Protect your patient’s “heartwood”

heartwood /heartwood/ n. the dense inner part of a tree trunk yielding the strongest timber.

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South African hypertension practice guideline 2014

Hypertension guideline working group: YK Seedat, BL Rayner, Yosuf Veriava

**Abstract**

**Outcomes:** Extensive data from many randomised, controlled trials have shown the benefit of treating hypertension (HTN). The target blood pressure (BP) for antihypertensive management is systolic < 140 mmHg and diastolic < 90 mmHg, with minimal or no drug side effects. Lower targets are no longer recommended. The reduction of BP in the elderly should be achieved gradually over one month. Co-existent cardiovascular (CV) risk factors should also be controlled.

**Benefits:** Reduction in risk of stroke, cardiac failure, chronic kidney disease and coronary artery disease.

**Recommendations:** Correct BP measurement procedure is described. Evaluation of cardiovascular risk factors and recommendations for antihypertensive therapy are stipulated. Lifestyle modification and patient education are cornerstones of management. The major indications, precautions and contra-indications are listed for each antihypertensive drug recommended. Drug therapy for the patient with uncomplicated HTN is either mono- or combination therapy with a low-dose diuretic, calcium channel blocker (CCB) and an ACE inhibitor (ACEI) or angiotensin receptor blocker (ARB). Combination therapy should be considered ab initio if the BP is ≥ 160/100 mmHg. In black patients, either a diuretic and/or a CCB is recommended initially because the response rate is better compared to an ACEI. In resistant hypertension, add an alpha-blocker, spironolactone, vasodilator or β-blocker.

**Validity:** The guideline was developed by the Southern African Hypertension Society 2014©.

**Keywords:** South Africa, hypertension, guideline

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**Definition and grading of hypertension**

HTN is defined as a persistent elevation of office blood pressure (BP) ≥ 140/90 mmHg (Table 1). The optimal BP is a value < 130/85 mmHg. High normal is BP levels from 130–139 mmHg systolic and 85–89 mmHg diastolic. This high-normal group of subjects is at higher CV risk and is also at risk of developing HTN, but does not require drug treatment.\(^9\) HTN is stratified into three grades depending on severity, which is useful in defining the approach to treatment.

**Measurement of blood pressure**

BP measurement is a vital clinical sign that is poorly performed by all healthcare professional categories. These recommendations

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**Table 1. Definitions and classification of office BP (mmHg).**

<table>
<thead>
<tr>
<th>Stage</th>
<th>Systolic BP (mmHg)</th>
<th>Diastolic BP (mmHg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal</td>
<td>&lt; 120</td>
<td>&lt; 80</td>
</tr>
<tr>
<td>Optimal</td>
<td>120–129</td>
<td>80–84</td>
</tr>
<tr>
<td>High normal</td>
<td>130–139</td>
<td>85–89</td>
</tr>
<tr>
<td>Grade 1</td>
<td>140–159</td>
<td>90–99</td>
</tr>
<tr>
<td>Grade 2</td>
<td>160–179</td>
<td>100–109</td>
</tr>
<tr>
<td>Grade 3</td>
<td>≥ 180</td>
<td>≥ 110</td>
</tr>
<tr>
<td>Isolated systolic</td>
<td>≥ 140</td>
<td>&lt; 90</td>
</tr>
</tbody>
</table>

BP should be categorised into the highest level of BP whether systolic or diastolic.
apply to both clinic and self-measurement of BP. Failure to follow these guidelines leads to significant errors in BP measurement. BP should be recorded using an approved and calibrated electronic device or mercury sphygmomanometer. 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). Measure BP after 1 and 3 minutes of standing at first consultation in the elderly, diabetics and in patients where orthostatic hypotension is common. When adopting the auscultatory measurement use Korotkoff 1 and V (disappearance) to identify SBP and DBP respectively. Take repeated measurements in patients with atrial fibrillation and other arhythmias to improve accuracy.

**Self- and ambulatory measurement of BP**

Self BP measurement (SBPM) and ambulatory BP measurement (ABPM) are recommended in selected circumstances and target groups:

- suspected white-coat HTN (higher readings in the office compared with outside) or masked HTN (normal readings in office but higher outside)
- to facilitate diagnosis of HTN
- to guide antihypertensive medication, especially in high-risk groups, e.g. elderly, diabetics
- refractory HTN
- to improve compliance with treatment (SBPM only).

Masked HTN should be suspected if, despite a normal BP in the office but higher outside, there is evidence of target-organ damage.

All devices used for SBPM and ABPM should be properly validated in accordance with the following independent websites: or http://afissaps.sante.fr.

In general, only upper-arm devices are recommended, but these are unsuitable in patients with sustained arrhythmias. For SBPM the patient should take two early morning and two late afternoon/early evening readings over five to seven days, and after discarding the first day readings, the average of all the remaining readings is calculated.

Wrist devices are recommended only in patients whose arms are too obese to apply an upper arm cuff. The wrist device needs to be held at heart level when readings are taken.

The advantages of SBPM measurement are an improved assessment of drug effects, the detection of causal relationships between adverse events and blood pressure response, and possibly, improved compliance. The disadvantages relate to increased patient anxiety and the risk of self-medication.

ABPM provides the most accurate method to diagnose HTN, assess BP control and predict outcome. Twenty-four-hour ABPM in patients with a raised clinic BP reduces misdiagnosis and saves costs. Additional costs of ABPM were counterbalanced by cost savings from better-targeted treatment. It can also assess nocturnal BP control and BP variability, which are important predictors of adverse outcome. However the assessment is limited by access to ABPM equipment, particularly in the public sector, and impracticalities of regular 24-hour ABPM monitoring.

The appropriate cut-off levels for diagnosis of HTN by SBPM and ABPM are listed in Table 3.

**Automated office BP measurement**

Despite efforts to promote proper techniques in manual BP measurement, it remains poorly performed. Automated office BP measurement offers a practical solution to overcome the effects of poor measurement, bias and white coating. It is more predictive of 24-hour ABPM and target-organ damage than manual office BP measurement. Six readings are taken at two-minute intervals in a quiet room. The initial reading is discarded and the remaining five are averaged. The appropriate cut-off level for HTN is 135/85 mmHg.

**CVD risk stratification**

The principle of assessing and managing multiple major risk factors for CVD is endorsed. However, because the practical problems in implementing previous recommendations based on the European Society of HTN (ESH) and the European Society of Cardiology (ESC) HTN guidelines, it has been decided to use a modification of this approach.

Once the diagnosis of HTN is established, patients with BP ≥ 160/100 mmHg should commence drug therapy and lifestyle modification. Patients with stage 1 HTN should receive lifestyle modification for three to six months unless they are stratified as high risk by the following criteria: three or more major risk factors, diabetes, target-organ damage or complications of HTN (Table 4).

**Routine baseline investigations**

Table 5 lists recommended routine basic investigations. The tests are performed at baseline and annually unless abnormal. Abnormal results must be repeated as clinically indicated.

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**Table 2. Recommendations for blood pressure measurement**

<table>
<thead>
<tr>
<th>Situations</th>
<th>SBPM</th>
<th>ABPM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Allow patient to sit for 3–5 minutes before commencing measurement</td>
<td>The SBP should be first estimated by palpation to avoid missing the auscultatory gap</td>
<td></td>
</tr>
<tr>
<td>Take two readings 1–2 minutes apart. If consecutive readings differ by &gt; 5 mm, take additional readings</td>
<td>Take initial consultation measure BP in both arms, and if discrepant use the higher arm for future estimations</td>
<td></td>
</tr>
<tr>
<td>The patient should be seated, back supported, arm bared and arm supported at heart level</td>
<td>The patient should be seated, back supported, arm bared and arm supported at heart level</td>
<td></td>
</tr>
<tr>
<td>Patients should not have smoked, ingested caffeine-containing beverages or food in previous 30 min</td>
<td></td>
<td></td>
</tr>
<tr>
<td>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 &gt; 33 cm (the bladder within the cuff should encircle 80% of the arm)</td>
<td>Measure BP after 1 and 3 minutes of standing at first consultation in the elderly, diabetics and in patients where orthostatic hypotension is common</td>
<td></td>
</tr>
<tr>
<td>When adopting the auscultatory measurement use Korotkoff 1 and V (disappearance) to identify SBP and DBP respectively</td>
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<td></td>
</tr>
<tr>
<td>Take repeated measurements in patients with atrial fibrillation and other arhythmias to improve accuracy</td>
<td>Take repeated measurements in patients with atrial fibrillation and other arhythmias to improve accuracy</td>
<td></td>
</tr>
</tbody>
</table>

**Table 3. Definitions of hypertension by different methods of BP measurement**

<table>
<thead>
<tr>
<th>Cut-off BP (mmHg)</th>
<th>Office</th>
<th>Self</th>
<th>Ambulatory</th>
</tr>
</thead>
<tbody>
<tr>
<td>Predicts outcome</td>
<td>+</td>
<td>++</td>
<td>+++</td>
</tr>
<tr>
<td>Initial diagnosis</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Mean night</td>
<td>135/85</td>
<td>Mean night 135/85</td>
<td></td>
</tr>
<tr>
<td>Mean night</td>
<td>135/85</td>
<td>Mean night 135/85</td>
<td></td>
</tr>
<tr>
<td>Evaluation of treatment</td>
<td>No</td>
<td>Yes</td>
<td>Limited, but valuable</td>
</tr>
<tr>
<td>Assess diurnal variation</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
</tr>
</tbody>
</table>
Through lifestyle and drug therapy, according to the Society for Risk and Underlying Co-morbidities. The only exception is that in antihypertensive treatment is SAHS accepts that to simplify management, a universal goal of SAHS does not support the JNC-8 Committee recommendations of a goal BP > 150/90 mmHg regardless of CV risk and underlying co-morbidities. The only exception is that in patients over 80 years of age, therapy should be initiated if SBP is > 160 mmHg and the goal is between 140 and 150 mmHg, based on the HYVET study in which the majority of patients received indapamide and the ACEI perindopril.

SAHS does not support the JNC-8 Committee recommendations of a goal BP < 150/90 mmHg for persons over 60 years without diabetes and CKD, as (1) increasing the target will probably reduce the intensity of antihypertensive treatment in a large population at high risk for cardiovascular disease, (2) the evidence supporting increasing the SBP target from 140 to 150 mmHg in persons aged 60 years or older was insufficient, (3) the higher SBP goal in individuals aged 60 years or older may reverse the decades-long decline in CVD, especially stroke mortality.

It is also essential to control hyperlipidaemia and diabetes through lifestyle and drug therapy, according to the Society for Endocrine Metabolism Diabetes of South Africa and South African Heart Association/Lipid and Atherosclerosis Society of Southern Africa guidelines, respectively. Aspirin should not be routinely prescribed to hypertensives (especially if BP is not controlled), and should mainly be used for secondary prevention of CVD (transient ischaemic attack, stroke, myocardial infarction).

### Goals of treatment

There has been considerable controversy about BP goals and SAHS accepts that to simplify management, a universal goal of antihypertensive treatment is < 140/90 mmHg regardless of CV risk and underlying co-morbidities. The only exception is that in patients over 80 years of age, therapy should be initiated if SBP is > 160 mmHg and the goal is between 140 and 150 mmHg, based on the HYVET study in which the majority of patients received indapamide and the ACEI perindopril.

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### Management of hypertension

All patients with HTN should receive lifestyle counselling as outlined in Table 6, and this is the cornerstone of management. The approach to drug treatment is outlined in Fig. 1. If the SBP is ≥ 180 mmHg or the DBP is ≥ 110 mmHg then refer to section 8 on severe (grade 3) HTN, as this section does not apply.

Before choosing an antihypertensive agent, allow for considerations based on the cost of the various drug classes, patient-related factors, conditions favouring use and contraindications, complications and target-organ damage (TOD) (Tables 4, 7).

In otherwise uncomplicated primary HTN, the initial first choice of antihypertensive drug is a diuretic (thiazide-like or thiazide), ACEI or ARB, and/or CCB used as mono- or combination therapy (Fig. 2). Combination therapy should be considered if clinically appropriate ab initio if BP is ≥ 160/100 mmHg (Fig. 1) as this is associated with better clinical outcomes and earlier achievement of goal BP. Fixed-dose combinations are preferred because of better patient adherence and control of BP. A treatment algorithm is outlined in Fig. 1 if the goal is not reached after initial treatment.

### Table 4. Major risk factors, target-organ damage (TOD) and complications. Adapted from the ESH/ESC guidelines

<table>
<thead>
<tr>
<th>Major risk factors</th>
<th>TOD</th>
<th>Complications</th>
</tr>
</thead>
<tbody>
<tr>
<td>SBP &gt; 160 mmHg</td>
<td>LVH: based on ECG</td>
<td>Coronary heart disease</td>
</tr>
<tr>
<td></td>
<td>– Sokolow-Lyons &gt; 35 mm</td>
<td>Heart failure</td>
</tr>
<tr>
<td></td>
<td>– R in aVL &gt; 11 mm</td>
<td>Chronic kidney disease:</td>
</tr>
<tr>
<td></td>
<td>– Cornel &gt; 2 440 (mm/ms)</td>
<td>– macroalbuminuria &gt; 30 mg/mmol</td>
</tr>
<tr>
<td></td>
<td>Microalbuminuria: albumin to creatinine ratio 3–30 mg/mmol preferably spot morning urine and eGFR &gt; 60 ml/min</td>
<td>OR eGFR &lt; 60 ml/min</td>
</tr>
<tr>
<td>Family history of early onset of CVD:</td>
<td></td>
<td>Stroke or TIA</td>
</tr>
<tr>
<td>– Men aged &lt; 55 years</td>
<td></td>
<td>Peripheral arterial disease</td>
</tr>
<tr>
<td>– Women aged &lt; 65 years</td>
<td></td>
<td>– Advanced nephropathy:</td>
</tr>
<tr>
<td>Waist circumference: abdominal obesity:</td>
<td></td>
<td>– haemorrhages OR</td>
</tr>
<tr>
<td>– Men ≥ 102 cm</td>
<td></td>
<td>– exudates</td>
</tr>
<tr>
<td>– Women ≥ 88 cm</td>
<td></td>
<td>– papilloedema</td>
</tr>
<tr>
<td>The exceptions are South Asians and Chinese:</td>
<td>men: ≥ 90 cm and women: ≥ 80 cm.</td>
<td></td>
</tr>
</tbody>
</table>

### Table 5. Routine investigations

<table>
<thead>
<tr>
<th>Test</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Height, weight, BMI</td>
<td>Ideal BMI &lt; 25 kg/m², overweight 25–30 kg/m², obese &gt; 30 kg/m²</td>
</tr>
<tr>
<td>Waist circumference</td>
<td>Men &lt; 102 cm; women &lt; 88 cm. South Asians and Chinese: men &lt; 90 cm and women &lt; 80 cm</td>
</tr>
<tr>
<td>Electrolytes</td>
<td>Low potassium may indicate primary aldo-steronism, or effects of diuretics</td>
</tr>
<tr>
<td>ECG</td>
<td>S in V1 plus R in V5 or V6 &gt; 35 mm or R in aVL &gt; 11 mm or Cornell product (R in aVL + S in V3 + 6 in females) × QRS duration &gt; 2 440 (mm/ms)</td>
</tr>
<tr>
<td>Echocardiogram (if indicated and facilities available)</td>
<td>LVH: men &gt; 115 g/m² and women &gt; 95 g/m²</td>
</tr>
<tr>
<td>Fasting glucose</td>
<td>Consider HBA₁c, or GTT if impaired fasting glucose (6.1–7.1 mmol/l)</td>
</tr>
<tr>
<td>Cholesterol</td>
<td>If total cholesterol &gt; 5.1 mmol/l – fast- ing lipogram</td>
</tr>
<tr>
<td>Creatinine</td>
<td>Calculate eGFR</td>
</tr>
<tr>
<td>Uric acid</td>
<td>High uric acid is relative contraindication to diuretics</td>
</tr>
<tr>
<td>Dipsticks urine</td>
<td>If abnormal, urine microscopy and protein estimation</td>
</tr>
</tbody>
</table>

### Table 6. Recommended lifestyle changes

<table>
<thead>
<tr>
<th>Modification</th>
<th>Recommendation</th>
<th>Approx ↓ SBP (mmHg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight reduction</td>
<td>BMI 18.5–24.9 kg/m²</td>
<td>5–20 per 10 kg</td>
</tr>
<tr>
<td>Dash diet</td>
<td>↓ saturated fat and total fat, ↑ fruit and vegetables</td>
<td>8–14</td>
</tr>
<tr>
<td>Dietary Na⁺</td>
<td>&lt; 100 mmol or 6 g NaCl/day</td>
<td>2–8</td>
</tr>
<tr>
<td>Physical activity</td>
<td>Brisk walking for 30 minutes per day most days</td>
<td>4–9</td>
</tr>
<tr>
<td>Moderation of alcohol</td>
<td>No more than two drinks per day</td>
<td>2–4</td>
</tr>
<tr>
<td>Tobacco</td>
<td>Complete cessation</td>
<td>–</td>
</tr>
</tbody>
</table>
In black hypertensive patients a diuretic and/or a CCB is recommended. Beta-blockers should generally be avoided in combination with diuretics as first-line therapy because of predisposition to diabetes, but this may not apply to highly selective beta-blockers. Beta-blockers may also be considered if there is intolerance to one of the first-line drugs. Loop diuretics such as furosemide should not be used because of their short duration of hypotensive activity of about six hours, unless there is evidence of chronic kidney disease (CKD) with estimated glomerular filtration rate (GFR) < 45 ml/min.

Table 7. Indications and contra-indications for the major classes of antihypertensive drugs. Adapted from the ESC/ESH guidelines

<table>
<thead>
<tr>
<th>Class</th>
<th>Conditions favouring the use</th>
<th>Compelling</th>
<th>Possible</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diuretics (thiazide; thiazide-like)</td>
<td>• Heart failure (HF) • Elderly hypertensives • Isolated systolic HTN (ISH) • Hypertensives of African origin</td>
<td>• Gout</td>
<td>• Pregnancy • β-blockers (especially atenolol)</td>
</tr>
<tr>
<td>Diuretics (loop)</td>
<td>• Renal insufficiency • HF</td>
<td>• Renal failure • Hyperkalaemia</td>
<td>• Pregnancy</td>
</tr>
<tr>
<td>Diuretics (anti-aldosterone)</td>
<td>• HF • Post-myocardial infarction • Resistant hypertension</td>
<td>• Tachyarrhythmias • HF especially with reduced ejection fraction</td>
<td>• Pregnancy</td>
</tr>
<tr>
<td>CCB (dihydropyridine)</td>
<td>• Elderly patients • ISH • Angina pectoris • Peripheral vascular disease • Carotid atherosclerosis • Pregnancy</td>
<td>• AV block (grade 2 or 3) • Constipation (verapamil)</td>
<td>• Pregnancy • Hyperkalaemia • Bilateral renal artery stenosis • Angioneurotic oedema (more common in blacks than in Caucasians)</td>
</tr>
<tr>
<td>CCB non-dihydropyridine (verapamil, diltiazem)</td>
<td>• Angina pectoris • Carotid atherosclerosis • Supraventricular tachycardia</td>
<td>• Pregnancy • Hyperkalaemia • Bilateral renal artery stenosis</td>
<td>• Pregnancy • Hyperkalaemia • Bilateral renal artery stenosis</td>
</tr>
<tr>
<td>ACEI</td>
<td>• HF • LV dysfunction • Post-myocardial infarction • Non-diabetic nephropathy • Type 1 diabetic nephropathy • Prevention of diabetic microalbuminuria • Proteinuria</td>
<td>• Pregnancy • Hyperkalaemia</td>
<td>• Peripheral vascular disease • Bradycardia • Glucose intolerance • Metabolic syndrome • Athletes and physically active patients</td>
</tr>
<tr>
<td>ARB</td>
<td>• Type 2 diabetic nephropathy • Type 2 diabetic microalbuminuria • Proteinuria • LVH • ACEI cough or intolerance</td>
<td>• Pregnancy • Hyperkalaemia • Bilateral renal artery stenosis</td>
<td></td>
</tr>
</tbody>
</table>
Management of severe hypertension

Patients with severe HTN (grade 3; BP ≥ 180/110 mmHg) may fall into one of three categories, which determine the urgency of their treatment. Patients should be managed or referred to the appropriate level of care and caregiver in accordance with local resources. Sustained, severe HTN requires immediate drug therapy and lifestyle modification, and close follow up.

Asymptomatic severe hypertension

These patients are asymptomatic but have severe HTN without evidence of progressive TOD or complications. The patient must be kept in the care setting and BP measurement repeated after resting for one hour. If still elevated at the same level, commence oral therapy using two first-line drugs. Follow up within a week or earlier, with escalation of treatment as needed. Early referral is advised if BP is not controlled within two to four weeks.

Hypertensive urgencies and emergencies

While not common, hypertensive emergencies and urgencies are likely to be encountered by all clinicians because of the high prevalence of chronic HTN. It is essential that all professionals are familiar with treatment. There is a paucity of information from well-conducted studies on the outcomes of various antihypertensive drugs and BP-lowering strategies.

Hypertensive urgency

This level of HTN is symptomatic, usually with severe headache, shortness of breath and oedema. There are no immediate life-threatening neurological, renal, eye or cardiac complications, such as seen in hypertensive emergencies. Ideally, all patients with hypertensive urgency should be treated in hospital.

Commence treatment with two oral agents and aim to lower the diastolic BP to 100 mmHg slowly over 48 to 72 hours. This BP lowering can be achieved with the use of: (1) long-acting CCBs; (2) ACEI, initially used in very low doses, but avoid if there is severe hyponatraemia (serum Na < 130 mmol/l indicates hyper-reninaemia and BP may fall dramatically with ACEI); (3) β-blockers; and (4) diuretics.

Hypertensive emergency

A hypertensive emergency is severe, often acute elevation of BP associated with acute and ongoing organ damage to the kidneys, brain, heart, eyes (grade 3 or 4 retinopathy) or vascular system. These patients need rapid (within minutes to a few hours) lowering of BP to safe levels. Hospitalisation is ideally in an intensive care unit (ICU) with experienced staff and modern facilities for monitoring. If an ICU is unavailable, the patient may be closely monitored and treated in the ward.

Intravenous antihypertensive therapy, tailored to the specific type of emergency, has become the standard of care. Labetalol, nitrprusside or nitroglycerin are the preferred intravenous agents. Overzealous lowering of BP may result in stroke. A 25% reduction in BP is recommended in the first 24 hours. Oral therapy is instituted once the BP is more stable. Although most adult patients with a hypertensive emergency will have BP > 220/130 mmHg, it may also be seen at modest BP elevations; for example, in a previously normotensive woman during pregnancy (eclampsia) or in the setting of acute glomerulonephritis, especially in children.

Severe HTN associated with ischaemic stroke and intracerebral haemorrhage should be managed according to the recommendations of the Neurological Association of South Africa. Great caution should be exercised in lowering BP after an ischaemic stroke due to the risk of extending the ischaemic penumbra.

Resistant hypertension

HTN that remains > 140/90 mmHg despite the use of three antihypertensive drugs in a rational combination at full doses and including a diuretic (hydrochlorothiazide 25 mg or indapamide 2.5 mg) is known as resistant HTN. Common causes of resistant HTN are listed in Table 8.

The therapeutic plan must include measures to ensure adherence to therapy and lifestyle changes. Unsuspected causes of secondary HTN are less common, but need to be considered based on history, examination and special investigations. It is essential to exclude pseudo-resistance by performing SBPM or 24-hour ABPM. Referral to a specialist is often indicated for a patient with resistant HTN.

Table 8. Causes of resistant hypertension in South Africa

<table>
<thead>
<tr>
<th>Non-adherence to therapy</th>
<th>Volume overload</th>
<th>Associated conditions</th>
<th>Identifiable causes of hypertension</th>
<th>Pseudoresistance</th>
<th>Drug-related causes</th>
<th>Drug actions and interactions</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Instructions not understood</td>
<td>• Excess salt intake</td>
<td>• Smoking</td>
<td>• Chronic kidney disease</td>
<td>• ‘Whitecoat hypertension’ or office elevations</td>
<td>• Doses too low</td>
<td>• Non-steroidal anti-inflammatory drugs (NSAIDs)</td>
</tr>
<tr>
<td>• Side effects</td>
<td>• Inadequate diuretic therapy</td>
<td>• Increasing obesity</td>
<td>• Renovascular disease</td>
<td>• Pseudohypertension in older patients</td>
<td>• Wrong type of diuretic</td>
<td>• Sympathomimetics: nasal decongestants, appetite suppressants</td>
</tr>
<tr>
<td>• Cost of medication and/or cost of attending at healthcare centre</td>
<td>• Progressive renal damage (nephrosclerosis)</td>
<td>• Sleep apnoea</td>
<td>• Primary aldosteronism</td>
<td>• ‘Whitecoat hypertension’ or office elevations</td>
<td>• Inappropriate combinations</td>
<td>• Cocaine, Tik and other recreational drugs</td>
</tr>
<tr>
<td>• Lack of consistent and continuous primary care</td>
<td></td>
<td>• Insulin resistance/hyperinsulinaemia</td>
<td>• Primary aldosteronism</td>
<td></td>
<td>• Rapid inactivation (e.g. hydralazine)</td>
<td>• Oral contraceptives</td>
</tr>
<tr>
<td>• Inconvenient and chaotic dosing schedules</td>
<td></td>
<td>• Ethanol intake of more than 30 g (three standard drinks) daily</td>
<td>• Coarctation</td>
<td></td>
<td></td>
<td>• Adrenal steroids</td>
</tr>
<tr>
<td>• Organic brain syndrome (e.g. memory deficit)</td>
<td></td>
<td>• Anxiety-induced hyperventilation or panic attacks</td>
<td>• Cushing’s syndrome</td>
<td></td>
<td></td>
<td>• Liqueur (as may be found in chewing tobacco)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Chronic pain</td>
<td>• Phaeochromocytoma</td>
<td></td>
<td></td>
<td>• Cyclosporine, tacrolimus, erythropoietin</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Intense vasoconstriction (Raynaud’s phenomenon), arteritis</td>
<td></td>
<td></td>
<td></td>
<td>• Antidepressants (monoamine oxidase inhibitors, tricyclics)</td>
</tr>
</tbody>
</table>
Once the issues relating to lifestyle, adherence to therapy, white coating, etc. outlined in Table 7 have been satisfactorily managed, then consideration should be given to the addition of the fourth- and fifth-line drug. Currently spironolactone (25–50 mg only) with careful monitoring of serum potassium, beta-blockers and/or long-acting doxazosin is recommended. Other choices include direct-acting vasodilators (hydralazine, minoxidil), or centrally acting drugs (methyldopa, moxonidine, reserpine).

Initial studies of renal denervation in patients with resistant HTN showed very promising results. The recent publication of the Simplicity 3 study showing no significant effect on BP compared to sham procedure, the place of renal denervation in the treatment of resistant HTN remains to be established and is not supported by this guideline.

**Special considerations for hypertension in certain populations**

**Blacks and Asians**

Blacks are more prone to complications of stroke, heart failure and renal failure, while the incidence of coronary heart disease, although increasing in frequency, is less common compared with that in whites and Asians. The prevalence of diabetes mellitus and the metabolic syndrome is higher in Asians compared to other racial groups.

Compared to whites, blacks respond poorly to ACEI and β-blockers as monotherapy, but this difference disappears once these drugs are combined with diuretics. Overall, CCBs show the most consistent response in blacks compared to other classes of drugs used as monotherapy. However there is a higher incidence of angioedema in blacks treated with an ACEI.

**Hypertension in children and adolescents**

HTN in children is an important issue beyond the scope of this guideline. In adolescents, the HTN is increasingly linked to obesity and affects up to 10% of people between the ages of 15 and 25 years. The international trend of poor diet and lack of exercise in children is leading to an epidemic of obesity, with the early onset of HTN and even type 2 diabetes. The early recognition of HTN in these adolescents will be an important motivation for both children and parents to institute important lifestyle changes.

**HIV/AIDS**

There are an estimated 5.8 million people living with HIV in South Africa. The co-existence of HIV with HTN and diabetes is increasing, and patients should be screened for associated glomerulonephritis. Prolonged highly active antiretroviral therapy (HAART) is associated with a higher prevalence of systolic HPT, and it is essential that BP is monitored in patients receiving HAART.

Two of the three major classes of antiretroviral drug, the protease inhibitors and the non-nucleoside reverse transcriptase inhibitors, are involved in many drug interactions by inhibiting or inducing the key hepatic enzyme system, cytochrome P450. CCBs are the major class of antihypertensives affected by such drug interactions, leading to inhibition or induction of their metabolism. This results in either an enhanced or loss of antihypertensive efficacy.

**Disclaimer**

This national clinical guideline is a reference and educational document. The SAHS accepts no responsibility or liability arising from any information contained in or any error of omission from the protocol or from the use of any information contained in it.

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The importance of guidelines

Erika SW Jones, Brian L Rayner

The management of chronic diseases crosses the line between primary healthcare and tertiary academic medicine. New technologies are constantly being developed and treatment options being better defined. This has resulted in the development of multiple guidelines in order to standardise appropriate therapy for chronic diseases and to disseminate the information. Guidelines highlight current literature and new evidence, and they create an easy step-wise approach to the management of diseases, the targets for disease control and the standards of care.

There is a growing prevalence of patients with hypertension and diabetes mellitus. The cardiovascular complications of these disorders are well documented (including ischaemic heart disease, heart failure, neuropathies, retinopathy, renal failure and stroke) and result in considerable morbidity and mortality. However, with good care, these complications can be decreased, controlled or prevented, limiting the adverse outcomes.

It has been established that the quality of care provided in South Africa is inadequate to prevent these adverse outcomes. Hypertension and its sequelae account for three of the top 10 causes of death in South Africa. This is because blood pressures are uncontrolled, there is poor glycaemic control and screening for complications is inadequate. Guidelines attempt to improve these issues. However, physician compliance with guideline recommendations needs to be addressed in order to improve the outcomes.

Reviews of the major trials in various chronic diseases, such as that by Okpechi and Rayner, summarise the results of the trials but do not make the information practically available. Accessing reviews and applying them to clinical practice requires time and expertise, whereas guidelines are made easily available in their local setting for healthcare providers to peruse as and when needed.

Guidelines provide an easily accessible resource that clinicians can review to expand their knowledge base and determine patient care. This allows clinicians to be able to keep abreast of current knowledge despite the rapidly expanding knowledge that is being continuously developed. Health services and insurers can also access these guidelines to determine standards of care and medication recommendations. This can be the basis for essential drug lists.

The National High Blood Pressure Education Programme (NHBPEP) released their first guideline in 1977. This was the first in the series of hypertension management guidelines produced in the United States to improve blood pressure control and management. The production and implementation of these guidelines resulted in improved patient awareness of blood pressure and the complications that result. As a result of this awareness, people are more likely to visit their doctor for blood pressure checks, the most common reason for adults to visit their doctor.

The NHBPEP is responsible for improving blood pressure control and outcomes; age-adjusted mortality has declined by 70% for heart disease and by 80% for stroke over the four decades of its existence. There has been a steady decline in heart-related deaths over this time period, and malignant hypertension is rare in the USA.

Implementing guidelines can be a difficult task and in some instances may not improve outcomes. A study in Cape Town in 1999 showed that the approach to treating hypertension and diabetes with guidelines did not improve blood pressure or glycated haemoglobin levels.

The implementation of the guidelines involved a multifaceted intervention. A structured record was designed and incorporated into the folder. This structured record was a three-sided folded A3 sheet with multiple components: patient details, medical history, referrals, educational topics, algorithms for hypertension and diabetes diagnosis and management, targets, treatment options, and a flow sheet for results. The intervention included an educational package to train the primary healthcare providers in the use of the guidelines.

Unfortunately this intervention did not improve blood pressure control or glycated haemoglobin levels. There are multiple reasons for this; the structured record was only found in 60% of the intervention folders and was generally not used when found in the folders. Other contributing factors include that this was a time when the healthcare system was being changed in South Africa by redistributing patients to primary care facilities. The changes did not include the badly needed increase in staffing. There was also a lack of budget to support the implementation of these guidelines, a lack of facilities within the primary healthcare services, and lack of time to provide the suggested care.

This study highlights two importance aspects of guidelines and interventions. They need to be simple and suited to the environment in which they will be implemented; and in order to implement the guidelines, there needs to be the institutional infrastructure to be able to manage the recommendations.

The American Heart Association has highlighted the cost of hypertension and the resultant cardiovascular complications in the USA. They have issued a science advisory in order to improve control. This document is an attempt to ‘identify, disseminate, and implement more effective approaches to achieve optimal control’. They suggest that blood pressure requires a multifactorial approach, and the engagement of all potentially involved persons/health systems. They suggest that best-practice guidelines are essential in achieving the goals of blood pressure control and cost saving. This advisory considers that lack of control can be ascribed to fragmented healthcare services (a major problem in South Africa) and the poor implementation of health-system solutions at a clinical level, as seen by Steyn et al.
An evidence-based treatment programme in Kaiser Permanente, northern California, showed system-level success. This programme resulted in an increase in blood pressure control (44 to 80%) despite an increase in numbers of patients with hypertension; possibly due to better and earlier detection, which results independently in better treatment and control.

It is, however, important to recognise the necessity of individualising treatment. This approach was best seen in the physiologically based antihypertensive therapy as described by Spence. Such management can, if successful, be included into guidelines where appropriate.

Guidelines are an essential tool in the care of chronic diseases. They provide a means to update and disseminate information and the standard of care to all health sectors. However, they are only as good as the clinicians who implement them, and the system that provides the infrastructure for their implementation. Furthermore, they need to be appropriate for the system in which they will be implemented.

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