South African Hypertension Guideline 2011

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Outcomes. Extensive data from randomised controlled trials have shown the benefit of treating hypertension. The target blood pressure (BP) for antihypertensive management is systolic <140 mmHg and diastolic <90 mmHg with minimal or no drug side-effects; however, stricter BP control is required for patients with end-organ damage, co-existing risk factors and co-morbidity, e.g. diabetes mellitus. The reduction of BP in the elderly and in those with severe hypertension should be achieved gradually over 1 month. Co-existent risk factors should also be controlled.

Benefits. Benefits of management include reduced risks of stroke, cardiac failure, chronic kidney disease and coronary heart disease.

Recommendations. The correct BP measurement procedure is described, and evaluation of cardiovascular risk factors and recommendations for antihypertensive therapy are stipulated. The total cardiovascular disease risk profile should be determined for all patients to inform management strategies. Lifestyle modification and patient education are cornerstones in the management of every patient. Major indications, precautions and contraindications to each recommended antihypertensive drug are listed. Combination therapy should be considered *ab initio* if the BP is ≥20/10 mmHg above goal. First-line drug therapy for uncomplicated hypertension includes low-dose thiazide-like diuretics, calcium channel blockers (CCBs) or angiotensin-converting enzyme inhibitors (ACE-Is) (or ARBs - angiotensin II receptor blockers). If the target BP is not obtained, a second antihypertensive should be added from the aforementioned list. If the target BP is still not met, the third remaining antihypertensive agent should be used. In black patients either thiazide-like diuretics or CCBs can be used initially, because response rates are better than with ACE-Is or β-blockers. In treating resistant hypertension, a centrally acting drug, vasodilator, α-blocker, spironolactone or β-blocker should be added. This guideline includes management of specific situations, i.e. hypertensive emergency and urgency, severe hypertension with target organ damage, hypertension in diabetes mellitus, resistant hypertension, fixed drug combinations, new trials in hypertension, and interactions of antihypertensive agents with other drugs.

Validity. The guideline was developed by the Southern African Hypertension Society.

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1. Introduction

This is the 5th hypertension guideline published by the Southern African Hypertension Society (SAHS). It is an important step towards implementing a national standard to improve the quality of care for persons living with hypertension. The realistic objectives described can be applied widely and aim to diminish the impact of hypertension and related cardiovascular disease (CVD) risk in South Africa. Previous versions of the SAHS guideline emphasised improved diagnosis and treatment, tighter control and risk factor stratification.[1-4] Other guidelines support the same trends and the movement to evidence-based strategies.[5-10] The SAHS continuously reviews its guideline, given the changing nature of the evidence.

Using criteria of BP ≥160/95 mmHg or persons aged >18 years receiving antihypertensive medication, the 1998 South African Demographic and Health Survey estimated that there were 3.3 million people with hypertension in the country.[11] Acceptance of the international definition of hypertension (BP ≥140/90 mmHg; used in this guideline) adds a further 2.7 million people to this hypertensive population.[11] CVD was previously ranked as the second highest cause-of-death category in South Africa.[12] This has major cost implications for a developing country and requires a national strategy for prevention and management.

Hypertension is a global health burden affecting developed and developing countries, including South Africa.[13] The high prevalence of hypertension worldwide contributes to the present and anticipated pandemic of CVD, which is of particular concern in developing countries.[13] The control of hypertension, together with the curbing of other major risk factors such as cigarette smoking, dyslipidaemia and diabetes mellitus, constitutes the ideal approach to the primary prevention of atherosclerotic disease, and remains a major challenge for the community. The trend towards comprehensive cardiovascular (CV) risk factor management is the internationally accepted model of care.[14]

Hypertension is a major and costly contributor to CVD: it accounted for R4 - 5 billion in direct and indirect expenditure in 1991,[15] and was previously shown to constitute 7.5% of the direct total healthcare spend in South Africa.[16] This guideline has adopted an evidence-based approach to the estimation of CVD risk, intended to allow the treatment of patients at highest risk and those who can benefit most from lifestyle and drug interventions at the lowest cost, given the country's limited resources.[17]

2. Objective and methodology

The objective of this guideline is to promote evidence-based, accessible, and comprehensive management of hypertension by healthcare professionals in the public and private sectors in South Africa. It should act as a resource document to inform hypertensive patients of the national approach to hypertension care. For development of this guideline, hypertension and CVD treatment and prevention guidelines were reviewed, as well as hypertension trials reporting clinical end-points, including individuals with important co-morbidities, such as diabetes mellitus and chronic kidney disease (CKD).

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3. Measurement of BP

Blood pressure (BP) measurement is a vital clinical sign, but can be poorly performed by healthcare professionals. Published recommendations of the European Hypertension Society and the American Heart Association are endorsed by the Hypertension Working Group.[5,18]

3.1 Generic measurement principles

These recommendations are generic and apply equally to all validated devices, especially in clinic and self BP monitoring (SBPM); considerations include arm position, posture of the patient, cuff size and the number of readings that should be taken. BP should be recorded using an approved device with the patient seated for at least 5 minutes before measurement (with the back supported, and arm bared and resting on a surface at heart-level). Patients should not have smoked, or ingested caffeine-containing beverages or food in the preceding 30 minutes. In persons aged 60+ years, those with diabetes mellitus and others at risk (Table III), the BP should also be recorded after the patient has stood 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 (under-cuffing); the BP can equally be underestimated (over-cuffing) if the cuff and bladder are too large.

Systolic blood pressure (SBP) and diastolic blood pressure (DBP) should be recorded. BP should be measured in both arms at the initial consultation; if there is a discrepancy, it should subsequently be taken in the arm with the higher BP. SBP should be estimated first 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 sound (Phase V). Measurement at Phase V is also recommended in pregnancy. In cardiac arrhythmia (e.g. atrial fibrillation) the highest Phase I and lowest Phase V are recorded as the SBP and DBP, respectively. Circumstances when both Phase IV (muffling) and Phase V should be recorded include 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. When the initial SBP is between 140 and 160 mmHg, or the DBP is between 90 and 100 mmHg, repeat measurements should be performed on 3 separate occasions within a period of 2 months, to determine whether a diagnosis of hypertension is valid. All measurements should preferably be taken at the same time of the day and in the same arm.

The elderly may present considerably variable BP measurements. It may be advisable to check the standing BP in hot weather – particularly in diabetics, the elderly, and those who have symptoms of postural hypotension.[19] The most common form of hypertension is isolated systolic hypertension (ISH), attributed to the stiffening of the large arteries that occurs with ageing.

The BP measurement device and its attachments (tubing, cuff, and valve) must be serviced and calibrated at least once each year.

3.2 Mercury sphygmomanometer

There is increasing criticism of the use of mercury sphygmomanometers: mercury is inert and does not degrade,[20] but is not toxic to patients or operators, provided that the device is intact; however, mercury becomes a major environmental hazard when it is discarded. There are international moves to replace mercury sphygmomanometers with battery-operated digital devices; however, in South Africa and other developing countries, there is concern about the availability of accurate devices, and the safe disposal of lead-containing batteries. If a mercury sphygmomanometer needs replacement, an inexpensive solar-powered validated oscillometric device should be considered.[21]

3.3 Self- and ambulatory BP monitoring

SBPM and ambulatory blood pressure monitoring (ABPM) is recommended in selected circumstances and for selected target groups:[18]

- In suspected 'white-coat' (higher readings in the office compared with readings outside) or masked hypertension (normal readings in the office and higher readings outside)
- To guide antihypertensive medication, especially in high-risk groups (e.g. the elderly and diabetics)
- In refractory hypertension
- To improve compliance with treatment (SBPM only).

Masked hypertension should be suspected if target organ damage (TOD) progresses or remains unresolved, despite BP control in the clinic. All devices used for SBPM and ABPM should be validated properly with the following independent websites: http://www.dableducational.com and http://afssaps.sante.fr.

For SBPM, only upper-arm devices are recommended, but are unsuitable in patients with sustained arrhythmias. These devices should not be used for BP measurement during exercise, and they are not as specific as ABPM devices for the diagnosis of white-coat hypertension. Ideally, a reliable mean BP value should be established by calculating the average of 2 early morning and 2 late afternoon readings taken over 5 days. Patients must discuss any proposed change in medication with their healthcare professional. The advantages of SBPM are: improved assessment of drug effects; detection of causal relationships between adverse events and BP response; and improved compliance. The disadvantages include an increase in anxiety and the risk of self-medication.

ABPM provides the most accurate method to diagnose hypertension, assess BP control and predict outcome.[22] In patients with a raised clinic BP, ABPM was shown to reduce misdiagnosis and save costs.[23] Additional costs of ABPM were counter-balanced by the costs saved by better-targeted treatment. ABPM can also assess nocturnal BP control and BP variability, which are important predictors of adverse outcome; however, this is limited by access to equipment – particularly in the public sector – and the impracticalities of regular 24-hour monitoring (Table I).

Summary

- Use conventional sphygmomanometers properly
- Replace old sphygmomanometers with validated automatic devices
- Encourage SBPM and ABPM for clear indications.

4. Cardiovascular disease risk stratification

The principle of assessing and managing multiple major risk factors for CVD is unanimously accepted; however, there is much debate on which method of risk stratification to use.

4.1 Rationale for cardiovascular risk assessment

The rationale for assessing CVD risk is that certain risk factors confer a great possibility of morbidity and mortality. It is assumed that identification of individuals at highest risk allows scarce resources

Table I. Different methods of BP measurement*

	Clinic	Home	Ambulatory
Predicts outcome?	Yes	Yes	Strongly
Initial diagnosis?	Yes	Yes	Yes
Cut-off BP levels (mmHg)	140/90	135/85	135/85 (mean day) 120/70 (mean night)
Evaluation of treatment?	Yes	Yes	Limited but valuable
Assess diurnal rhythm?	No	No	Yes

* The small difference between the clinic BP and the ABP shown, does not clearly reflect an increasing difference between the 2 measurements as the clinic BP rises. As the clinic BP rises, the ABP rises much less.[22] Thus 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.

to be focussed on managing individuals with the greatest potential to benefit from treatment. Despite the availability of many CVD risk factor systems and charts, all have shortcomings, particularly in developing countries such as South Africa. Any consensus must address topics such as the weighting of BP readings and other risk factors in relation to ethnic group, resources, and the development of associated clinical conditions (ACC) and TOD. The SAHS remains committed to the format of the CVD risk assessment (Table II) until there is national consensus on a different model by all stakeholders (professionals, providers, government and healthcare funders) that is supported by adequate local data. The CVD risk assessment described in this guideline was developed by the European Hypertension Society and the European Society of Cardiology.[7] Absolute risk and the continuous risk associated with BP is used in many other guidelines.[6,8,9] This pragmatic risk assessment model is adaptable for use in many settings, including those constrained by limited resources and low budgets.

There is consensus on the necessity of immediate drug treatment for those with known ACC and/or TOD and/or a SBP ≥180 mmHg or DBP ≥110 mmHg (Fig. 1).[7] In the absence of ACC, TOD and very high levels of BP, the exact BP level at which to initiate treatment has changed over time, and remains the subject of debate.

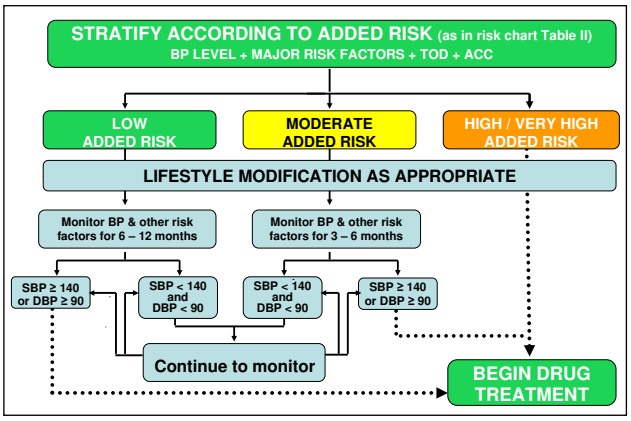

Fig. 1. Southern African hypertension management flow diagram based on added CVD risk (adapted from the WHO CVD risk-management package for low - medium resource settings).

4.2 Risk factors, TOD and ACC

Table III lists the major risk factors, ACC and TOD. Modifiable risk factors (e.g. smoking and dyslipidaemia) should be the target of lifestyle intervention and treatment as appropriate. In addition to controlling hypertension, TOD and ACC must be managed appropriately and, if necessary, the patient must be referred to a higher level of care.

Consensus is lacking in treatment decisions on the importance of newer risk factors such as obesity and the metabolic syndrome, e.g. obesity may be measured using the body mass index (BMI), abdominal circumference or waist-to-hip ratio.[24] The metabolic syndrome has not been listed as a risk factor as in the JNC 7 report, despite evidence of its link to CV risk and future diabetes.[5] The

Table II. Stratification of risk to quantify prognosis*

	BP (mmHg)				
Other risk factors and disease history	Normal SBP 120 - 129 or DBP 80 - 84	High normal SBP 130 - 139 or DBP 85 - 89	Stage 1: Mild hypertension SBP 140 - 159 or DBP 90 - 99	Stage 2: Moderate hypertension SBP 160 - 179 or DBP 100 - 109	Stage 3: Severe hypertension SBP >180 or DBP >110
No other major risk factors	Average risk	Average risk	Low added risk	Moderate added risk	High added risk
1 - 2 major risk factors	Low added risk	Low added risk	Moderate added risk	Moderate added risk	Very high added risk
≥3 major risk factors or TOD or diabetes mellitus or metabolic syndrome	Moderate added risk	High added risk	High added risk	High added risk	Very high added risk
ACC	High added risk	Very high added risk	Very high added risk	Very high added risk	Very high added risk

* Based on the ESH/ESC guidelines.[7]

Table III. Major risk factors, target organ damage (TOD) and associated clinical conditions (ACC)*

Major risk factors	TOD	ACC
Levels of SBP and DBP	LVH: based on ECG	CHD
Smoking	Sokolow-Lyon >38 mm	HF
Dyslipidaemia	Cornell >2440 mm.ms	CKD
Total cholesterol >5.1 mmol/l, OR	Microalbuminuria	albuminuria >30 mg/mmol, OR
LDL >3 mmol/l, OR	albumin creatine ratio 3 - 30 mg/mmol	creatinine >133 µmol/l (men)
HDL <1 (men) and <1.2 mmol/l (women)	Slightly elevated creatinine:	creatinine >124 µmol/l (women)
Diabetes mellitus	115 - 133 µmol/l (men)	Stroke or TIA
Men >55 years	107 - 124 µmol/l (women)	Peripheral arterial disease
Women >65 years		Advanced retinopathy:
Family history of early-onset CVD		Haemorrhages, OR
Men aged <55 years		Exudates
Women aged <65 years		Papilloedema
Waist circumference		
Men ≥94 cm		
Women ≥80 cm		
Exceptions are South Asians and Chinese: Men >90 cm and women >80 cm		

* Adapted from the ESH/ESC guidelines.[7]

syndrome represents a combination of underlying and major risk factors; however, there is debate as to which criteria to adopt and whether the clustering of risk factors represents a greater CV risk over and above the individual components used in the Framingham risk calculation. However, where the metabolic syndrome is present, a SBP in ≥140 mmHg and or DBP ≥85 mmHg requires treatment (weight loss and exercise followed by drug therapy, after an appropriate trial of lifestyle modification). Table IV shows the new definition of the metabolic syndrome,[25] which has recently harmonised with other major international bodies.[26]

Table IV. International Diabetes Federation (IDF) definition of metabolic syndrome[26]

According to the new IDF definition*, a person is defined as having diabetes if they have at least 3 of the following criteria:

- Central obesity: defined as waist circumference >94 cm for white men and ≥80 cm for white women with ethnicity-specific values for other groups
- Raised TG level: ≥1.7 mmol/l, or specific treatment for this lipid abnormality
- Reduced HDL cholesterol: <1.03 mmol/l in males and <1.29 mmol/l in females, or specific treatment for this lipid abnormality
- Raised BP: SBP ≥130 mm Hg or SBP ≥85 mmHg, or treatment of previously diagnosed hypertension
- Raised fasting plasma glucose (FPG) ≥5.6 mmol/l, or previously diagnosed Type 2 diabetes; an oral glucose tolerance test (GTT) is strongly recommended but is not necessary to define presence of the syndrome.

*The definition has been updated from those originally presented to ensure consistency with Adult Treatment Panel III (ATPIII) criteria.[25]

4.3 Routine baseline investigations

Table V lists recommended routine basic investigations. Apart from measurements of overweight and obesity, the tests are performed annually, unless abnormal results are obtained. Tests with abnormal results must be repeated as clinically indicated.

5. Goals of BP-lowering treatment

The goals of BP-lowering treatment vary according to number of major risk factors, TOD and/or ACC (Table VI). These goals should be added to the recommended goals for waist/abdominal circumference, blood sugar and lipid levels in patients with the metabolic syndrome (section 8.3).

6. Sustainable hypertension management and scarce resources

The Hypertension Working Group has given considerable time, thought and debate to the concerns about the economic sustainability of lifelong drug therapy. Affordability is important in South Africa's private and public sectors. This becomes more relevant given the proposals for the holistic management of hypertension, its complications and disease associations (section 8.3).

SAHS strongly reiterates the importance of lifestyle modification at all stages of hypertension. If resources are limited, drug treatment may be delayed if the added CV risk is low or moderate (Table II and Fig. 1). Studies emphasise the cost-effectiveness of lifestyle and drug management in reducing CVD risk in developed and less-developed regions of the world, and the importance of tight BP control in African-Americans.

Currently, the price of antihypertensive and other drugs fluctuates considerably irrespective of market sector. Where possible, generic equivalents and combinations are encouraged and the cheapest generic in a class should be considered, provided that it is a true equivalent. The patient should not be changed frequently from one generic to another in the same

Table V. Routine investigations

Investigation	Clinic frequency	Comments
Body weight / overweight		
Body weight	Every visit	
Height	First visit	
BMI	Every visit	<25 kg/m² for men and women (refer to Table IX for definitions of obesity)
Abdominal obesity		
Waist circumference	Every visit	Use correct method of measurement Men <94 cm and women <80 cm; South Asians and Chinese: men <90 cm and women <80 cm
OR		
Waist-to-hip ratio		The waist-to-hip ratio has greater predictive value than BMI or waist circumference for MI but may not be practical in many settings
Urine dipstick		
Protein	First visit	Abnormal dipstick – any one of the following:
Blood	Yearly if normal	• Proteinuria ≥2+
Sugar	Repeat at next visit if abnormal on first visit	• Haematuria ≥1+
		Refer for immediate further investigation
Microalbuminuria Diabetes mellitus and selected hypertensives only	First visit then yearly	Performed on diagnosis of diabetes mellitus Type 2, or 5 years after diagnosis of Type 1; refer to the SAHS policy on microalbuminuria
Blood tests		
Creatinine	Yearly if normal	From serum creatinine calculate GFR (modified MDRD equation = GFR in ml/min/1.73 m²)
Potassium	Yearly if normal	
Glucose (fasting preferred)	Yearly if normal	Consider GTT in patients with fasting glucose >6.1 mmol/l
Random total cholesterol	Yearly if normal	Measure fasting lipogram if cholesterol >5.1 mmol/l or in high-risk groups
ECG (resting)	Yearly if normal	Refer to SAHS policy brief on LVH
Secondary cause suspected	Referral as necessary	If suspected at first visit or if refractory hypertension exists, additional investigations should be performed If invasive renal, vascular or endocrine investigations are required, refer the patient to the appropriate specialist or subspecialist

class, solely because of lower price. SAHS is concerned that guidelines overemphasise the use of limited resources (when to introduce medication, use of generics, and inadequate level of BP control) and may lead to poorly managed hypertension with the undesirable consequences of heart failure, stroke and chronic renal failure. Best practice recommendations should be stated clearly and compromises, based on limited resources, should be made deliberately and transparently.

7. Management

A diagnosis of hypertension may be made if repeat BP measurements, performed on 3 separate occasions within a period of 2 months, indicate a SBP ≥140 mmHg and/or a DBP ≥90 mmHg. Where circumstances permit, ABPM should be considered, particularly in the absence of TOD. This section does not apply if the SBP is ≥180 mmHg or the DBP is ≥110 mmHg: refer to section 9 on severe (stage III) hypertension.

Lifestyle information should be given to all patients when BP measurement is performed. In the case of elevated BP, a programme of lifestyle modification should be implemented immediately (Fig. 1 and section 8 – further clarified by using Table II).

7.1 Lifestyle modification

A healthy lifestyle remains the cornerstone of managing hypertension regardless of BP level: in addition to decreasing BP, it enhances antihypertensive drug efficiency and decreases total CV risk. The Department of Health's strategy for a healthy lifestyle is supported – measures to improve BP include (Table VII):

Table VI. Goals of BP-lowering treatment

Stage	BP level*
All stages	<140/90 mmHg
High-risk patients, e.g.:	<130/80 mmHg
Diabetes mellitus	
Renal disease (microalbuminuria and/or elevated creatinine)	
Congestive heart failure	

* Ideally these targets should be reached within 3 months.

- **Achieving and maintaining ideal weight** (BMI of 18.5 - 24.9) – refer to the 2 local guidelines for the prevention and management of obesity.
- **Limiting total sodium intake to <2 400 mg/day** (<1 teaspoon of salt). High sodium levels are found not only in table salt, but also in packet soups, stock cubes, gravies, processed cheese, many breakfast cereals, breads, salty snacks and tinned foods. Reducing the intake of such foods is crucial. The removal of the salt cellar from the table and a gradual reduction in added salt in food preparation should be recommended. Patients must be informed that food may taste bland initially and that taste adaptation to reduced sodium intake occurs with time; the use of lemon juice, herbs and spices as alternative seasoning should be encouraged. Salt content is listed as sodium in food labels:
  - 'Sodium free': <5 mg per 100 g serving
  - 'Very low sodium': ≤40 mg per 100 g serving
  - 'Low sodium': ≤120 mg per 100 g serving
  - Salt content can be calculated by multiplying sodium content by 2.5.
- **Limiting alcohol intake** to 2 standard drinks per day for men and 1 standard drink per day for women and small men. A standard drink (approximately 10 g of ethanol) is equivalent to 25 ml of liqueur/spirits, 125 ml of wine, 340 ml of beer, or 60 ml of sherry.
- **Following the nutrition guidelines published by the WHO,** which emphasise: a diet low in total fat with high intake of fruit and vegetables (5 portions per day), regular low-fat dairy products, high intake of high-fibre wholegrain foods, fish rather than red meat, products low in saturated fat, low salt, and sparing use of sugar and sugar-containing foods.[8,14,17] Beverages with high caffeine levels should be avoided, but modest use (1 - 2 cups of coffee per day) will not increase BP.
- **Regular moderate intensity exercise** for at least 30 minutes on most – preferably all – days of the week, e.g. brisk walking at 40 - 60% of peak. Exercise bouts can be continuous or accumulated in shorter periods throughout the day. The benefit of exercise is dose-responsive: early adaptations from a sedentary lifestyle to becoming moderately active have the greatest effect. Patients with uncontrolled hypertension should only embark on exercise training after evaluation and initiation of therapy.
- **Avoiding the use of all tobacco products,** including snuff. Nicotine replacement therapy should be used for a patient with hypertension, while under medical supervision.

7.2 Drug therapy

In use of these recommendations for treatment, it is essential that the patient's added CV risk is assessed according to Table II, thereby informing the decision to implement drug therapy according to the decision flow chart (Fig. 1). Drug therapy is commenced in the following cases:

- Low added risk: SBP remains ≥140 mmHg or DBP remains ≥90 mmHg despite a period of lifestyle modification and observation (6 - 12 months)
- Moderate added risk: SBP remains ≥140 mmHg or DBP remains ≥90 mmHg despite a period of lifestyle modification and observation (3 - 6 months)
- High or very high added risk.

The following must be considered prior to the selection of an antihypertensive agent: the cost of the drug class, patient-related factors such as the presence of major risk factors, conditions favouring use, contraindications, ACC and TOD (Tables III and VIII). In otherwise uncomplicated essential hypertension, there are 3 important antihypertensive agents: diuretics (thiazide and thiazide-like), angiotensin-converting enzyme inhibitors (ACE-Is) and calcium channel blockers (CCBs). A thiazide-like diuretic is advisable when consideration for the cost of therapy is relevant. Studies have led to reconsideration of the drugs of choice for the management of uncomplicated hypertension. The most cost-effective antihypertensive drugs are a thiazide-like diuretic (or a CCB in black patients).[10] The combination of a thiazide diuretic with a β-blocker is discouraged, especially where there is abdominal obesity combined with hypertension; both classes of drugs have adverse metabolic consequences and increase the risk of new diabetes.

In uncomplicated essential hypertension, therapy should be initiated with a diuretic, ACE-I (or ARB – angiotensin II receptor blocker), or CCB. Combination therapy should be considered *ab initio* if BP is ≥20/10 above goal, with either an ACE-I (or ARB)/diuretic, ACE-I/CCB or CCB/diuretic combination. A thiazide-like diuretic with a CCB is the preferable combination for black hypertensive patients. In general, fixed drug combinations (FDCs) are preferred. If control is not reached with monotherapy, combination therapy should be instituted with another drug from the first-line classes.

The choice of diuretic should be a low-dose hydrochlorothiazide (12.5 - 25 mg) or a thiazide-like diuretic-like indapamide (1.25 - 2.5 mg daily). Chlorthalidone (15 - 30 mg daily) is more potent compared with hydrochlorothiazide; it produces a sustained 24-hour BP-lowering response, and may replace hydrochlorothiazide as a hypotensive agent.[10,27-29] Chlorthalidone is currently not available in South Africa, except as a fixed combination with atenolol. Loop diuretics such as furosemide should not be used because of their short duration of hypotensive activity (about 6 hours), unless there is evidence of chronic kidney disease (CKD) with an estimated glomerular filtration rate (GFR) <45 ml/min.

Table VIII lists the clinical considerations and possible contra-indications of the major antihypertensive drug groups. Issues relating to drug adherence are critical and must be considered in each patient (section 14). Ensuring that each patient understands the importance of adherence to the treatment regimen and returns drug containers and unused drugs should be reinforced frequently. Patient empowerment and single daily dose regimens improve compliance. Fixed-dose combinations should be used where appropriate. Continued monitoring and management of drug side-effects is essential.

Hypertension can seldom be managed in isolation from other related chronic illnesses. Lifestyle modification, drug therapy and the targets of management should be broadened to include measures of other risk factors and co-morbidities, e.g. obesity, blood sugar, lipids and BP control (Table IX).

The metabolic syndrome is of increasing prevalence. The clinical criteria of the syndrome have been debated and may include obesity, dyslipidaemia and Type 2 diabetes mellitus in addition

Table VII. Lifestyle modification for hypertension care.

Modification	Recommendation	Approximate SBP reduction
Weight reduction	Maintain normal body weight (BMI*; 18.5 - 24.9) by means of limited calorie intake and adequate daily physical activity	5 - 20 mmHg/10 kg weight loss
Dietary sodium reduction	Reduce dietary sodium intake to ≤100 mEq/l (2.4 g sodium or 6 g sodium chloride - limit salt intake)	2 - 8 mmHg
Moderate alcohol consumption	Limit consumption to no more than 2 standard drinks per day in men and 1 standard drink per day in women	2 - 4 mmHg
Limit total fat intake (according to the WHO, total fat intake should be 15 - 30% of total energy)	Limit total fat intake, reduce saturated and trans-fatty acids Recommended maximum fat intake for moderately active adults: Female normal weight = 70 g/day Female overweight = 50 g/day Male normal weight = 95 g/day Male overweight = 70 g/day	
Increase fruit and vegetable consumption	Increase fruit, vegetables, legumes, whole grains and nuts to 5 helpings per day	
Limit free sugars	Reduce free sugars to less than 40 g/day (8 level teaspoons)	
Physical activity	Engage in regular aerobic physical activity such as brisk walking at least 30 min/day, most days of the week, minimum of 150 min/week	4 - 9 mmHg
Stop smoking and ALL nicotine-based products		

* BMI = weight (kg) divided by the square of height (m^2).

to hypertension. This guideline recognises that insulin levels or insulin/glucose ratios have no place in the diagnosis (Table IV). The syndrome is not a clearly defined entity with an evident aetiology or underlying mechanism; therefore, its management should reflect the accepted strategies to reduce CV risk, and each component of the syndrome should be managed if present (e.g. increased abdominal girth and BP is decreased with a combination of intensive diet and exercise).

Table VII reflects the current South African norms for the Dietary Approaches to Stop Hypertension (DASH).[30] A low-sodium diet will lower BP and also have a favourable effect on weight, lipids and glycaemic control. Evidence is mounting that so-called normal lipid levels may be inappropriately high in hypertensive patients, and are certainly so in patients with hypertensive complications, e.g. stroke and myocardial infarction (MI). Lipid-lowering therapy is increasingly becoming a part of standard drug therapy in both young and old patients with vascular disease. In some cases, the use of the biguanide and/or metformin may be required, in addition to exercise, to prevent the progression to frank Type 2 diabetes mellitus in hypertensive patients with central obesity.

Questions are frequently asked regarding the indications and contraindications for the use of aspirin, hormone replacement therapy and antioxidants. Low-dose aspirin should be used for secondary prevention of a transient ischaemic attack (TIA), stroke and MI, only once the BP is well-controlled. The use of hormone replacement therapy, antioxidants, homoeopathic or complementary drugs is of no benefit in hypertensive patients.

7.2.1 Consensus statement on the use of ACE-Is and ARBs

The use of ARBs and ACE-Is results in up to 95% and 75% blockade, respectively, of the renin-angiotensin system. No difference in this outcome was found in patients with diabetes and microalbuminuria (*N*=50)[31] or in patients post myocardial infarction, with heart failure and/or impaired left ventricle (LV) dysfunction.[32] The ARB losartan produced greater regression of left ventricular hypertrophy (LVH), a 14% reduction in the primary end-point of CV morbidity and death, and a 25% reduction in stroke, compared with a β-blocker.[33] ACE-Is have been shown to prevent the progression of microalbuminuria from normoalbuminuria, and reduce established microalbuminuria in Type 2 diabetes.[34] ARBs have also been shown to reduce microalbuminuria, and delay the progression of established diabetic nephropathy.[35] ACE-Is, in combination with indapamide[36] or an ARB, have proven effective in the secondary prevention of stroke.[37] Furthermore, the effect of the ARB, telmisartan, has been shown to be equivalent to that of the ACE-I, ramipril, in patients at high CV risk. Combination therapy, however, had no added advantage, and caused increased side-effects and adverse renal outcomes.[38] Hence, there appears to be little difference between ACE-Is and ARBs; choice of therapy should be determined by cost and tolerability.[31]

7.2.2 Compelling indications for a specific drug class

Table VIII outlines the compelling indications (high-risk conditions) for certain classes of antihypertensive drugs, based on randomised

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

Class	Conditions favouring use	Contraindications	
		Compelling	Possible
Diuretics (thiazide/thiazide-like)	HF Elderly hypertensives ISH Hypertensives of African origin	Gout	Pregnancy β-blockers (especially atenolol)
Diuretics (loop)	Renal insufficiency HF		Pregnancy
Diuretics (anti-aldosterone)	HF Post-myocardial infarction Resistant hypertension	Renal failure Hyperkalaemia	
CCB long-acting only (dihydropyridine)	Elderly patients ISH Angina pectoris Peripheral vascular disease Carotid atherosclerosis Pregnancy (nifedipine only)		Tachyarrhythmias HF
Non-dihydropyridine CCB (verapamil, diltiazem)	Angina pectoris Carotid atherosclerosis Supraventricular tachycardia	AV block (grade 2 or 3) HF	Constipation (verapamil)
ACE-Is	HF LV dysfunction Post-myocardial infarction Non-diabetic nephropathy Type 1 diabetic nephropathy Prevention of diabetic microalbuminuria Proteinuria	Pregnancy Hyperkalaemia Bilateral renal artery stenosis Angioneurotic oedema (more common in blacks than in whites)	
ARBs	Type 2 diabetic nephropathy Type 2 diabetic microalbuminuria Non-diabetic nephropathy LVH ACE-I cough or intolerance Patients at high CV risk	Pregnancy Hyperkalaemia Bilateral renal artery stenosis	
β-blockers	Angina pectoris Post-myocardial infarction HF (selected) Tachyarrhythmias	Asthma Chronic obstructive pulmonary disease AV block (grade 2 or 3) Pregnancy (atenolol)	Peripheral vascular disease Bradycardia Glucose intolerance Metabolic syndrome Athletes and physically active patients Non-dihydropyridine CCBs (verapamil, diltiazem)

* Adapted from the JNC7 guidelines.[5]

Table IX. Current South African norms for dyslipidaemia, obesity and diabetes

Lipid and triglyceride goals		
	Lipid	Current recommended SA levels for different levels of risk
Established CVD, diabetes	TC	<4.5 mmol/l
OR	Triglyceride	<1.7 mmol/l
High CVD risk	HDL-C	men >1 and women >1.2
	LDL-C*	<2.5
Intermediate	TC	<5 mmol/l
OR	Triglyceride	<1.7 mmol/l
Low CVD risk	HDL-C	>1 men >1.2 women
	LDL-C*	<3
Obesity BMI		
Classification	BMI (kg/m²)	Risk of chronic, non-communicable diseases
Underweight	<18.5†	Low (but risk of other clinical problems may be greater)
Normal weight	18.5 - 24.9	Average
Pre-obese (overweight)	25.0 - 29.9	Increased
Obese (class I)	30.0 - 34.9	Moderate
Obese (class II)	35.0 - 39.9	Severe
Obese (class III)	≥40.0	Very severe
Abdominal obesity waist circumference		
	Ideal	Substantial risk
Men	<94 cm	>102 cm
Women	<80 cm	>88 cm

Symptoms of diabetes PLUS

- casual plasma glucose concentration ≥11.1 mmol/l,‡ OR
- fasting plasma glucose ≥7.0 mmol/l,§ OR
- 2 h post-prandial glucose ≥11.1 mmol/l during an oral glucose tolerance test.

* LDL-C is the primary target of treatment;
† Values are considered to be independent of age, and are the same for men and women;
‡ Casual is defined as any time of day without regard to time since the last meal. The classic symptoms of diabetes include polyuria, polydipsia and unexplained weight loss;
§ Fasting is defined as no calorie intake for at least 8 hours;
¶ The test should be performed as described by the World Health Organization, using a glucose load containing the equivalent of 75 g anhydrous glucose dissolved in water;
Note: In the absence of unequivocal hyperglycaemia with acute metabolic decompensation, these criteria should be confirmed by repeat testing on a different day. The oral glucose tolerance test (OGTT) is not recommended for routine clinical use but as many as 30% of people with diabetes will not be diagnosed if only fasting measurements are done. Different criteria are used to diagnose gestational diabetes in pregnant women.

controlled trials. These indications apply equally to patients from any ethnic group; however, the prevalence of other illnesses such as diabetes in certain groups such as the Asians must be considered (section 11.1).

7.2.3 Direct renin inhibitor

Since the last guideline publication, the direct renin inhibitor, aliskiren, has been registered for the treatment of hypertension in the USA and Europe. This drug provides antihypertensive efficacy similar to other classes of drugs and has a similar placebo-like profile to ARBs. It can be combined effectively with other major classes of antihypertensive drugs, especially diuretics and CCBs. In the absence of major outcome studies, the place of direct renin inhibitors is not established and it is uncertain whether aliskiren will have additional benefits over ACE-Is and ARBs. However, benefits of the combination of aliskiren with ACE-Is and ARBs have been shown in patients with diabetic nephropathy and heart failure, respectively.[39,40] Long-term outcome studies – such as the ALTITUDE study in patients with Type 2 diabetic nephropathy[41] – are awaited before recommendations on the use of direct renin inhibitors can be made.

7.2.4 New trials

Seven recent trials, involving 83 112 patients with hypertension and other co-morbidities, have been published and have influenced this guideline: TRANSCEND,[42] ON TARGET,[38] ACCOMPLISH,[43] HYVET,[44] PROFESS,[45] AVOID,[39] ADVANCE,[46] and ACCORD.[47]

Prior to the HYVET study, the treatment of hypertension in very elderly patients was not proven to be beneficial; the study showed unequivocally that initiation of treatment with indapamide, with or without perindopril vs. placebo, resulted in significant reductions in mortality and CV end-points.[44]

The ACCOMPLISH study demonstrated that combination treatment with amlodipine plus benazepril vs. hydrochlorothiazide plus benazepril resulted in a 20% reduction in the primary end-point.[43] This influenced the recent ISHIB guidelines regarding combination therapy, where a CCB plus RAAS inhibitor combination was preferred, except in the event of volume overload.[48] In the latter case, a RAAS inhibitor plus diuretic combination was preferred.

Two recent studies in Type 2 diabetes showed contrasting results. In the ADVANCE study, the addition of perindopril plus indapamide

vs. placebo resulted in significant reductions in both macro- and microvascular complications, with no lower threshold for BP.[46] In contrast, in the ACCORD study, intensive (<120/80 mmHg) vs. standard care did not result in a reduction in the primary end-point of CV morbidity and mortality, but did reduce the secondary end-point of stroke.[48] These contrasting results have created a dilemma regarding the target BP in diabetics.

The PROFESS[45]and TRANSCEND[42] studies showed no reduction in the primary end-point in patients with a previous stroke or those at high CV risk and intolerant to ACE-Is, despite significant lowering of the BP. This has prompted a re-evaluation of lower BP targets for patients at higher CV risk. Studies of a larger scale and longer time-frame may be required to demonstrate unequivocal benefit.

7.2.5 Combination treatment in hypertension

The pathophysiology of hypertension is multifactorial. Data show that the reductions in BP produced by monotherapy are too small to achieve recommended BP targets. The use of combination therapy is recommended, especially if the BP >20/10 mmHg above goal and there are co-morbidities to consider such as diabetes, ISH, CKD or overt CVD. There is a revival of combination therapy owing to poor BP control in different countries and the need to achieve lower target BP levels.

Combination therapy may include free or fixed combination of a standard or lower dose. BP reduction with a low-dose combination of agents is comparable to that achieved with full-dose single agents, with a lower incidence of side-effects. FDC can be defined as 2 or more drugs in a single formulation, with independent modes of action, the combination of which is synergistic or complementary in effect. Free combinations can be defined as 2 or more drugs in separate formulations, usually taken at the same time. The requirement for a rational fixed-dose antihypertensive combination is that each component should be safe, efficacious, and have predictable pharmacokinetic and pharmacodynamic profiles, with a high trough-peak ratio and no excessive hypotensive episodes.

The benefits of combination therapy include an enhanced antihypertensive effect, better response rates and outcomes, and fewer adverse effects. Effective drug combinations include diuretics with β-blockers, diuretics with long-acting CCBs, ACE-Is or ARBs, and β- and α-blockers. Black patients respond best to diuretics or CCBs combined with other antihypertensive agents. Drug synergism exists with ACE-Is or ARBs combined with either CCBs or diuretics. Synergism is defined as a co-operative action resulting in a total effect that is greater than the sum of the effects taken individually; this may relate to BP and TOD.

7.3 Fixed drug combinations in hypertension and hyperlipidaemia

In many developing countries, the primary problem to be addressed with FDC therapy is not incomplete treatment, but rather the lack of treatment in patients unknown to the healthcare system. In this setting, the benefits of FDCs would be derived primarily from simplifying the process of patient identification and treatment provision.

There is limited empirical evidence to support or refute the main purported advantage of FDC, namely increased patient adherence.[49] Additional presumed advantages include: *(i)* a simpler dosage schedule which improves compliance and treatment outcomes; *(ii)* a reduction in inadvertent medication errors; *(iii)* reduced drug shortages, i.e. simplification of drug handling lowers the risk of being 'out of stock'; *(iv)* simplified drug procurement, management and handling; *(v)* lower production, packing and shipping costs; and *(vi)* reduced side-effects, if one of the combined drugs serves this purpose.[50] The presumed disadvantages of FDCs include: *(i)* a greater expense than separate tablets, although not invariably so; *(ii)* cases where FDC therapy must be discontinued and replaced by separate tablets if a patient is allergic or has side-effects (this also applies with single-dose formulations); and *(iii)* irrational combinations may result from incompatible pharmacokinetics, i.e. different elimination half-lives of individual components.[50]

The pharmaceutical industry, academic and public health sectors advocate the expansion of secondary CVD prevention. A proposed FDC for established ischaemic heart disease is aspirin 75 mg, simvastatin 10 mg, lisinopril 10 mg and atenolol 25 mg daily, and for established ischaemic cerebrovascular disease a combination of aspirin 75 mg, lisinopril 10 mg, simvastatin 10 mg and hydrochlorothiazide 12.5 mg daily[51]. All of these drugs are available in generic formulation.

The polypill holds promise for the treatment of chronic disease.[51-53] Although the value of such a pill remains to be 'clearly demonstrated rather than simply assumed', a 3 - 4 drug polypill has been supported by the World Health Organization[53,54] and a global trial began in 2007. Only 20% of chronic diseases occur in high-income countries; 80% occur in low- and middle-income countries, with equal numbers of deaths in men and women.[52] High-cost physician models of care for chronic diseases are unsuitable in the latter. It has been shown that 20% of patients with coronary heart disease (CHD) in such countries were not receiving any aspirin, and patients requiring β-blockers – which are low-cost and widely available – were not receiving them.[53] This has been one reason to introduce the polypill, and it will hopefully improve compliance; however, Reddy feels that the 'preventive polypill has much promise but insufficient evidence'.[54]

7.4 Antihypertensive drug interactions

A drug interaction is the quantitative modification of drug effect by the simultaneous or successive administration of a different drug. Antihypertensive agents have many drug interactions, some of which are highly significant; morbidity or mortality can result if steps are not taken to minimise this risk. Patients with hypertension frequently take multiple medications and are therefore at increased risk of drug interactions. There is also significant potential for drug interactions in the elderly, as they often receive larger number of drugs and show renal impairment in the excretion of several therapeutic agents.

Drug interactions may occur via pharmacokinetic (i.e. absorption, distribution, metabolism, and elimination) or pharmacodynamic means. The most frequent interactions related to clinical problems are pharmacokinetic; most stem from metabolism via the cytochrome P_{450} system or presystemic clearance by means of P-glycoprotein. Polymorphisms of the cytochrome P_{450} enzymes may explain the individual differences or the appearance of drug interactions. Certain drugs may impair the renal excretion of other agents, usually at the tubular level, e.g. drug plasma level and toxicity increases have been demonstrated with concomitant use of verapamil, amiodarone or quinidine.[55] Of the statins, simvastatin is particularly prone to drug interactions, partly because it is extensively metabolised by the cytochrome CYP3A4 enzyme system.[55] The SEARCH trial indicated that much of the increase in risk for myopathy noted in the high-dose simvastatin group was due to the concomitant use of medications such as amiodarone, diltiazem and amlodipine.[56] Judicious concomitant use of other medications with simvastatin will reduce the risk of myopathy (Table X).

There may be pharmacodynamic interactions between similarly acting drugs which may lead to additive or potentiation effects, e.g.

Table X. Interactions between antihypertensives and other drugs[55]

Drugs (Class)	Interaction with	Mechanism	Effect
β-blockers	Verapamil, diltiazem	Additive effects	A-V conduction impaired: risk of A-V block
	Oral antidiabetics	β_2-receptor blockade	Symptoms of hypoglycaemia are suppressed
	Broncho-spasmodic agents	β_2-receptor blockade	Suppression of the broncho-spasmolytic effect
	Dobutamine	β_1-receptor antagonism	The intropic action of dobutamine is inhibited
Thiazide diuretics	Digoxin	Hypokalaemia	Digoxin become more toxic (arrhythmogenic)
	Lithium ions	Renal excretion of lithium ions impaired	Accumulation of lithium ions
α-blockers	Noradrenaline	α_1-receptor blockade	Noradrenaline shows less vasoconstrictor activity
Calcium antagonists			
Verapamil, diltiazem	β-blocker	Additive effect	A-V conduction impaired; risk of A-V block
	Digoxin	Renal excretion of digoxin	Digoxin may accumulate, arrythmogenic effect
	Protease inhibitors (HIV-treatment)	Inhibition of hepatic degradation	Accumulation of verapamil or diltiazem
Dihydropyridine	β-blocker	β-receptor blockage	Suppression of reflex tachycardia (favourable)
Felodipine	Grapefruit juice	Enzymic inhibition (Cytochrome P450 system)	Accumulation of felodipine
Amlodipine	Simvastatin >20 mg daily	Simvastatin is extensively metabolised by the CYP3A4 enzyme system	Increased risk for myopathy
Diltiazem, amiodarone	Simvastatin > 10 mg daily	Simvastatin is extensively metabolised by the CYP3A4 enzyme system	Increased risk for myopathy
ACE-Is	Diuretics (thiazide)	Additive effect	Enhanced hypotensive action
	Diuretics (K^+-sparing)	Reduced renal excretion of K^+	Hyperkalaemia
	NSAIDs including high-dose salicylates	Retention of Na^+ and H_2O, hyperkalaemia	Reduced antihypertensive effects
	Lithium ions	Reduced excretion of lithium ions	Lithium ions accumulate
AT_1-receptor antagonists	Virtually the same as ACE-Is	Interactions as ACE-Is (see above)	Described before

Drugs	Mechanism of action	Increase in BP	Interferes with antihypertensive effect
Sympathomimetics	Nasal decongestants (α-receptor)	Yes	No
Ergot alkaloids	Antimigraine drugs, bronchodilators (β_2-receptor)	Yes	No
NSAIDs	Sodium retention, inhibition of vasodilating prostaglandins	Yes	Yes
Oral contraceptives	Oestrogens and progesterone	Yes	No

Table X. Interactions between antihypertensives and other drugs[55] – continued

Drugs	Mechanism of action	Increase in BP	Interferes with antihypertensive effect
Corticosteroids	Sodium retention	Yes	Yes
Psychotropes	Chlorpromazine, tricyclics, Monoamine-oxidase-inhibitors, etc	Yes	No
Erythropoietin	Increase in blood viscosity	Yes	No
Cyclosporine	Hypothethical (via nitric oxide)	Yes	No
Resin	Inhibition of GI absorption of antihypertension drugs	Yes	Yes
Anabolic steroids	Sodium retention	Yes	No

the combination of intravenous verapamil and a β-blocker may cause additive impairment of a cardiac atrioventricular (AV) block. A combination of 2 or more antihypertensive agents may be expected to cause an additive BP-lowering effect. The antidepressant effects of all drugs that suppress the activity of the central nervous system enhance the side-effects of centrally acting antihypertensives (reserpine, α-methyldopa, guanfacine and clonidine). Recently, attention has been paid to the interaction of antihypertensives and non-steroidal anti-inflammatory drugs (NSAIDs).[55] The ONTARGET study showed that telmisartan was as effective as ramipril, with marginally increased tolerability. The combination of the two was not superior to ramipril and had increased side-effects; the data suggest that the combination could precipitate acute renal failure and aggravate the onset of renal insufficiency.[38] A summary of drug interactions in hypertension is shown in Table X.[55]

8. Management of severe hypertension

Severe hypertension (stage 3 DBP ≥110 mmHg and/or SBP ≥180 mmHg) may be classified into one of 3 categories to determine the urgency of treatment, namely asymptomatic severe hypertension, hypertensive urgency and hypertensive emergency. Patients should be managed or referred to the appropriate level of care in accordance with local protocols. Sustained severe hypertension requires immediate drug therapy and lifestyle modification.

8.1 Asymptomatic severe hypertension

These patients are asymptomatic but have severe hypertension with or without evidence of progressive TOD or ACC. The patient must be kept in the care setting and BP measurement must be repeated after 1 hour of rest. If the second measurement remains elevated at the same level, oral therapy should be started with a combination of 2 drugs, including a low-dose thiazide-like diuretic. The second drug is usually a dihydropyridine CCB. Follow-up should occur within a week, with escalation of treatment as required. Early referral is advised if BP is not controlled within 2 - 4 weeks.

8.2 Hypertensive urgencies and emergencies[57]

Despite advances in chronic hypertension management, hypertensive emergencies and urgencies remain serious complications. Factors for this include poor compliance with antihypertensive management, failure to institute effective antihypertensive therapy, failure to refer patients with resistant hypertension timeously, and failure to recognise important secondary causes.

Hypertensive emergencies and urgencies also occur in hypertension in pregnancy and in the preoperative period. Many classes of intravenous antihypertensive drugs are available to treat hypertensive emergencies, and specific agents may have an advantage in a given clinical situation. Orally active agents are used to treat hypertensive urgencies and include ACE-Is, CCBs, diuretics, α-β-blockers and β-blockers. Most patients respond well to drug therapy, but problems may arise if BP is normalised rapidly.

Hypertensive emergencies and urgencies are uncommon, but are likely to be encountered by all clinicians because of the high prevalence of chronic hypertension. All doctors must be familiar with treatment. Information is available from well-conducted studies on the outcomes of various antihypertensive drugs and BP-lowering strategies; therefore, any recommendation is based on case studies, clinical reports, comparative studies and expert opinion.

8.2.1 Hypertensive urgency[58]

Hypertensive urgency is symptomatic, usually with severe headache, shortness of breath and oedema. There are no immediate life-threatening neurological, renal, eye or cardiac complications as in the case of hypertensive emergency (section 8.2.2). Ideally, all patients with hypertensive urgency should be treated in hospital. Treatment should be commenced with 2 oral agents with an aim to lower the DBP to 100 mmHg, slowly over 48 - 72 hours. Lowering of the BP can be achieved with the use of: *(i)* long-acting CCBs; *(ii)* ACE-Is used initially in very low doses and avoided if there is severe hyponatraemia (serum sodium <130 mmol/l indicates hyper-reninaemia and BP may fall dramatically with ACE-Is); *(iii)* β-blockers; and *(iv)* diuretics (which may potentiate the effects of the other classes of drugs). Furosemide should be used if there is renal insufficiency or evidence of pulmonary congestion.

8.2.2 Hypertensive emergency

A hypertensive emergency exists when acute elevation of BP is associated with acute and ongoing organ damage to the kidneys, brain, heart, eyes (grade 3 or 4 retinopathy) or vascular system. Such patients require rapid lowering of the BP to safe levels, within minutes or a few hours. Once a genuine hypertensive emergency is identified, immediate hospitalisation is essential, with monitoring in a modern-facility intensive care unit (ICU) with experienced staff. Standard care includes intravenous antihypertensive therapy tailored to the specific type of emergency (except in stroke patients – see 'Summary: management of acute stroke'). The potential threat of harm from overzealous lowering of BP exists together with the need for careful and structured BP reduction.

The definition of a hypertensive emergency does not explicitly include absolute BP levels, although most affected adults have a SBP

>220 mmHg and/or DBP >130 mmHg. Hypertensive emergencies may also occur at modest BP elevations, e.g. in previously normotensive women during pregnancy (eclampsia) or in acute glomerulonephritis (especially in children). Hypertensive emergencies are uncommon, with an estimated occurrence of less than 1 - 2% of the hypertensive population; however, they are more common in black and older patients. Most patients know that they are hypertensive, and are receiving treatment.

Hypertensive emergencies and urgencies may be seen in the immediate postoperative period following vascular surgery. The initiating factors of hypertensive emergencies are poorly understood, but a rapid rise in BP associated with increased vascular resistance is suspected as the initial derangement. Smoking – possibly via associated endothelial injury – is suspected to be a risk factor: smokers have 5 times the risk of developing malignant hypertension. Hypertensive emergencies in patients with thrombotic (ischaemic) stroke and intracerebral haemorrhage should be managed according to the guideline of the Neurological Association of South Africa.[59]

Summary: management of acute stroke[59]

- Do not lower the BP or use antihypertensive medication unless the SBP >220 mmHg or DBP >120 mmHg – a rapid fall in BP may aggravate cerebral ischaemia and worsen the stroke
- If the BP is above these levels, then treatment should aim to lower the BP by no more than 15 - 20% in the first 24 hours
- Oral treatment may be given, but parenteral treatment may be warranted if the patient is unable to swallow
- The preferred parenteral drugs are those that are easily titrated and have a minimal effect on cerebral blood vessels (e.g. labetalol). Sodium nitroprusside should be administered in an ICU because of its rapid onset of action.

Common clinical hypertensive emergencies are described in sections 8.2.2.1 - 8.2.2.4 below.

8.2.2.1 Acute cerebrovascular syndromes

Severe hypertension is common in the case of acute stroke; it is debatable whether or not it should be treated, and if so, to which immediate target BP. In this setting, cerebral auto-regulation is impaired, and rapid BP reduction may result in an ischaemic stroke extension. The American Heart Association recommends the treatment of hypertension in the case of intracerebral bleeding when BP >180/105 mmHg, and the maintenance of mean arterial pressure (DBP plus one third of pulse pressure) above 130 mmHg. In the case of ischaemic stroke, BP should be observed for at least 1 - 2 hours to assess whether it will lessen spontaneously. Only a persistently elevated DBP >120 mmHg or SBP >220 mmHg should be treated, with caution and an initial 20% reduction in mean arterial pressure.

Hypertensive encephalopathy is a cerebrovascular hypertensive emergency characterised by diffuse cerebral dysfunction with headache, nausea, vomiting, disturbed consciousness and – rarely – seizures. The condition is frequently accompanied by retinal findings of malignant hypertension and acute renal dysfunction. Computed tomography (CT) imaging usually appears normal with the condition, but may show diffuse cerebral oedema or posterior leuko-encephalopathy. The gradual lowering of BP generally leads to a fairly rapid improvement in symptoms. Sodium nitroprusside or labetalol are recommended for treatment. In patients failing to improve within 6 - 12 hours of BP reduction, an aggressive additional evaluation should be prompted for an alternative cause of the encephalopathy.

8.2.2.2 Acute cardiac syndromes

Severe hypertension in the setting of acute myocardial infarction, unstable angina, or pulmonary oedema should be treated aggressively and concurrently with all other indicated interventions. BP treatment reduces the ischaemic load on the left ventricle. Classic studies have shown that treatment with intravenous nitroglycerine is ideal in this setting, because it reduces myocardial oxygen consumption and increases blood flow beyond a stenosis. Sodium nitroprusside is also suitable and can be used alone or in combination with nitroglycerine.

8.2.2.3 Postoperative hypertension[60]

Postoperative hypertension is frequent (20 - 75%) and tends to be more prevalent in patients with poor pre-operative BP control, autonomic disorders, or a history of acute alcohol or cocaine use. Reversible causes of the hypertension may include pain, hypoxia, a full bladder, hyper- and hypovolaemia, persistent vomiting and anxiety. Patients with true emergencies should preferably be treated by an appropriate specialist, with admission of the patient to the ICU for parenteral drug therapy (Table XI) and monitoring. The BP should not be lowered by >25% within 30 - 120 minutes, with a goal of 160/100 mmHg within the following 2 - 6 hours. This may be achieved with the use of intravenous or oral drugs.

Summary

- Severe hypertension requires careful clinical evaluation to differentiate hypertensive emergency from hypertensive urgency and asymptomatic severe hypertension
- This allows appropriate treatment decisions regarding level of care (hospitalisation and observations) and indicates the route of drug administration and rapidity of BP reduction
- Hypertensive emergency requires intensive clinical care
- Hypertensive urgency needs careful outpatient or short-stay management (preferable) and early follow-up
- Severe asymptomatic hypertension usually requires observation for 1 - 3 hours and early follow-up
- All require long-term follow-up and control of CV risk factors.

8.2.2.4 Resistant hypertension

Refractory or resistant hypertension remains >140/90 mmHg despite the use of 3 antihypertensive drugs in a rational full-dose combination with a diuretic component. An appropriate therapeutic plan must include lifestyle modification measures. In older patients with ISH, refractory hypertension is diagnosed when triple therapy (as above) has failed to control the BP below 160/90 mmHg. Table XII lists the causes of refractory hypertension in South Africa that must be considered in management of this condition.

The most common cause of resistant hypertension in South Africa is probably non-compliance (adherence) with lifestyle and medication; this includes the unavailability of medication and other drug-related causes. Unsuspected causes of secondary hypertension are less common, but bilateral renal disease and bilateral adrenal hyperplasia should be considered. These are suspected in patients with a reduced GFR and abnormal dipstick test results, or a positive ratio of plasma aldosterone to plasma renin. Once lifestyle and adherence to therapy have been managed satisfactorily, the addition of a fourth-line drug should be considered. Resistant hypertension should, where possible, be managed by specialist physicians. Fourth-line therapy drugs are listed below and users should be conversant with their pharmacology:

- direct vasodilators: hydralazine and minoxidil
- centrally acting drugs: methyldopa and moxonidine

Table XI. Intravenous and oral drugs for hypertensive emergency*

Drug	Dose	Indications and precautions	Effect on BP
Intravenous			
Nitroglycerine (glyceryl trinitrate)	5 - 10 µg/min	Especially useful for myocardial ischaemia	BP lowering occurs in 2 - 5 min
Dihydralazine	10 mg every 10 - 15 min until either BP is controlled or a maximum of 50 mg given	Avoid in patients with myocardial ischaemia	BP lowering occurs in 10 min
Sodium nitroprusside	0.25 - 10 µg/kg/min diluted in 5% dextrose and adjust dose as necessary	Admission to ICU An intra-arterial BP line is desirable	BP control is immediate
Labetalol	2 mg/min to a total dose of 1 - 2 mg/kg	Use where emergency caused by phaeochromocytoma caution in acute pulmonary oedema	
Furosemide	40 - 80 mg	Acts only for 6 hours Potentiates all of the above drugs	
Oral (use only if IV drugs are not available)			
Nifedipine (long-acting only)	Long-acting CCBs must be used to prevent rapid and dangerous BP reduction Check dosage according to CCB brand used	Preferred in black persons	
Captopril	6.25 mg as a test dose	Other rapidly acting ACE-I may be used starting with a low test dose	BP lowering in 15 - 30 min
	Increase to 25 mg if BP lowering is not obtained in 15 - 30 min	DO NOT USE if bilateral renal artery stenosis is suspected	
		DO NOT USE if pregnancy is suspected	

* For treatment of hypertensive emergency in pregnancy see section 9.3.

- α-blockers: doxazosin
- β-blockers: many cardio-selective agents are available
- aldosterone antagonist: spironolactone[61] and eplerenone.

9. Special considerations for hypertension in certain populations

9.1 Hypertension in blacks and Asians

Black persons are prone to complications such as stroke, heart failure and renal failure, while CHD – although emerging in frequency – is less common than in whites and Asians.[62] Asians have a higher prevalence of diabetes mellitus and the metabolic syndrome compared with other racial groups.[63]

Compared with white patients, black patients respond poorly to antihypertensive monotherapy with ACE-Is and β-blockers, but do respond well to these agents in combination therapy with diuretics. Overall, CCBs show the most consistent response in black hypertensive patients compared with other classes of drugs used as monotherapy.[64,65]

9.2 Hypertension in children and adolescents[66,67]

Hypertension in children is an important issue beyond the scope of this guideline. Measurement of BP should be a routine part of paediatric examination, and the use of appropriate cuff size is essential. Hypertension in children is defined by a SBP and DBP greater than the 95th percentile according to age, sex and height (Table XIII). Hypertension is seldom primary in childhood; a detailed investigation should be made for an underlying secondary cause. Referral to a specialist for evaluation and treatment is essential.

In adolescents, hypertension is increasingly linked to obesity. Globally, poor diet and a lack of exercise in children is causing an epidemic of obesity, with an early onset of hypertension and Type 2 diabetes. Early recognition of this hypertension will be an important motivation for children and their parents to institute important lifestyle changes.

9.3 Hypertension in pregnancy

Hypertensive disease in pregnancy is the leading cause of direct maternal deaths in South Africa. Pre-eclampsia is a multi-organ disease unique to pregnancy, clinically evident by the presence of hypertension and proteinuria. In severe form, pre-eclampsia is the most common cause of maternal and perinatal morbidity and mortality.

9.3.1 Treatment

Antihypertensive treatment should be instituted when SBP ≥160 mmHg or DBP ≥110 mmHg. In the presence of other markers of potentially severe disease (e.g. thrombocytopenia, oliguria and/or abnormal liver function), treatment should be initiated at lower degrees of hypertension. Diuretics and atenolol should generally be avoided, and ACE-Is and ARBs are contraindicated entirely. Suitable antihypertensive drugs to be used in pregnancy are:

Table XII. Causes of resistant hypertension in South Africa*

Non-adherence to therapy	Instructions not understood
	Side-effects
	Cost of medication and/ or cost of attending at healthcare centre
	Lack of consistent and continuous primary care
	Inconvenient and chaotic dosing schedules
	Organic brain syndrome (e.g. memory deficit)
Volume overload	Excess salt intake
	Inadequate diuretic therapy
	Progressive renal damage (nephrosclerosis)
	Fluid retention from reduction of BP
Associated conditions	Smoking
	Increasing obesity
	Sleep apnoea
	Insulin resistance/hyperinsulinaemia
	Ethanol intake of more than 30 g (3 standard drinks) daily
	Anxiety-induced hyperventilation or panic attacks
	Chronic pain
	Intense vasoconstriction (Raynaud's phenomenon), arteritis
Identifiable causes of hypertension	Chronic renal disease
	Renovascular disease
	Primary aldosteronism
	Coarctation
	Cushing's syndrome
	Phaeochromocytoma
Pseudoresistance	'White-coat hypertension' or office elevations
	Pseudo-hypertension in older patients
	Use of regular cuff on very obese arm
Drug-related causes	Doses too low
	Wrong type of diuretic
	Inappropriate combinations
	Rapid inactivation (e.g. hydralazine)
Drug actions and interactions	NSAIDs
	Sympathomimetics: nasal decongestants; appetite suppressants
	Cocaine and other recreational drugs: caffeine; oral contraceptives
	Adrenal steroids
	Liquorice (as may be found in chewing tobacco)
	Cyclosporine, tacrolimus; erythropoietin
	Antidepressants (monoamine oxidase inhibitors, tricyclics)

* Adapted from JNC VI.[5]

- methyldopa (500 mg 6-hourly)
- nifedipine XL (30 - 60 mg daily)
- apresoline (25 - 50 mg 8-hourly)
- labetalol (100 - 200 mg twice per day, titrated to 600 mg if needed).

9.3.2 Hypertensive emergencies (impending eclampsia, eclampsia)
Very high BP should be lowered with an infusion of labetalol: 5 mg/ml at a rate of 4 ml/h via a syringe pump. The infusion rate should be doubled every 30 minutes to a maximum of 32 ml until the DBP has fallen and stabilised at an acceptable level (95 - 100 mmHg).

Table XIII. 95th percentile of BP in boys and girls aged 3 - 16 years, according to age, sex and height*

	Age	Height percentile (boys)				Height percentile (girls)			
	(years)	5th	25th	75th	95th	5th	25th	75th	95th
SBP (mmHg)	3	104	107	111	113	104	105	108	110
	6	109	112	115	117	108	110	112	114
	10	114	117	121	123	116	117	120	122
	13	121	124	128	130	121	123	126	128
	16	129	132	136	138	125	127	130	132
DBP (mmHg)	3	63	64	66	67	65	65	67	68
	6	72	73	75	76	71	72	73	75
	10	77	79	80	82	77	77	79	80
	13	79	81	83	84	80	81	82	84
	16	83	84	86	87	83	83	85	86

* The height percentiles were determined with standard growth curves. Data are adapted from those of the Task Force on High Blood Pressure in Children and Adolescents.[67]

Labetalol can also be used as an intermittent bolus infusion – 50 mg (10 ml of labetalol 5 mg/ml) administered over at a period of at least 1 minute. This treatment should take effect within 5 minutes and should be repeated until the DBP is between 95 and 100 mmHg – to a maximum dose of 200 mg and provided that the pulse rate remains >60 bpm. Nifedipine is an alternative drug administered via a 10 mg oral tablet (not a slow-release tablet); it should not be given sublingually, chewed, bitten or used buccally.

9.4 Hypertension in persons living with HIV/AIDS

Prolonged highly active antiretroviral therapy (HAART) is associated with a higher prevalence of systolic hypertension.[68] Individuals receiving HAART may be at increased risk of developing hypertension-related conditions, underscoring the importance of monitoring their BP. When antiretroviral drugs are used, the doses of CCBs are invariably influenced, especially at the start, termination or change of therapy. Frequent BP and dose checks are advised. Two of the 3 major classes of antiretroviral drugs – protease inhibitors (PIs) and non-nucleoside reverse transcriptase inhibitors (NNRTIs) – are involved in many drug interactions by inhibition or induction of the key hepatic enzyme system, cytochrome P_{450}. CCBs are the major class of antihypertensives affected by such drug interactions.[68-70]

The first-line antiretroviral regimen is currently based on NNRTIs (efavirenz or nevirapine) which are enzyme inducers, thereby promoting the metabolism of all currently available CCBs – via a poorly understood mechanism – and potentially reducing their antihypertensive effect. If the first-line regimen fails, therapy is changed to a PI regimen, which decreases the rate of CCB metabolism to increase CCB blood levels with the risk of hypotension. Particular care must be taken in patients receiving first-line antiretroviral therapy where the BP is controlled with CCBs. If the antiretroviral therapy is switched to include a PI, a dramatic fall in BP may result; it is therefore better to avoid CCBs with concurrent antiretroviral therapy.[70] The metabolism of numerous β-blockers may be inhibited by PIs – a theoretical interaction of uncertain significance. It would be prudent to initiate a low-dose β-blocker treatment in patients receiving PIs.

9.5 Control of hypertension in diabetes

Diabetes is prevalent in South African Indians (15.8%)[63] and whites (3.5%),[71] and is becoming more common in blacks (4.8 - 6%).[72] The illness has become the most common cause of end-stage renal disease (ESRD) because it is increasing in prevalence (particularly Type 2). Moreover, diabetic patients live longer at present, and are receiving treatment in ESRD programmes from which they were previously excluded.[73] The onset and course of the disease can be ameliorated if measures are instituted early.

ESRD is the most common complication of Type 1 diabetes. A higher proportion of individuals with Type 2 diabetes are found to have microalbuminuria and overt nephropathy shortly after diagnosis because the disease had been present for many years prior. A correlation exists between the degree of albuminuria and CVD. The guideline was abbreviated and therefore does not meet the detailed information required for the prevention and treatment of diabetes with hypertension in the SA population.[73]

The earliest clinical evidence of nephropathy – i.e. incipient nephropathy – is microalbuminuria (3 - 30 mg/mmol on spot urine). Microalbuminuria rarely occurs with a short duration of Type 1 diabetes; therefore, screening is necessary after 5 years of disease course. Because of the difficulty in precise dating of the onset of Type 2 diabetes, screening should begin at diagnosis.[73] The Diabetes Control and Complications Trial[74] and the United Kingdom Prospective Study[75] have both shown that intensive therapy of blood sugar can significantly reduce the development of microalbuminuria and overt nephropathy in diabetic patients.

Hypertension in diabetes shows: *(i)* more ISH; *(ii)* more non-dippers; *(iii)* abnormal BP regulation (variable with exercise and posture); *(iv)* a widened pulse pressure; *(v)* a correlation between SBP, heart failure and CV disease in Type 2 diabetes; and *(vi)* impaired sodium handling by the kidneys. In patients with Type 2 diabetes, hypertension is present in about one-third of patients at the time of diagnosis. Hypertension in diabetes is aggressive and progressive; it progresses rapidly to renal failure unless aggressively treated. The ACE-I, captopril, relieves albuminuria and prevents the progression of renal disease in Type 1 diabetes.[76] Studies have shown that ACE-Is reduce the progression of microalbuminuria in Type 2 diabetes,[77] and prevent the onset of microalbuminuria.

The combination of a third-generation dihydropyridine CCB (manidipine) and an ACE-I (delapril) failed to slow GFR but safely ameliorated CVD, retinopathy and neuropathy in the DEMAND study, involving 380 hypertensive Type 2 diabetic patients with albuminuria <200 mg/min. Notably, treatment was well tolerated, and the trial was double-blind, placebo-controlled and randomised to a 3-year follow-up.[78] Because of the high proportion of patients

who progress from microalbuminuria to overt nephropathy in ESRD, the use of ACE-Is or ARBs is recommended for all patients with microalbuminuria or advanced stages of nephropathy.[76, 77] The decision to use either an ACE-I or ARB in Type 2 diabetes should be left to the physician, with consideration of the affordability of therapy.

The metabolic syndrome has been described in the black population in the Free State[72] and the Indian population in Durban.[63,79] Owing to the diabetogenic effects of a thiazide-like diuretic used concomitantly with a β-blocker,[80] this treatment is probably inadvisable in such patients.[63,79] If it is necessary to use combination therapy to obtain the desired target BP (≤130/80 mmHg), an ACE-I or ARB should be combined with a thiazide-like diuretic (in the absence of gout or hyperuricaemia) or CCB, as these combinations have synergistic effects.

Patients with diabetic nephropathy are at very high CV risk, and there should be effective control of common CV risk. Patients should stop smoking, receive salicylates 80 - 150 mg daily (provided that the BP is controlled), and statins (and/or fibrates if indicated). In all stages of nephropathy, a BP <130/80 mmHg and blood HbA_{1c} level<7% should be targeted. Albumin excretion should be monitored annually (albumin/creatinine ratio on spot urine). Treatment with an ACE-I or ARB is the preferred initial choice, combined with other antihypertensive drugs.

In more advanced nephropathy (CKD stages 4 and 5) the following should be observed: *(i)* glycaemic control must be modified due to risks of hypoglycaemia and metabolic acidosis related to metformin; *(ii)* BP <130/80 mmHg should be targeted, and furosemide twice daily should be considered; *(iii)* ACE-Is or ARBs should be continued (but with extreme caution in CKD stage 5), with awareness of the risks of hyperkalaemia and acute decline in renal function; and *(iv)* malnutrition should be avoided, but protein and phosphate restriction can be considered. Dialysis and renal transplantation should be considered in suitable cases with end-stage disease.

10. Primordial prevention

The main objective is to avoid or decrease the social, economic and cultural determinants that contribute to the development of hypertension. Primordial prevention relies on health policies that create a congenial environment in which healthy behaviour and population-wide education programmes are encouraged. In turn, policies rely on many factors, including political commitment, advocacy by health professionals, and involvement of community leaders and the mass media. Strategies are intended to prevent the acquisition or enhancement of CVD risk factors, particularly lifestyle and diet changes in black patients brought about by rapid urbanisation.[80] The approach should be non-pharmacological, population-based and lifestyle-linked. Development of cost-effective methods for diagnosis and cost-saving measures for all risk factors of CVD is needed.

11. Prevention of hypertension

Prevention of hypertension is reliant upon the adoption of strict lifestyle measures. The prevalence of hypertension and CVD is increasing rapidly in Sub-Saharan Africa.[80] In a study of hypertension in Tanzania, under 20% of hypertensive subjects were aware of their diagnosis, approximately 10% reported receiving treatment, and less than 1% had controlled BP (<140/90 mmHg).[81] Similarly, the treatment status for South African black males showed that 20% were aware of their hypertension, 14% were receiving treatment and only 7% had controlled BP. In females, 47% were aware of their hypertension, 29% were receiving treatment and only 15% had controlled BP.[11]

12. Patient education

Hypertensive patients have the right to be informed about the status and progress of their condition. The main objective of patient education is to empower individuals to participate actively and ensure the quality of the management of their hypertension. Effective, honest and open two-way communication between the care provider and the patient is critical to the management of chronic life-long conditions. Acquisition of communication and counselling skills by health professionals is essential – preferably in the language of the target population. A checklist to guide the content of hypertensive patient education is provided in Annexure B. Poor adherence to therapy is the central cause of uncontrolled BP; obstacles to adherence are shown in Table XIV.

13. Ongoing management of the patient with hypertension

- Dose titration or stepwise increase should be carried out after 2 months if the BP remains uncontrolled and adherence is a factor
- Once a stable target BP has been achieved, follow-up BP measurement should be performed every 3 - 6 months
- Drug dose should be reduced if the patient presents with symptoms of postural hypotension (i.e. dizziness or SBP fall >20 mmHg on standing)
- Refer the patient from primary care to higher level care in the following:
  - Young patients (18 - 30 years)
  - Pregnancy
  - Resistant hypertension (uncontrolled BP despite treatment with 3 drugs)

Table XIV. Obstacles to adherence

Treatment characteristics	Patient and illness characteristics
Long duration of therapy	Asymptomatic nature of the condition leave people feeling that they are not ill
Complicated regimens	Chronic conditions require constant attention
Expensive medications	There are no immediate consequences of stopping therapy, e.g. one does not feel sick
Side-effects of medications	Social isolation
Lack of specific appointment times	Disrupted home situation
Long waiting period at clinic or office	Psychiatric illnesses
Lack of consistent and continuous primary care	
Instructions not understood	
Organic brain syndrome (e.g. memory deficit)	
Medicines not available	

- Any patient with severe TOD and/or severe ACC (most patients with high added risk or very high added risk)
- Hypertensive urgency or emergency.

- Most patients with low or moderate added risk can be managed at primary care level (general practitioner or clinic nurse) and assessed every 6 months. Patients with high or very high added risk with numerous risk factors should be managed by physicians or medical subspecialists (cardiologists, nephrologists and endocrinologists) and healthcare professionals with a special interest in hypertension; these patients may need frequent visits until the BP is controlled.

14. Strategic implications for implementing this guideline

This section was developed by the Department of Health (DoH) and has been included as Annexure C. The SAHS endorses the strategy, which is mainly for policy-makers or those who administer healthcare facilities. Implementation of the guideline is an active process requiring more than dissemination and education; it requires the full collaboration and co-operation of policy makers, administrators and funders. The DoH and SAHS are committed to the full implementation of this guideline.

15. Disclaimer

This national clinical guideline is for educational and reference purposes only. It is not intended to be a substitute for the advice of the appropriate healthcare professional or for independent research and judgment. The SAHS accepts no responsibility or liability arising from any information contained within the guideline, or any error of omission from the protocol or from the use of any information contained within it.

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Annexure A: Abbreviations

ABP	ambulatory blood pressure
ABPM	ambulatory blood pressure monitoring
ACC	associated clinical conditions
ACE-I	angiotensin-converting enzyme inhibitor
ARB	angiotensin II receptor blocker
AV	atrioventricular
BMI	body mass index
BP	blood pressure
CCB	calcium channel blocker
CHD	coronary heart disease
CKD	chronic kidney disease
CV	cardiovascular
CVD	cardiovascular disease
DBP	diastolic blood pressure
DoH	Department of Health
ECG	electrocardiogram
ESRD	end-stage renal disease
FDC	fixed drug combination
GFR	glomerular filtration rate
HDL	high-density lipoprotein
HDL-C	high-density lipoprotein cholesterol
HF	heart failure
ICU	intensive care unit
ISH	isolated systolic hypertension
LDL	low-density lipoprotein
LDL-C	low-density lipoprotein cholesterol
LV	left ventricle
LVH	left ventricular hypertrophy
MI	myocardial infarction
NNRTI	non-nucleoside reverse transcriptase inhibitors
NSAIDs	non-steroidal anti-inflammatory drugs
PI	protease inhibitor
SAHS	Southern African Hypertension Society
SBP	systolic blood pressure
SBPM	self blood pressure monitoring
TC	total cholesterol
TIA	transient ischaemic attack
TOD	target organ damage

Annexure B: Checklist for therapeutic patient education

The major objective is to empower all patients to participate actively in the management of their non-communicable chronic diseases/conditions.

	☑
Provide information to patients so that they can understand hypertension and its consequences if not treated adequately. Involve the patient and family or care-giver in the management.	☐
Inform patients of the distinction between having a risk factor and having a disease, and the benefits of controlling risk factors.	☐
Reinforce the importance of lifestyle modification at each visit.	☐
Inform patients of their BP reading at every visit and whether BP is controlled or what the target should be.	☐
Emphasise the importance of adherence to the management protocol.	☐
Patients must know the name, strength and dose of the drug(s) prescribed, dose frequency, and the necessity of regular ongoing use.	☐
Inform patients on how to deal with side-effects.	☐
Patients must be made aware of drug interactions and food/drug interactions.	☐
Tell patients to take the morning dose on the day of each visit to the health service.	☐
Ask patients to return drug containers, even if they are empty, at each visit.	☐
Support groups for the patients are essential and need to be established at all facilities. The focus should be on self-care and self-monitoring, emotional needs, cultural differences, discrimination, change management and behavioural change.	☐
Counsel patients with hypertension who may have an excessive fear of strokes or other consequences of hypertension.	☐
Educate patients to inform all healthcare providers consulted, that they do have hypertension and which drugs they are taking.	☐
Encourage patients to request a BP measurement at each visit.	☐

Annexure C: Strategic implications for the implementation of this guideline

This section, developed by the SAHS, is mainly for those who administer healthcare facilities or make policy. The implementation of the guideline is an active process involving more that dissemination and education. It requires the full collaboration and co-operation of policy makers, administrators and funders. SAHS is committed to the full implementation of this guideline. The key elements of focus to improve the management of hypertension and any other non-communicable chronic diseases/conditions are:

Communication	Partnerships – working together to deliver best possible care
Continuity	Performance – deliver quality care
Coordination	Professions – the right people delivering service
Comprehensiveness	Patient access – deliver fast and convenient care
Community linkages	Patient empowerment – rights and needs are met
Caring ethos	Prevention – promote healthy living
Care of high quality	
Competence	

- If the above key elements are considered, it will:
  - Enable the creation of long-term innovative care models suitable for developing communities, and prevent non-communicable chronic diseases and associated risk factors from developing
  - Control the progression of the non-communicable chronic diseases or their risk factors, increase survival and enhance quality of life
  - Allow health professionals, patients and families to share complementary knowledge and skills, thereby allow patients to become active partners in the management of their non-communicable diseases
  - Allow for a lifestyle, drug and self-management strategy with community and family support
  - Encourage a broad spectrum of care organisations, professionals and informal caregivers to participate.
- **Patient-centred care and service** is desired where there is one-to-one communication and group education. Inform patients on how, where and when to access help. A patient-oriented, tolerant, caring, concerned attitude is required from healthcare providers. Be sensitive to patients' socio-economic conditions and cultural history. Empathic communication builds trust and is a potent motivator. Implement long-term care models where there is a dedicated care provider, dedicated clinic time, chronic disease register, etc.

Annexure C: Strategic implications for the implementation of this guideline – continued

- **A paradigm shift is needed to adjust the health delivery system.** To make a tangible difference in non-communicable disease morbidity and mortality, a paradigm shift is required. In order to enhance this paradigm shift, movement from a single risk-factor approach to a comprehensive risk-management approach is needed, and chronic/long-term care models need to be implemented. Effective chronic/long-term care requires a different kind of healthcare delivery system in which there is coordinated comprehensive care: i.e. a move from a 'find it and fix it' model to one of coordinated and comprehensive continuum of care over extended regular contact. The implementation of dedicated services is a clinic organisational issue and it should be implemented at primary level for chronic diseases. Strengthen and decentralise resources and the provision of care for patients with non-communicable chronic diseases and disabilities at primary level. The chronic long-term care model differs from acute care models and the delivery of service should reflect this.

- **Institute dedicated hypertension service (i.e. team and time)** by using a team of health professionals specifically assigned to deal with hypertensive patients. Wherever possible, patients should see the same healthcare provider at each visit. The team members should be appropriately trained and carefully selected, and not rotated. Rotation makes training one of the major cost drivers in the delivery of long-term care. An overall coordinator for chronic care/long-term care should be selected and should be responsible for the treatment outcomes in the facility. All patients with hypertension require a dedicated time, day, etc. Alternative measures should be implemented if dedicated hypertension health professionals are not available.

- **Patients should never be treated at the same time as patients** with acute, curable disease, unless the latter is the reason for visiting the clinic. This will require an effective triage system. The hallmarks of a dedicated hypertension service/care are:
  - **Effective:** with the right level of care provided at the right time, by the right persons
  - **Efficient:** with appropriate integrated care packages across the levels of care – this will require an effective, well-defined referral system, known to patients and healthcare providers and even an appointment system
  - **Informative:** with patient access to understandable information that allows them to make rational decisions about care options, treatment, laying of complaints, etc.
  - **Equitable:** all patients should benefit from service/care that is consistent, continuous, available and accessible
  - **Promotive and preventive:** such aspects must be included in the integrated hypertension care package: e.g. therapeutic education, life skills training, etc.

- **Adequate equipment** must be available to perform the tasks and observations as listed in this guideline.

- **Drug therapy:** relevant and appropriate drugs should be available at all times and not be changed, except by the prescriber. Patients should receive the total amount of drugs as prescribed. Procurement and distribution systems should be more effective.

- **National record-keeping** in the form of chronic disease registers should be implemented in all care facilities to monitor patient control and compliance.

- **The patient/healthcare provider ratio** should be reasonable.

- **Patient record/file management** should be sequential and systematic with each entry dated and signed as appropriate. All information should be documented on the record and no loose papers or stickers should be allowed.

- **Self-monitoring equipment** should be made available to those patients as recommended in the SBPM (see section 3.3). Each support group must have validated SBPM devices for group use.

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