European guidelines with regard to the management of hypertension. Tables III and IV, sourced from the SAMJ 2004; 94(3): 4, will illustrate the point.

**Further reading**

Dahlöf B, *et al.* Prevention of cardiovascular events with an antihypertensive regimen of amlodipine adding perindopril as required versus atenolol adding bendroflumethiazide as required, in the Anglo-Scandinavian Cardiac

Outcomes Trial – Blood Pressure Lowering Arm (ASCOT – BPLA): a multicentre randomised controlled trial. *Lancet* 2005; **366**: 895-906.

Joint National Hypertension Guideline Working Group 2006. South African Hypertension Guideline 2006. *S Afr Med J* 2006; **96**: 337-362.

Table IV. **Goals of BP-lowering treatment**

Stage	BP level (mmHg)
All stages	< 140/90
Diabetes mellitus	< 130/80
Renal insufficiency (serum creatinine > 220 µmol/l)	< 130/80
Proteinuria > 1 g/24 h	< 125/80
Congestive heart failure	< 120/80
Hypertensive emergency (pulmonary oedema, encephalopathy)	Reduce mean arterial pressure by 25% in the first 2 hours. Aim for 160/100 mmHg in 2 – 6 hours

Ideally these targets should be reached within 3 months.

**IN A NUTSHELL**

In a nutshell, the following are the key points in family medicine and primary health care with regard to hypertension:

Blood pressure should be recorded accurately.

Most patients with hypertension have neither signs nor symptoms.

Approximately 20% of patients who by all other criteria have essential hypertension have suppressed plasma renin activity.

Investigations include: urinalysis – protein, glucose and blood, urea and electrolytes, creatinine, random blood glucose, electrocardiogram: there may be changes consistent with left ventricular hypertrophy secondary to hypertension. In the ECG SV<sub>1</sub> + RV<sub>5</sub> or RV<sub>6</sub> (whichever is tallest) > 35 mm (Sokolow Lyon criterion), random total cholesterol level.

There are 3 important antihypertensive agents for the management of persons without compelling indications: diuretics (thiazide-like and thiazide), angiotensin-converting enzyme inhibitors (ACE-I) and calcium-channel blockers (CCBs).

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