DRAFT GUIDELINES FOR THE MANAGEMENT OF HYPERTENSION IN PRIMARY CARE IN SOUTH AFRICA

E SCHULTZ **AUGUST 2004; REVISED APRIL 2007.**

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1 INTRODUCTION

Essential hypertension is part of the metabolic syndrome. Some of the other components are abdominal obesity, dyslipidaemia, insulin resistance with or without impaired glucose tolerance and non-insulin dependent diabetes, a pro-inflammatory state, endothelial abnormalities and a hypercoagulable state.[1, 2] All the components are, individually and jointly, associated with cardiovascular and reno-vascular complications. There is considerable interaction and overlap between them and their risk factors. The prevalence of the metabolic syndrome, its complications, and their risk factors is high in all except possibly very traditional societies.

These guidelines address the diagnosis and management of hypertension at a personal level within the framework of the metabolic syndrome. They are located in a low-resourced economically deprived environment with particular consideration to the affordability and feasibility of the interventions and the deployment of appropriate care providers. Risk management is stressed.

The guidelines are directed at the medical care of hypertensive patients in primary care, defined as first contact ambulatory medical care between a patient and a medical service provider. Simple point of care tests and general, non-drug measures take precedence over high-tech investigations and medicines. Primary prevention is not considered but the general non-pharmacological [non-drug] recommendations directed at the whole disease spectrum including the risk factors apply also to primary prevention.

Changes are taking place in our understanding of the metabolic syndrome, and in the role of non-drug measures, the pharmacological and clinical effects of drugs, service organisation, and human resource deployment. New drugs, new drug formulations and new combinations of old drugs are being developed, drug patents are expiring, and drug costs and affordability are changing. Diagnostic criteria and management objectives are evolving. Frequent guideline revisions are therefore needed.

Public health action on the social and economic determinants of the metabolic syndrome is not discussed. It is, however, increasingly incumbent on the medical profession to interact with the state and with civic society because the devastating epidemic now confronting all societies cannot be stemmed by the profession.

2 DEFINITION OF HYPERTENSION

The term hypertension refers to the sustained elevation of systolic and/or diastolic arterial pressure. The definition is based on the choice of a threshold value from a continuous distribution of readings. Any point separating “normal” from “elevated” is, however, arbitrary and is evolving.[3]

While the diagnosis must be based on readings taken on several occasions over many months, a single elevated casual blood pressure measurement may be predictive or indicative of hypertension especially in the presence of complications, other components of the metabolic syndrome and of their shared risk factors precursors.

3 CLASSIFICATION OF HYPERTENSION

Hypertension should be classified according to the level of the blood pressure, the presence and severity of complications, and aetiology. There is a direct relationship between the level of the blood pressure and complications.

3.1 classification by blood pressure levels - grades

Blood pressure is classified into grades for descriptive purposes, as a reference point for intervention and as an measure of control. As with diagnosis, the threshold points for grading are arbitrary. Many classifications by blood pressure grades have been published; most have been modified over the years, several more than once.

The usefulness of blood pressure grades is, however, questionable. Blood pressure is a continuous variable with considerable biological variability. It cannot be measured exactly because of insensitive and inaccurate measurement tools, poor observer technique and biological variability. The reproducibility, reliability and validity of readings is reduced by variations in type of equipment used and the distorting effect of ambient physical and inter-personal factors in the environment during measurement.

The grades shown here are adapted from several sources.

OFFICE-READ BP GRADES IN NON-PREGNANT ADULTS [≥18YEARS]			
NAME	**GRADE**	**SYSTOLIC BP**	**DIASTOLIC BP**
normal or optimal		< 120	< 80
high normal [4]	pre-HT	120 -139	80 - 89
mild hypertension	1	140 -159	90 -99
moderate hypertension	2	160 -179	100 -109
severe hypertension	3	180 -199	110 -119
very severe hypertension	4	≥ 200	≥ 120

OFFICE-READ BP GRADES IN PREGNANT WOMEN AND CHILDREN			
NAME	**GRADE**	**SYSTOLIC BP**	**DIASTOLIC BP**
normal or optimal		< 120	< 80
mild hypertension	1	120 - 139	80 - 89
moderate hypertension	2	140 -159	90 -99
severe hypertension	3	160 -179	100 -109
very severe hypertension	4	≥ 180	≥ 110

ACCELERATED AND MALIGNANT HYPERTENSION	
NAME	**DESCRIPTION**
accelerated hypertension	any BP level + retinal haemorrhages + soft exudates
malignant hypertension	any BP level + papilloedema

Both systolic or diastolic blood pressure do not need to be elevated for a diagnosis of hypertension to be made. The highest reading of either should be used for grading purposes. The systolic pressure can even be measured on its own if resources for the accurate measurement of both pressures are not adequate. In persons over the age of 50 years the systolic pressure is more relevant than the diastolic pressure, while in pregnant women the diastolic is more important.

3.2 classification by target organ damage - stages

The increase in blood pressure affects the cardiovascular system directly, through its effect on arterioles [micro-vascular disease], and indirectly through its effect on arteries [macro-vascular disease]. The effects are referred to as cardiovascular complications or target organ damage. They are also influenced by and mediated via the total risk profile.

STAGES OF TARGET ORGAN DAMAGE		
STAGES	**TARGET ORGAN DAMAGE**	
1	NIL	
2	mild to moderate target organ damage	
	pressure-related disease:	
	heart	left ventricular hypertrophy
	micro-vascular disease:	
	retina	hypertensive retinopathy [grade 1]
	kidney	renal impairment [grade 1]
	macro-vascular disease:	
	NIL	
3	severe target organ damage	
	pressure-related disease:	
	brain	arterial thrombosis or embolism
	heart	left ventricular failure, pulmonary oedema
	vessels	aortic aneurysm
	micro-vascular disease:	
	brain	encephalopathy
	retina	hypertensive retinopathy [grade 2 - 4]
	kidney	renal impairment [grade 2 - 4]
	macro-vascular disease:	
	brain	arterial thrombosis or embolism
	retina	atherosclerotic retinopathy [grade 3 - 4]
	heart	coronary artery disease
	kidney	renal impairment [grade 2 - 3]
	vessels	dissecting aortic aneurysm
		carotid artery disease
		intermittent claudication

GRADES OF HYPERTENSIVE RETINOPATHY	
GRADE	**RETINA**
1	narrowing of terminal arterioles
2	widespread, severe narrowing of arterioles with distal dilatation
3	striate haemorrhages, soft exudates, deep lipid exudates near macula
4	papilloedema

GRADES OF ATHEROSCLEROTIC RETINOPATHY	
GRADE	**RETINAL VESSELS**
1	thickening of arterioles, copper wiring
2	arteriolar/venous [a/v] nipping
3	increased arteriolar tortuosity
4	sheathed vessels, retinal vein occlusion

GRADES OF RENAL IMPAIRMENT		
GRADE	**TEST/OBSERVATION**	**RESULT**
1	serum creatinine or	120 - 149 µmol/l
	serum urea	7.6 - 9.9 mmol/l
	if creatinine < 120 µmol/l or urea < 7.6 mmol/l	
	nocturia	3 times
	micro-albuminuria	present
	proteinuria	occasional
	creatinine clearance	90 - 129 ml/min/1.73m^2
2	serum creatinine or	150 - 179 µmol/l
	serum urea	10 - 12.4 mmol/l
	if creatinine < 150 µmol/l or urea < 12.5 mmol/l	
	nocturia	> 3 times
	proteinuria	persistent
	creatinine clearance	60 - 89 ml/min/1.73m^2
3	serum creatinine or	180 - 259 µmol/l
	serum urea	12.5 - 14.9 mmol/l
	creatinine clearance	30 - 59 ml/min/1.73m^2
4	serum creatinine or	≥ 260 µmol/l
	serum urea	≥ 15 mmol/l
	creatinine clearance	< 30 ml/min/1.73m^2

A glomerular filtration rate [GFR] or creatinine clearance < 15 ml/min/1.73m^2 =

end-stage renal or kidney disease [ESRD or ESKD],
kidney failure or
stage 5 renal impairment.

3.3 classification by etiology

3.3.1 primary or “essential” hypertension

Many inter-dependent and inter-related factors are associated with the development and maintenance of primary blood pressure elevation. Their relative significance differs between individuals. They are called risk factors. They include:

- family history of the metabolic syndrome*
- overweight and obesity
- high sodium intake
- low potassium and magnesium intake
- high sodium/potassium ratio
- physical inactivity [> grade 2 inactivity]
- intra-uterine under-nutrition and low birth weight
- starvation during puberty [5]
- psycho-social stress, alcohol abuse and tobacco use

COMPONENTS OF THE METABOLIC SYNDROME – EXPANDED PUTATIVE LIST - 2006

hypertension
abdominal, central or visceral obesity
insulin resistance
impaired glucose tolerance and type 2 diabetes
dyslipidaemia and atherosclerosis
hypercoagulability and endothelial abnormalities
pro-inflammatory state
non-alcoholic fatty liver disease
adult macular degeneration

* A formal definition of the metabolic syndrome is on page 8

OVERWEIGHT AND OBESITY		
	OVERWEIGHT	OBESITY
% above IBM*	0 - 19.9	≥ 20
BMI [Asians]	23 - 27.5	≥ 27.7
BMI [others]	25 - 29.9	≥ 30

- IBM also called IBW [ideal body weight, normal, desirable or optimum mass]

IBM [ideal body mass] in kg = height in cm – 105
BMI [body mass index] = weight [kg] divided by height [m^2]

CUT-OFF POINTS FOR DAILY INTAKE	
sodium [Na]	< 1.5 gm
sodium chloride - table salt	< 3 gm
Potassium [K]	± 3 gm
Magnesium [Mg]	± 350 mg
sodium/potassium ratio	< 0.75

GRADES OF PHYSICAL INACTIVITY		
GRADE	**TYPE OF ACTIVITY**	**FREQUENCY/WEEK**
0	sub-maximal	5 - 6
1	sub-maximal	3 - 4
1	taxing	5 - 6
2	sub-maximal	1 - 2
2	taxing	3 - 4
2	moderate	5 - 6
3	taxing	1 - 2
3	moderate	3 - 4
3	minimal	7
4	moderate	1 - 2
4	minimal	< 7

DESCRIPTION OF TYPE OF ACTIVITY

sub-minimal activity	sedentary life, no domestic work
minimal activity or light exercise	walking less than 1 block per day, domestic work
moderate activity or exercise	brisk walking, gardening, sports like golf and active bowls, social tennis, gentle aerobic exercises
taxing activity or intense exercise	as sub-maximal, but less strenuous like swimming, sawing wood
sub-maximal activity or very intense exercise	dynamic exercises, strenuous sports, running, jogging, physically demanding work such as loading and carting

Binge drinking is a form of alcohol abuse. Two USA drinks of alcohol daily for males and one drink for females can be considered to be the upper limit of moderate alcohol use; more can be rated as alcohol abuse. Units are a bit smaller than 1 drink.

1 USA drink of alcohol =

beer - regular	12 oz	360 ml	150 cal
wine - 12% alcohol	5 oz	150 ml	100 cal
spirits - 80% proof	1.5 oz	45 ml	100 cal

SIZE AND CALORIE CONTENT OF UNITS OF ALCOHOL

1 unit of alcohol = about 10g alcohol =

mkomboti	scale	500 ml
beer	mug or can	340 ml
wine	wine glass	120 ml
port and sherry	sherry glass	60 ml
spirits	metric tot	25 ml
dry martini	glass	4 units

3.3.2 secondary hypertension

Causes of secondary hypertension include renal or adrenal disease, sleep apneoa, coarctation of the aorta, and thyroid and parathyroid disease. Hypertensive children are more likely to have secondary hypertension than adults, especially if they are not obese. Women who suffered from pre-eclampsia or eclampsia during pregnancy are at risk of developing hypertension.[6] This hypertension could be classified as secondary.

Some drugs cause blood pressure elevation. They could be considered as causes of secondary hypertension or as risk factors for primary hypertension.

DRUGS AND HERBAL PREPARATIONS ASSOCIATED WITH BLOOD PRESSURE ELEVATION

oral contraceptives, ACTH and cortico-steroids, cyclosporine
sympatheticomimetics such as appetite suppressors
respiratory decongestants, amphetamines
sodium-containing preparations like urinary and gastric alkalisers
anti-inflammatory agents - NSAIDs and COXIBs
monoamine oxidase [MAO] inhibitors, tri-cyclic anti-depressants
licorice, alcohol, tobacco, cocaine
herbal preparations like St John's wort, ephedra, bitter orange

4 DEFINITION OF THE METABOLIC SYNDROME

Threshold points for any set of diagnostic criteria are selected arbitrarily and like the definition of other continuous variables do not separate normal from abnormal. The criteria for the formal definition shown here were developed by the International Diabetes Federation.[7] The metabolic syndrome, however, includes an ever-expanding range of conditions. Understanding of the role of factors such as genetics, diet, alcohol abuse, physical inactivity and inflammation in its pathogenesis is evolving.

FORMAL DIAGNOSTIC CRITERIA FOR THE METABOLIC SYNDROME

central obesity [waist circumference]	Asian males: ≥ 90 cm, females ≥ 80 cm other males: ≥ 94 cm, females ≥ 80 cm
together with two of the following:*	
triglycerides	≥ 1.7 mmol/l
HDL-cholesterol	males < 1.03 mmol/l, females < 1.29 mmol/l
blood pressure	≥ 130/85 mm Hg or hypertension
fasting blood glucose	≥ 5.6 mmol/l or diabetes type 2

* including being on treatment for lipid abnormality, hypertension or diabetes

5 RISK FACTORS FOR CONDITIONS ASSOCIATED WITH HYPERTENSION

Hypertension and the other formal components of the metabolic syndrome are major independent and interactive risk factors for target organ damage. Damaged target organs interact with each other to aggravate the risk profile. All these conditions are here collectively referred to as conditions or diseases associated with hypertension.

Factors causally related to all the components of the metabolic syndrome are also risk factors for target organ damage. Most are shared between the components of the syndrome; some like tobacco use are directly implicated in target organ damage.

In summary the risk profile for target organ damage therefore includes:

clinical factors: hypertension, abdominal obesity and the other components of the metabolic syndrome, damaged target organs, over-weight and non-abdominal gluteal-femoral obesity, increased platelet aggregation, polycythaemia, and elevated uric acid, C-reactive protein and B-type natriuretic peptide[8]

dietary factors: high* intake of calories, sodium, total fat, saturated and trans-fatty acids, cholesterol, and free sugars [including sugars in fruit juices and honey], and low intake of potassium, magnesium, fibre [also called indigestible food residue or roughage], and anti-oxidants [found especially in vegetables and fruit]

other factors: age, gender, physical inactivity, psycho-social stress, tobacco use, alcohol abuse, use of street drugs such as cocaine and metamphetamines, some medicines and herbal remedies

* A high calorie intake is in excess of the daily calorie requirement. This depends on body build and level of activity [page 7] and can be calculated.

DEFINITIONS OF BODY BUILD				
	THIN	NORMAL	OVERWEIGHT	OBESE
% deviation from IBM	<10	-10 - 9.9	10 - 19.9	≥ 20
BMI [Asians]	<16.5	16.5 - 22.9	23 - 27.9	≥ 28
BMI [others]	<18.5	18.5 - 24.9	25 - 29.9	≥ 30

MAXIMUM DAILY DIETARY CALORIE REQUIREMENT					
BODY BUILD	LEVEL OF PHYSICAL ACTIVITY				
	4	3	2	1	0
very obese	30	25	20	17.5	15
obese	35	30	25	20	17.5
normal	40	35	30	25	20
thin	45	40	35	30	25
	calories/kg IBM/day				

If hypertension is viewed as a complex cardiovascular disorder rather than as just a set of high blood pressure values, it could be diagnosed in anticipation with readings in the normal range when risk factors for it and conditions associated with it are present.[9]

INTERACTION BETWEEN RISK FACTORS AND TARGET ORGAN DAMAGE													
METABOLIC SYNDROME AND OTHER RISK FACTORS	target organ damage	obesity	hypertension	dyslipidaemia	DM & insulin resistance	EUA & gout	physical inactivity	tobacco use	alcohol abuse	stress	platelet aggregation	polycythaemia	NSAIDs & COXIBs
target organ damage	x		x				x			x			
obesity	x		x	x	x	x	x		x	x		x	x
hypertension	x	x		x	x	x				x			
dyspilidaemia	x	x	x		x								
diabetes & insulin resistance	x	x	x	x		x	x			x	x		
elevated uric acid and gout	x						x			x			x
physical inacitivity	x	x	x	x	x			x		x	x		x
tobacco use	x		x	x			x		x	x	x	x	
alcohol abuse	x	x	x	x	x	x		x		x		x	
psycho-social stress		x	x		x		x	x	x				
increased platelet aggregation	x		x	x	x								
polycythaemia	x		x										
NSAIDs and COXIBs	x		x			x	x				x		
treatment for hypertension			x	x	x	x	x			x			

6 EXAMINATION OF THE PATIENT

6.1 introduction

As hypertension is very prevalent, no opportunity for measuring blood pressure and diagnosing hypertension should be missed.

From the perspective of clinical management, 4 types of subjects are encountered:

1. subjects in whom a high blood pressure reading is recorded
2. subjects in whom a high reading was recorded in another setting or time
3. known hypertensives
4. subjects with a normal blood pressure reading but in whom hypertension is suspected or anticipated, such as those who suffer from:

    - any condition causally related to the development of secondary hypertension
    - another component of the metabolic syndrome
    - any target organ damage or cardiovascular complication

    or those in whom the following are present:

    - risk factors for primary hypertension or an associated condition
    - a family member suffering from an associated condition.

The objectives of an examination are to locate the patient socially and demographically and to identify the presence and the extent of:

- sustained blood pressure elevation
- factors related to the development of secondary hypertension
- risk factors for primary hypertension
- risk factors for associated conditions
- presence and severity of associated conditions

A systematic structured examination is advised. The components are:

1 personal and family history
2 symptoms, signs and investigations for hypertension per se:

symptoms:	usually NIL but subjects may complain of episodes of postural hypotension, unexplained nose-bleeds or palpitations, and occipital headaches with no identifiable cause
signs:	usually NIL but tachycardia may be present
investigations:	blood pressure measurement

3 symptoms, signs and investigations for the risk factors for hypertension

4 symptoms, signs and investigations for associated conditions and their risk factors

6.2 personal and family history

occupation, income, literacy and education
accommodation, marital status and domestic arrangements
social networks and recreational activities
diet and physical activity
use of alcohol, tobacco and street drugs
past and current illnesses of the patient and close relatives
cause and age of death of close relatives

QUESTIONS ABOUT EMPLOYMENT, INCOME AND EDUCATION:

What is your work situation? full time/part-time/flexi-time/ temporary/permanent/self-employed/employed by others/unemployed/ voluntary worker/learner/student/housewife/retired/pensioner/disabled
What kind of job are you doing now? _____
For how many months have you been doing this job? _____
List other jobs that you have done: _____

Are you happy at work? YES/NO
Are you in control of what you are actually doing? YES/NO
Are you involved in decision making at work? YES/NO
Are there opportunities for your advancement at work? YES/NO

What is your personal monthly income? _____
What is the nett family monthly income? _____
How many people depend on this income - totally/partially? _____/_____

What formal education level have you reached? _____
Can you read and write English fluently? YES/NO
Can you read and write another language fluently? YES/NO

SHORT LIST OF QUESTIONS ABOUT DIET

How many times/day do you eat?
How many times/day do you eat a starch like bread, potato, rice, pasta?
How many times/week do you eat fish/meat/tinned food/biscuits/sweets?
How many times/week do you eat vegetables/fruit/dairy products/dried legumes?
What kind of fat or oil do you use on/in your food?
How many glasses of sugar-sweetened soft drinks/fruit juices do you drink/day?
How many teaspoons of sugar do you put in your tea/coffee/porridge/cereal?
How much salt do you put on/in your food – on a scale of 0 - 10?

QUESTIONS ABOUT PHYSICAL ACTIVITY

How physically demanding is your job? very heavy/heavy/moderate/light/nil
What type of transport do you usually use? bicycle/car/bus/train/own feet
Approximately how many minutes do you usually spend walking per day? _____
How many times per week do you go for a brisk walk or a jog? _____
How many times/week do you take part in any other physical activity? _____

QUESTIONS ABOUT ACCOMMODATION

Do you stay in a: house/flat/shack/room/hostel/street/veld _____
How many rooms [including the kitchen] are there in your home? _____
How many bedrooms are there in your home? _____
Is there a bathroom in the house? YES/NO

From where do you get water? inside tap/outside tap/pump/tanker/ _____
If there are no taps in your home how far is it to water? [minutes to walk] _____
What type of toilet do you use? water-flushed/pit/bucket/ _____
If water-flushed is the toilet in the building? YES/NO
How far is it from where you sleep to the toilet? [number of steps] _____
How many people share 1 toilet? _____

What type of fuel do you use for cooking? electricity/coal/wood/gas/paraffin/ ____
What type of fuel do you use for heating? electricity/coal/wood/gas/oil/ _____
What do you use for lighting? electricity/candle/gas/paraffin lamp/_____
Is your home adequately insulated? YES/NO
Does the roof of your home usually leak? YES/NO
Is your home damp? YES/NO

In your home:
Do you have a fridge? YES/NO
Do you have a radio? YES/NO
Do you have a TV set? YES/NO

RECORD SHEET FOR DATA ON ALCOHOL				
kind of alcohol	amount/week		Year in which you	
	now	most	started	stopped
pints of beer				
glasses of wine				
tots of spirit				
cartons of mqomboti				

also ask about binge drinking

RECORD SHEET FOR DATA ON TOBACCO					
type of tobacco	amount		Inhale	Year in which you	
	now	most	Yes/No	started	stopped
manufactured cigarettes/day					
hand-rolled cigarettes/day					
pipe tobacco g/week					
cheroots or cigars/day					

can also be used for street/recreational drugs

RECORD SHEET FOR DATA ABOUT FAMILY ILLNESSES AND CAUSE OF DEATH			
relative	age		nature of illnesses and cause of death
	now	death	
parents			
siblings			
children			
partner/s			

6.3 blood pressure measurement

6.3.1 the equipment

The mercury sphygmomanometer should be phased out because of the danger of mercury contamination.[10] Digital machines if affordable are preferred. Only validated devices should be used. Aneroid sphygmomanometers are safe and inexpensive but tend to become unreliable with non-zeroed gauges, cracked face plates, or defective rubber tubing, as do all machines.[11]

All equipment must be maintained in good working order. Devices must be regularly calibrated and checked for accuracy.

An appropriate-sized cuff [bladder encircling at least 80% of the arm] should be used. "If a choice must be made between a cuff which is too small and one which is too large, the larger one should be chosen." [2]

6.3.2 the physical environment

It is not possible to obtain a valid blood pressure reading in a noisy, cold, open or public place. Blood pressure should not be measured unless in, at least, a relatively quiet, fairly private, sheltered recess. To do otherwise is meaningless, disrespectful and a waste of time.

6.3.3 the subject

"Measurement should be made on the seated subject at a comfortable temperature. There should be no moderate or severe exertion, eating/drinking, smoking or exposure to cold immediately preceding the measurement." [3] The subject's feet must be on the

floor. The arm should be in the horizontal position a little above waist level. It should rest on something and not be held in position by either the observer or the subject.

The arm should be straight and the hand relaxed and empty. The arm need not be bare. Clothing must not be pushed up above the cuff. If necessary the cuff can be fitted over the sleeve - provided that the sleeve is not thick if auscultation at the ante-cubital fossa is to be done. In cold venues where heavy out-door clothing cannot be removed, only the item of clothing from the arm used for the measurement should be removed and loosely hung around the shoulder so that the subject is still comfortably, respectfully and warmly covered.

6.3.4 the observer

The observer should be seated, relaxed and not distracted. S/he should make eye contact with the subject. Body language and tone of voice should be attentive and caring. The “white coat” effect can be reduced, possibly even eliminated, by a dignified and respectful attitude. When not using automated devises, the observer should watch against bias in favour of a reading - common at cut-off points and even numbers.

6.3.5 the technique

This is well documented elsewhere. The following are however stressed:

1. Each observer or group of observers seeing the same subject must always use the same arm.

2. The cuff should be applied at the onset of the consultation and only removed just before the end. This will promote arm relaxation, enable hassle-free repeat measurement/s if indicated, and provide a rest and adjustment period.

3. The cuff must be applied snugly and evenly.

4. When not using an automated devise, the cuff should be deflated slowly.

5. If a mercury device is used the observer must not look down on the mercury column; the device and the observer’s eyes must be at the same level.

6. The USA[4] and EU guidelines[12] recommend that at least two measurements, spaced 1 – 2 minutes apart, should be made but do not comment on which reading should be used.

   The South African Department of Health recommends two measurements and the use of the lowest diastolic pressure reading together with its corresponding systolic pressure reading.

   The Southern African Hypertension Society recommends the average of two readings, taken 1 minute apart with the proviso that if these readings differ by more than 5 mm Hg additional readings should be taken.

The British Hypertension Society [BHS][13] recommends the average of two readings, unless the readings differ by more than 10 mm Hg when the first reading should be discarded and further readings taken.

Repeated readings and their mathematical manipulation induce anxiety in the patient and the observer. They are also time-consuming, subject to error and increase uncertainty. At borderline levels 24% of readings were found to be wrong even after 4 readings.[14]

It is therefore recommended that usually only one measurement should be made. If in doubt or unsure of the reading, the measurement should be repeated after an interval of at least 2 minutes and the second reading should be used. However, in the presence of cardiac arrhythmias repeated measurements [3 – 4] should be made and the average used.[2]

7. The blood pressure should also be measured with the patient standing when postural hypotension is suspected. This should be done immediately on rising.

8. Each reading must be written down as soon as it has been made.

6.3.6 recording a blood pressure reading

When not using automatic devices with digital displays:

1. The point at which the last arterial sound disappears [Korotkoff phase 5] is usually taken as the diastolic pressure.
2. In children the point at which the sound becomes muffled [Korotkoff phase 4] gives a better indication of diastolic pressure because the arterial sound may persist until the cuff pressure has fallen to zero.
3. In pregnant women the Korotkoff phase 4 sound is also used for the reading of the diastolic pressure.[2]
4. Readings should be made to the nearest mm Hg.

6.3.7 validity of blood pressure readings

The “white-coat” effect [response to an observer - who traditionally wore a white coat] can raise blood pressure by >20/10 mm Hg in up to 40% of patients. Almost 20% of patients diagnosed as hypertensive in a clinic “have entirely normal ambulatory pressures … including 4% of patients with readings >180/110 mm Hg.” [4]

The observer’s technique [especially digit preference and arm position with higher readings in a dependent rather than a horizontal position] influences readings while the subject’s familiarity with the observer and the process [habituation] and regression to the mean tend to reduce readings in repeated measurements. Other factors that need to be considered include time of day, time lapse since last drug dose, mental and physical stress, including hunger and repeat measurements, and the subject’s age. Below the age of 35 years a high reading may be a function of biological variation and not a true elevation,[15] and in elderly patients sclerotic arterial walls tend to give non-valid high blood pressure readings [pseudo-hypertension].

"Evidence regarding factors which distort blood pressure readings and the magnitude of their effect is generally weak, but talking, acute exposure to cold, recent ingestion of alcohol, incorrect arm position, and incorrect cuff size are able to affect readings by more than 5 mm Hg." [10] Even routine activities have been observed to elevate blood pressure.[16]

BP ELEVATIONS ASSOCIATED WITH ROUTINE ACTIVITY		
ACTIVITY	**SYSTOLIC BP**	**DIASTOLIC BP**
attending a meeting	20	15
commuting to work	16	13
dressing	12	10
walking	12	6
talking on telephone	10	7
eating	9	10
doing desk work	6	5
reading	2	2
watching television	0.3	1

Biological variability in blood pressure levels further compound the bias and error inherent in measuring equipment and in all aspects of the technique.

6.3.8 self-measurement of blood pressure

Self measurement at home should be considered for the evaluation of suspected "white-coat hypertension", apparent drug resistance, episodic hypertension, suspected autonomic dysfunction, or a hypotensive reaction to antihypertensive treatment.

Other indications include suspected masked hypertension [reverse white-coat hypertension], unusual variability in readings, high readings without target organ damage, monitoring of hypertension in pregnancy and compliance enhancement.

advantages of self-measurement:

- multiple readings over a prolonged period
- readings under different conditions and at different times
- readings in a familiar environment
- no distortions due to the white-coat effect
- patient participation leading to improved compliance and better control
- fewer clinic visits with lower costs to patient and institution
- better prediction of cardiovascular outcome than clinic readings[17]

Many devices for self-measurement of blood pressure are commercially available. The recommendations of regular review bodies such as the Working Group on Blood Pressure Monitoring of the European Society of Hypertension should guide purchases.

6.3.9 ambulatory measurement of blood pressure

Indications for the use of ambulatory measurement rather than self-measurement include the identification of nocturnal hypertension, sleep apnoea, percentage of elevated blood pressure readings or blood pressure load, and ambulatory hypotension. Expense severely limits use.

The advantages of ambulatory blood pressure monitoring also include:

- better correlation of ambulatory readings with the presence of target organ damage and prognosis[4] than of clinic readings
- the identification of a subgroup of "non-dippers" who may have more target organ damage and higher cardiovascular morbidity and mortality rates than "dippers" [in whom blood pressure drops at night when sleeping].

The average daytime pressure is commonly used as the operative reading. It is usually approximately 10/5 mm Hg lower than clinic readings as are the averages of readings obtained by self-measurement. Nevertheless, when management was based on ambulatory readings rather than on clinic readings, blood pressure was controlled with fewer drugs and without detriment to left ventricular mass or general wellbeing.[18] These observations challenge the current categorical recommendations for initiating and intensifying drug treatment. The same may apply to self-measured pressures.

6.3.10 interpretation of blood pressure readings

A single elevated reading even if very high only suggests hypertension; several elevated readings separated by a reasonable interval [not minutes, but hours to weeks] and the presence of target organ damage would confirm the diagnosis. The degree and type of target organ damage also points to the duration and severity of the hypertension. It is necessary to be aware that, the "use of a single measurement to define a patient's blood pressure would over-diagnose hypertension in 20-30% of the population and miss a third of those who are truly hypertensive."[4]

6.4 physical examination and investigations

More investigations are needed to establish a comprehensive diagnosis of hypertension and its associated conditions, and to monitor response to treatment. Valid indications should determine test type and frequency. Point of care tests are preferred as they are relatively inexpensive and the results are immediately available. Other factors that influence choice and frequency of investigations are risks to the patient, pick-up rates[2] and cost effectiveness – see tables on investigations.

code for importance: E = essential U = useful L = limited value
code for cost:[19] 0 = nil L = low M = moderate H = high

* If protein is present in the urine on more than one occasion in the absence of a urinary tract infection, renal impairment can be assumed to be present and the test need not be repeated.

FREQUENCY, INDICATION AND USEFULNESS OF EXAMINATIONS											
	frequency				indication				other		
	on admission	at each visit	annually	when necessary	metabolic syndrome	target organ damage	risk/aetiological factor	drug side-effect	importance	point of care test POC	cost
physical examination											
weight	X	X			X		X	X	E	X	L
height [to calculate BMI]	X		X		X		X		E	X	0
waist circumference	X		X		X		X		E	X	0
pulses and bruits	X		X	X		X		X	E	X	0
retina	X		X	X		X			E	X	L
heart & nervous system	X		X	X		X			E	X	0
urine											
chemical - protein *	X	X				X	X		E	X	L
- blood				X		X	X		U	X	L
- glucose	X		X	X	X		X		U	X	L
- micro-				X		X	X		U		M
microscopy				X		X			U		M
blood											
creatinine	X		X	X		X	X		E		M
creatinine-clearance[20]				X		X	X		U		M
urea – azostix				X		X	X		U	X	L
serum potassium	X		X	X			X	X	U		M
cholesterol total	X		X	X	X		X	X	U		M
cholesterol HDL	X		X	X	X		X		U		M
cholesterol LDL				X	X		X	X	L		M
triglycerides				X	X		X		L		M
glucose - random	X			X	X		X	X	U	X	L
glucose - 2-hr post-				X	X		X	X	U	X	L
uric acid	X			X	X			X	L		M
Hb				X		X	X		U	X	L
PCV	X		X	X		X	X		U	X	L
mean corpuscular Hb				X			X		L		M
C-reactive protein				X		X			U		H
other											
ECG				X		X		X	U	X	M

DATA ARRANGED ACCORDING TO INDICATIONS		
INDICATION	**ITEM**	**POC**
BMI - body build	weight and height	X
CENTRAL NERVOUS SYSTEM	physical examination	X
COMPLIANCE	pill count	X
	urine - sodium	X
GLUCOSE TOLERANCE	urine - glucose	X
AND DIABETES MELLITUS	blood - glucose, random	X
	blood - glucose, 2-hr post-prandial	X
HEART - SIZE AND FUNCTION	physical examination	X
	ECG	X
	C-reactive protein	
KIDNEY FUNCTION	history of nocturia > 4	X
	urine – blood and protein	X
	urine - micro albumin	X
	blood – creatinine *	
	blood - creatinine clearance	
	blood - urea [azostix] *	X
	blood - potassium	
	blood - haemoglobin	X
LIPID PROFILE	circumference - waist	X
	blood - cholesterol - total	
	blood - cholesterol – HDL and LDL	
RAS [renin-angiotensin system]	blood - potassium	
RISK FACTORS - other	blood - packed cell volume	X
alcohol abuse	blood - MCHb	
gout	blood - uric acid	
inflammation	blood - C-reactive protein	
inflammation	blood - wbc count	
VASCULAR SYSTEM	physical examination - pulses, bruits	X
	retinoscopy	X
SECONDARY HYPERTENSION	heart size and function	
	renal function	
	renin-angiotensin system	

***** Serum urea is not a reliable test of renal function. It should be used only when facilities for measuring serum creatinine are not available or when severe renal impairment is suspected and an immediate assessment is required.

REFERENCE - NOT OPTIMAL - RANGE OF VALUES IN ALPHABETIC ORDER	
TEST	**PREFERRED VALUES**
BMI – Asians and non-Asians [others]	18.5 - 22.9 and 18.5 - 24.9
circumference - waist [Asians]	females ≤ 80 cm; males ≤ 90 cm
circumference - waist [others]	females ≤ 88 cm; males ≤ 102 cm
BLOOD	
cholesterol - total	2.6 - 5.1 mmol/l
cholesterol - HDL	≥ 1.6 mmol/l
cholesterol - LDL	< 3.5 mmol/l
ratio of total to HDL cholesterol	< 4.5
creatinine	< 120 µmol/l
creatinine clearance [GFR]	≥ 130ml/min/1.73m^2
C-reactive protein [CRP]	< 2 mg/l
glucose, random and 2-hr post-prandial	2 - 6.9 mmol/l and 4.0 - 7.9 mmol/l
glucose - impaired tolerance	8 - 10.9 mmol/l; diabetes ≥ 11 mmol/l
haemoglobin	females 12 - 15 g%; males 13 - 17g%
white blood cell count [wbc]	< 4000/
MCHb	32 – 36 g/dl
PCV	females 37 - 48 %; males 45 – 52%
potassium	3.6 - 5.1 mmol/l
urea [azostix]	< 7.6 mmol/l
uric acid	0.17 - 0.40 mmol/l
URINE POC	
blood, glucose, protein	nil present
URINE	
bacteria, casts and crystals	nil present
epithelial cells	nil - scanty
red blood cells	< 5000/ml
white blood cells	< 5000/ml
culture	nil cultured
micro albumin	< 20 mg/l

Most of the reference values in the table are arbitrary cut-off points and serve as diagnostic aids and in some circumstances also as objectives of management.

Those applicable to the metabolic syndrome differ from the criteria for the formal diagnosis of the syndrome as set out above. They meet different needs.

7 OBJECTIVES OF MANAGEMENT

The overall objective of management is to prevent and/or reduce target organ damage. This implies a comprehensive integrated approach aimed at all the risk factors for hypertension and its associated conditions as well as at all the associated conditions themselves. Management is not a numbers game and does not depend on the level of the blood pressure, lipid fractions, BMI, creatinine, blood glucose or any other quantitative variable. Management should be directed at the full disease spectrum as it affects the patient. Obviously neither the blood pressure nor any other risk factor should be lowered at the expense of aggravating other risk factors and diseases.

7.1 general objectives

1. empower patients to take responsibility for their own health and for managing their disease/s
2. protect and improve patients' quality of life
3. encourage patients to continue "normal" living
4. extend the intervention to the patients' family/household and beyond …

7.2 medical objectives

1 lower blood pressure, AND
2 reduce the total risk profile for hypertension and associated diseases
3 control existing associated diseases
4 prevent the development of new associated diseases.

7.2.1 blood pressure targets

RECOMMENDED BLOOD PRESSURE TARGET LEVELS		
	SYSTOLIC BP	**DIASTOLIC BP**
children < 18 years	< 115	< 75
pregnant women	± 115	± 75
after a stroke - first 6 months	± 160	± 100
adults with heart failure	± 160	± 100
old people > 80 years	evidence of benefit is weak	
all other adults	± 120	± 80

Blood pressure is a continuous variable, and there is no threshold in the relationship between blood pressure and the risk of cardiovascular disease.[21] There is no satisfactory evidence on optimal blood pressure targets.[22] For individual patients the odds of benefit for small differences in target levels is low.[23] Where blood pressure targets are used, care providers should customise them for their patients bearing in mind that they are arbitrary and difficult to achieve, and that measurement errors and diurnal and other biological fluctuations in blood pressure are not uncommon.

While precise targets may be of questionable value and difficult to achieve, blood pressure reduction has been shown to have significant benefits. In an overview of clinical trials it was noted that anti-hypertension treatment was associated with a mean reduction of 35-40% in the incidence of stroke, 20-25% in the incidence of myocardial infarction and >50% in the incidence of heart failure.[24] It was also estimated that a 12 mm Hg reduction in systolic blood pressure in persons with mild hypertension, if sustained over 10 years, will prevent 1 in 11 deaths in those with additional cardio-vascular risk factors, and 1 in 9 deaths in those with target organ damage.[25]

In subjects 40 – 70 years of age and across the range of 115/75 to 185/115 mm Hg, the risk of morbidity and mortality from cardiovascular and renal complications doubles with each increment of 20/10 mm Hg.[4] Hopefully it would half with similar decrements and be reduced pro-rata with smaller decrements.

While even a small but sustained reduction in blood pressure reduces the risk for cardiovascular complications, a see-saw pattern, especially over short periods, has a worse prognosis than persistently elevated levels.

In most other guidelines lower target levels are recommended in the presence of associated diseases. This is not done here. The 7th report of the Joint National Committee of the USA on the prevention, detection, evaluation, and treatment of high blood pressure recommended a target of <140/90 mm Hg for all non-pregnant adults except for patients with diabetes or renal disease where the target was set at <130/80 mm Hg.[4] The British Hypertension Society recommended 140/85 mm Hg and 130/80 mm Hg respectively.[9] It also recommended the use of “audit standards” as the minimum acceptable level of control for treated hypertensives -

> <140/80 mm Hg if diabetes, impaired renal function or cardiovascular disease is present and <150/90 mm Hg if none of the above is present

Among all hypertensives aged 35-64 years in relatively affluent countries in the 1990s, only 29% were controlled at 140/90 mm Hg in the United States, 17% in Canada, and 10% in Europe.[26] For those on treatment for hypertension in the United States, the rate of control at 140/90 mm Hg ranged from 47% for black men to 60% for white women.[27] The situation has improved in the USA but is still not good. The rate of control for everybody on treatment rose from 41.3% in 1999-2000 to 50% in 2003-2004.[28]

summary of recommendations on blood pressure targets

- bear in mind the poor validity of blood pressure readings
- customise targets according to patient and circumstances
- aim for the lowest level compatible with patient comfort
- accommodate measurement errors and biological variability
- appreciate the value of even small reductions
- temper resolve with realism
- do not lower blood pressure at the expense of the total risk profile
- focus on the whole spectrum of disease

8 INTRODUCTION TO MANAGEMENT

Management of hypertension and its associated conditions is for life. They are increasingly prevalent throughout the world and the rate of increase is alarming. It was reported in 2007 that about 18 million people die every year from cardiovascular diseases.[29] Only where an adequate human resource infra-structure and appropriate services exist, can clinical interventions be expected to have at least a chance of success. This pessimism is justified. The record of successful control of treated hypertension in real-life settings is poor, even in well-resourced countries.[28-30, 30]

The common-sense organisational criteria[31] adapted from the WHO's project Innovative Care for Chronic Conditions (ICCC) may if brought back into primary care or used in dedicated chronic disease care facilities, help to meet the challenge.

CRITERIA FOR AN APPROPRIATE CARE MODEL

- appropriate and cost-effective service
- evidence-based, cost-effective and feasible clinical protocols
- flexibility and adaptability
- integration, co-ordination, and continuity of care across health care settings, categories of chronic conditions, communities and time

- informed patient and family participation in management
- focus of management is the patient and not the disease/s

- policies and procedures for ensuring patient compliance
- regular, sustained follow-up of patients
- good patient and facility record-keeping
- programme monitoring and evaluation
- community disease surveillance

9 PATIENT EDUCATION

The successful implementation of a hypertension risk management strategy is predicated on an effective patient education programme, which could facilitate informed patient participation. Patients need to know in general about hypertension and its associated conditions. They also need to know specifically how to access facilities, why and how to implement general measures, what drugs to avoid, how to use prescribed drugs, and how to manage selected common acute conditions.

Advice on general measures and self-care should be the same for all patients, and from all care providers, at least throughout each country, if not throughout the world. The only variation that is acceptable is in respect of cultural preferences, and

availability and affordability. Because these measures promote good health and prevent disease, they apply equally to everybody and should form part of an education programme presented at all medical facilities to all patients.

While clinicians as clinical care-providers should be familiar with the content of the education programme so that they are able to identify with the recommendations and reinforce them, it is totally unrealistic to expect clinicians [doctors and other medical personnel acting as clinicians] to be the primary educators. There simply is not enough time for this.[32] It will be necessary to deploy a specially trained dedicated cadre of registered and regulated health educator for this service.[33]

10 CARE PROVIDERS AND SERVICE STRUCTURE

Medical management of hypertension and its associated conditions can best be effectively implemented by a team of care providers operating in a structured primary care environment. The team should include a clinician and health educators and be responsible for the comprehensive one-stop care of the patient. Referral to any other service should only be for specialist opinion and, when needed, in-patient management with transfer back to primary care for on-going monitoring and support.

While the primary competence and responsibility of health educators should be patient education, they could be trained and deployed in other concurrent roles such as case managers, assistant dieticians, pharmacists, physiotherapists, social workers, and psychologists, as well as phlebotomists, receptionists and clinical clerks, and more generally as ombudsmen, patient protectors and health activists. Their scope of practice will depend on the clinical and demographic profile of the patients, the number of patients attending per day, and on the material resources of the primary care facility. It is wrong to use trained nurses in any of these roles. Until such specially trained health educators are available receptionists, unemployed and retired “health workers” or lay persons could after crash-training act temporarily as health educators.

Such a team-based service structure operated successfully at a South African public sector hypertension and diabetic clinic and is the experiential basis for this recommendation.[34] A team service structure is successfully being used in dedicated chronic disease care clinics in the USA as well as in some primary care settings.[35] If patients with chronic conditions attend a medical facility at the same time as other patients with the same conditions, they could participate in group education and constitute a supportive community with social capital potential. Group consultations for people suffering from chronic diseases is a successful extension of such a model.[36]

11 RECORDS

Registers are essential. They must contain up-to-date data on patients' identification, contact details, attendances/encounters and appointments.

There are 2 types of clinical records: patient-retained and provider-retained. One could contain only minimal data while the other should be detailed. Both must be structured.

PRIMARY HEALTH CARE CENTRE			
phone number: 011 123-5896		care provider's name:	
patient name:		patient's number:	
date of visit	diagnosis	treatment	date of next visit

AN EXAMPLE OF A PATIENT-RETAINED RECORD

The example shown fitted into a wallet or pocket when folded once and was used successfully in an under-resourced rural facility. A booklet containing educational material and graphed notes of similar size was used in an urban setting. The detailed record should preferably be provider-retained. The data would then be readily accessible for analysis. It should record at least the following items in addition to the patient's identification and contact data. It should also provide space for short notes.

- fixed data: sex, date of birth, height
- variable data to be collected at each encounter:

  date, care provider's identity, patient's general condition, pulse rate, systolic and diastolic blood pressure, weight, diagnosis and progress of unrelated disease/s and/or distressful events, non-drug compliance, drug pill counts, prescribed items, date of next encounter.

- variable data to be collected annually and when necessary:

  presence and status of risk factors, associated disease/s, results of tests

Entries should be in a standardised code. Numerical rating [0 - 4 for nil to very severe] works well, while abbreviations like DM, CVA, PVD are fairly universal. Other abbreviations can be encoded in a customised convention.[37]

Below is an up-dated and slightly modified example of a provider-retained record used by the author in rural and urban settings.

HYPERTENSION MONITORING RECORD

demography	name			sex		date of birth				pt. no.		
risk factors	year of onset			family		obesity		abdominal obesity				
	DM 2	DLP		tobacco		sloth		alcohol		stress		
other findings	height	LDL		HDL		Tg		BG		PCV		SUA
complications	retina	aorta		CVA		IHD		PVD		CCF		IRF

visit number	history		1	2	3	4	5	6	7	8	9	10
date	level	onset										
attendant	& rate	date										
headache												
dizziness												
weakness or tiredness												
shortness of breath												
cough												
chest pain												
palpitations												
poor vision												
nocturia/polyuria												
impotence/date of LMP												
other synptoms												
weight												
time BP measured												
systolic blood pressure												
diastolic blood pressure												
pulse rate												
pulse rhythm												
swollen ankles												
LVH												
retina												
other signs												
urine protein												
serum urea [point of care]												
serum creatinine												
serum K												
other tests												
other diagnosis 1												
other diagnosis												
time last meal												
no. meals/day												
salt intake												
free sugar intake												
other carbohydrates/day												
vegetables/day												
vegetable oil/bran												
legumes/week												
meat and fish/week												
packaged drinks/day												
other packaged food/week												
alcohol/week												
tobacco/day												
exercise/day												
stress												

Hypertension monitoring record - continued.

compliance:												
attendance [days early or late]												
K/Mg salts												
pill count HCT												
time last HCT taken												
pill count reserpine												
pill count other anti-HT drug												
time last taken												
pill count other drug/s												
total daily dose prescribed												
K/Mg salts												
HCT 12.5mg												
reserpine 0.125mg												
other anti-hypertension drug												
method of contraception												
other drug/s												
date next visit												
new address												

12 COMPLIANCE

Compliance is more dependent on care-providers than on patients. Blaming the patient for non-compliance is doomed to failure. In view of the cost in time and money involved, consideration should be given to not prescribing drugs unless excellent or at least near-excellent compliance with drug-taking can be secured. This injunction is corroborated by evidence that the risks of target organ damage are greater from fluctuating blood pressure levels than from a stable elevated blood pressure. This constraint does not apply to recommendations on non-drug measures where every bit of advice followed can contribute to a better outcome.

Patients should be able to establish a mutual relationship of trust with a regular, dedicated, and efficient care provider and team. A successful consultation also depends on the amount of time available for the consultation. There is a cut-off point in the duration of a consultation below which contact between a patient and a care provider may be useless, counter-productive or even iatrogenic.

Patients should be able to use medical facilities with minimum disruption to their work and other activities, in safety, at times convenient to them and when affordable and low-hassle transport is available. Arrangements for this should be made.

Patients should be delayed as little as possible in the service facility, there should be few queues and the time patients are obliged to spend in such facilities should be used productively. Patients should be able to enjoy their visits and should not be harassed, hassled or otherwise distressed or discomforted.

Patients should have access to drinking water. Where possible food according to the recommended dietary guidelines should be served or at least available for purchase. It

is axiomatic that food that is to be avoided should not be accessable. Alternatively patients should be encouraged to bring food with them to use while waiting.

GENERAL CARE-PROVIDER MEASURES TO PROMOTE AND ENHANCE COMPLIANCE

- good clinical records and patient registers
- personalised appointment, monitoring and information booklets
- an effective appointment system
- support of a non-drug programme by example
- patient education in safe self-management of inter-current episodes of urinary ` and upper respiratory tract infection and musculo-skeletal distress
- appropriate intercessions for patients who cannot afford to attend punctually or experience other difficulties with punctual attendance

A GOOD RELATIONSHIP BETWEEN PATIENT AND CARE-PROVIDER IS PROMOTED BY:

- continuity of care
- a patient education programme based on a process of shared learning
- good communication, a supportive attitude, not judgmental nor accusatory
- a staff attitude which is patient-oriented, tolerant, caring, and sensitive to the patients' socio-economic, political, cultural, and historical reality
- staff accountability to patients and colleagues
- a democratic culture with staff and patient participation in decision-making
- an institutional commitment to patient empowerment and advocacy
- equitable access to transparent grievance resolution procedures

RESPONSIBILITIES AND COMMITMENTS OF CARE-PROVIDERS

- follow guidelines
- inform patients on how, where, when, and from whom to access help
- ensure that patients understand what is to be done
- give clear, feasible, and correct advise on all aspects of management
- inform patients on how to deal with problems including drug side-effects
- enter data meticulously into patient encounter records in real time
- monitor compliance with non-drug programme
- reinforce advice and address difficulties, mistakes and lapses
- carefully check left-over drugs and empty containers [pill counts]
- monitor outcome at every encounter and evaluate progress at least annually
- provide positive feed-back
- make clear and realistic arrangements for follow-up
- trace and retrieve non-attenders [defaulters]

RESPONSIBILITIES AND COMMITMENTS OF PATIENTS

- attend punctually - if not able to keep an appointment, the onus is on the patient to arrange another appointment and a supply of sufficient drugs
- adhere as much as possible to the recommended general measures
- comply perfectly with the drug prescription – if not able to do so, the patient must report to the care-provider for an alternative prescription

13 CLINICAL MANAGEMENT

The blood pressure reading is not the only criterion on which the initiation and goal of management of hypertension is based. Management is directed at the whole spectrum of disease and starts as soon as a diagnosis of hypertension is made or suspected.

13.1 remove or reduce risk factors

The modifiable risk factors for primary hypertension and its associated conditions, must be, if not removed, at least reduced. The same applies where possible to the causes of secondary hypertension. The reversion to the status quo ante or an approximate disease-free normality depends on the age of the subject, the stage of the disease and the timing and extent of the interventions.

It is necessary to look at the whole inter-related chain of causality of hypertension and the diseases associated with it. Recommendations should not to be limited by a restrictive methodology subsumed in the doctrine of a specific aetiology, such as sodium and potassium, omega-3 fatty acids, olive oil, or even fruit and vegetables. Hypertensives eat meals, not individual nutrients or food items . Diet, tobacco use, alcohol abuse and physical inactivity are reflections of social and market pressures rather than individual choice. People live in historical, social, economic, political and geographic contexts which influence their habits or so-called “lifestyle”.[38, 39]

The risk factors for primary hypertension and its associated conditions are inherent in the consumerist society where people eat commercially-prepared and industrially-produced high fat, sugar-sweetened, salt-saturated food, smoke, sniff, and chew tobacco and abuse alcohol, cocaine, and other recreational drugs, where people are dependent on motor vehicles, escalators and “lifts” for commuting, and click a computer mouse or a TV remote button for exercise. This is the “life-style” which hypertensives are urged to “modify”. It is the environment that should be modified as well-stated in the WHO-FAO report on chronic diseases: [40]

> “For interventions to have a lasting effect on the risk factor prevalence and health of societies, it is … essential to change or modify the environment in which these diseases develop.

Many communities in industrialising countries are not yet fully ensnared in this unhealthy way of living and do not rely on medical services and medicines to manage

every discomfort and ailment. Hopefully they will not develop hypertension and its associated diseases and would then not need medical care for them, but the trend seems to be in the other direction, presaging another epidemiological disaster. The situation is aggravated by limited access to appropriate medical care and in many instances by the devastation wrought by poverty, social disruption, and war.

The message to individuals should be positive, feasible, and within the context of socio-economic reality – try to adopt healthy, life-sustaining practices. In the current macro and micro environment it is, however, not easy - perhaps not even possible. It is therefore incumbent on medical service providers to be knowledgeable, empathetic, supportive and constructive. Blaming patients for non-compliance is unproductive. It can be construed as victim-bashing and, if aggressively pursued, even as harassment.

13.2 general or non-drug measures

General non-pharmaceutical or non-drug measures are essential management tools at all stages in the life and care of hypertensives. They play a more important role than do drugs. Their effects are synergistic, incremental and cumulative. There are no negative side-effects.

Non-drug measures not only lower blood pressure but also enhance anti-hypertensive drug efficacy and help prevent and manage associated conditions. They also prevent and manage other diseases linked to the metabolic syndrome and gluteal-femoral obesity, prevent several cancers, modulate the response to immune-sensitive conditions, promote general health and improve the quality of life.

Ignoring synergistic effects, if a small reduction in blood pressure [2-3 mm Hg] achieved by fair compliance with 1 personal non-drug intervention is multiplied by the number of interventions, the psychological, clinical, logistic and economic impact on the patient, on the medical service sector, and on society would be considerable.

13.2.1 a healthy diet

A diet high in vegetables, fruit and low-fat or fat-free diary products and low in fats, the so-called DASH diet [Dietary Approaches to Stop Hypertension] diet,[41] lowers blood pressure by 8 -14 mm Hg. Dietary sodium restriction is associated with a 2 - 8 mm Hg blood pressure reduction and a 10 kg weight loss with a 5 - 10 mm Hg blood pressure reduction.[9] Dietary sodium reduction over 10 – 15 years has been observed to lower cardiovascular mortality by 20% and risk of cardiovascular disease by 25-30%.[42] A desk-top calculation of the effect of 6 dietary items with demonstrated efficacy [red wine, fish, dark chocolate, walnuts, fruit, vegetables and garlic] showed a reduction in cardiovascular disease of >75%.[43] Calorie restriction to below daily requirements but with an adequate intake of essential nutrients delays biological aging, lowers weight, blood pressure, triglycerides, total and LDL cholesterol, C-reactive protein, and the risk of stroke, ischaemic heart disease and diabetes. Diastolic function is improved.[44]

The following recommendations are based on nutritional, clinical,[40] epidemiological,[45] anthropological and historical evidence. They also draw on material prepared for governments[46] and the WHO[31] and promoted by scientific groups and societies.[47]

The recommendations are non-specific and can be customised to be individually feasible, and to accord with the individual's preferences. They show how macro-nutrient content can be balanced and how calorie requirements can be calculated and met. There are recommendations on meal frequency and spacing and examples of portion sizes and restricted and forbidden foods are listed.

1. food groups

Four food groups are identified according to their predominant macro-nutrient content.

MACRO-NUTRIENT FOOD GROUPS WITH EXAMPLES	
GROUP	**EXAMPLES**
starch-rich foods	grains, high starch vegetables, legumes
oils and fats	dairy fat, vegetable and fish oils, margarine
vegetables and fruit	all, except high starch vegetables, legumes
protein-rich foods	meat, fish, dairy products, eggs, legumes

The word "carbohydrate" is deliberately not used as it includes sugars, also called simple carbohydrates or mono- and di-saccharides. These are to be avoided. Edible starches, also called complex carbohydrates are a dietary staple in all communities. They are highly recommended. Non-digestible oligosaccharides and polysaccharides are constitute dietary fibre, an adequate intake of which is recommended. Resistant [to endogenous digestion] starch is a major form of fibre, Grains/cereals and vegetables such as potatoes, mealies and dried legumes are important sources of starch and of fibre. All vegetables, fruit pomace, and sea weeds are good sources of fibre.

DIETARY FIBRE

plant cell wall material:	cellulose, β-glucans, hemi-cellulose, pectin, lignin, waxes, cutins, indigestible cell wall proteins,
intracellular plant material:	gums, mucilages, resistant starch
animal derived material:	amino-polysaccharides
non-absorbed sugar alcohol fractions	

can be soluble or insoluble

soluble:	glucans, fructans, oligo-saccharides, guar, pectins and resistant starch as in grains, legumes, tubers, rhizomes, …
insoluble:	cellulose, lignin as in whole seeds, bran, …

starch is resistant when crystalline or retrograded [as when cooled after cooking]

Vegetables and fruit are rich in sugars, anti-oxidants, and vitamins, minerals and roughage [VMR] and have been allocated to the VMR group. Despite being rich in vitamins, minerals, and roughage, high starch vegetables and legumes are for strategic reasons not defined as vegetables as in the USA dietary guidelines.[43] The contribution of fruit to the dietary sugar and calorie load should not be ignored.

2. daily calorie requirement

The daily calorie requirement depends on body build and level of activity. Body build is defined by the BMI or by the degree of deviation from the IBM as defined on pages 6 and 10 or as a weight associated with relative longevity according to life insurance data – see appendix. Level of activity depends on the type and frequency of activity and can be graded as described on page 7.

3. macro-nutrient balance

Meals and snacks should be balanced so that the different macro-nutrient food groups provide calories in approximately the following proportions:

starch-rich foods	≥ 60%	fats and oils	≤15%
protein-rich foods	5%	VMR foods	20%

BALANCING FOOD GROUP AND CALORIE REQUIREMENT				
food group	**starch-rich foods**	**fats & oils**	**vegetables & fruit**	**protein-rich foods**
1000 – 1499	5	5	5	3
1500 – 1999	8	8	8	3
2000 – 2499	11	11	11	3
2500 – 2999	13	13	13	3
calories/day	average number of portions/day			

The number of portions in the table apply to the top of the calorie range. Portion sizes rather than number of portions should be reduced for the rest of the calorie range.

4. portions

CALORIES PER PORTION - BY MACRO-NUTRIENT GROUP

Examples of portions of starch-rich foods [providing about 100 calories]

bread	1 slice - 1.5 cm	potato	1 medium boiled
legumes - dry	1/3 - 1/2 cup cooked	oats porridge	2/3 cup cooked
maize porridge	1 cup soft	pasta	1/2 cup cooked
mealie - on the cob	1 medium	rice - white	1/2 cup cooked

Examples of food portions containing oils and fats [providing about 45 calories]

avocado pear	2 teaspoons	full-cream milk	1/4 cup
butter	1 teaspoon	vegetable oil	1 teaspoon

Examples of portions of protein-rich foods [providing about 70 calories]

chicken [raw]	5 x 4 x 2 cms	legumes - dry	1/4 cup cooked
cheese - gouda	3 x 3 x 2 cms	hake [raw]	5 x 5 x 3 cms
egg [whole]	1 small	fat-free milk	1 cup

A few examples of the approximate size of portions to be used in the table on macro-nutrient balance is shown. In general helpings should be small and served in small plates and bowls. Repeated small helpings rather than big helpings will also prevent food being wasted. It is better to stop eating when almost full, rather than when full.

5. meal frequency

At least 5, preferably more, evenly-spaced, small meals or snacks should be eaten each day, and not 3 or fewer large meals.

SUGGESTED TIMING OF ≥ 5 MEALS OR SNACKS PER DAY

morning:	on rising, breakfast, mid-morning "tea"
afternoon:	lunch, afternoon "tea"
evening:	early evening snack, supper, bed-time snack

6. calorie and macro-nutrient distribution over 24 hours

The calorie content of meals and snacks should be apportioned to provide more energy when physically active and less when sedentary of before sleeping, while maintaining as far as possible the recommended macro-nutrient balance at each meal and snack or at least during the morning, afternoon and evening periods.

7. fruit and vegetables

Vegetables are preferred over fruit. Vegetables contain a relative small amount of sugars but fruit contains a lot and its intake should be limited preferably to not more than one item of one kind per one day. The presence of healthy nutrients in fruit compensates partially for the deleterious effects of the sugars.

EXAMPLES OF PORTIONS OF VEGETABLES AND FRUIT [± 50 CALORIES]

carrots	1 cup cooked	vegetable salad *	2 cups raw
cauliflower	1 mug cooked	apple	1 small
green beans	1 mug cooked	grapes	20 large
spinach	1 mug cooked	orange	1 medium
tomato	2 medium raw	raisins	15 small

* lettuce, cucumber, tomato, onion – without oil or sugar in dressing

8. sugar - sugars

Food containing "free" sugar should be avoided. They contribute only empty calories. Sugar is considered "free" unless it occurs in whole fruit and vegetables. The sugars in fruit and vegetable juice are therefore "free". The intake of fruit juices should therefore be avoided. Fruit and vegetables juices also do not qualify as food portions.

Food contains different forms of sugars: fruit and vegetables contain glucose, fructose, and sucrose [a mixture of glucose and fructose] and milk contains lactose [a mixture of glucose and galactose]. Different forms also have different effects on the body. for example glucose and galactose activate insulin and cause satiety while fructose does neither. A high intake of fructose is associated with over-eating and the development of the metabolic syndrome and should be avoided. Because fructose is sweeter and cheaper than sucrose, it has replaced sucrose in industrially prepared drinks, sweets, and baked products. Fruit contains a lot of fructose, especially when ripe. Sugar alcohols, not regarded as sugar in food labels in the USA, are broken down to yield fructose and indigestible poly-saccharides. Many forms of sugar have several names.

THE MANY NAMES OF SUGARS

white sugar, brown sugar, raw sugar, table sugar,
sucrose, glucose, lactose, maltose, dextrose,
anhydrous dextrose, crystal dextrose, dextrin,
malt syrup, maple syrup, pancake syrup,
corn syrup, corn-syrup solids, corn sweetener,
high-fructose corn syrup, honey, molasses, syrup,
fructose sweetener, liquid fructose, fructose,
sorbitol, xylitol, mannitol, starch hydrolysates,
invert sugar, and fruit-juice concentrate.

FOOD HIGH IN FREE SUGARS

jam, syrup, honey, and alcohol,
cold-drinks, colas, lemonades, fruit juices,
chocolates, sweets, custard, jelly, puddings, ice-cream, sorbet,
commercially stewed fruit and glazed fruit,
cakes, biscuits, buns, crackers, cookies, muffins, pastries,
instant mixed coffee, shop magewu, tonic and chocolate drinks,
sweetened yoghurt and other sweetened milk products,
ready-cooked breakfast cereals, commercial muesli.

9. At least 3 glasses of fluid - free of all sugars - should be taken daily

10. unsaturated fatty acids

The intake of unsaturated fatty acids should be adequate. Mono-unsaturated fatty acids, such as oleic acid, present in high concentration in olive oil, and erucic acid found in mustard and rape seed oil and herring, are associated with an elevated HDL cholesterol. These oils were used in societies with a relatively low prevalence of the metabolic syndrome. In the 1980s the use of erucic acid was, however, banned in

many OECD countries and canola, an artificial low erucic acid rape seed [LEAR] oil with a transgenic high concentration of oleic acid and a lower α-linolenic acid, promoted.[48] Mustard seed oil suffered a similar fate being replaced in India by soya oil. Multi-national companies were implicated.[49] Herring, which contains a lot of erucic acid, is paradoxically still highly recommended. The re-introduction in Poland during the 1990s of rape seed oil - and to a lesser extent soya oil - instead of trans and saturated fat was associated with a remarkable reduction in coronary heart disease.[50]

The essential short-chain poly-unsaturated fatty acid linoleic acid in high concentration in non-transgenic sunflower, soya, maize, peanut and in grain oils lowers LDL cholesterol, while the other essential short-chain poly-unsaturated fatty acid α-linolenic acid in walnut, mustard, rape, soya and linseed oil is converted in the body into a long-chain poly-unsaturated omega 3 fatty acid similar to those found in fatty fishes. All are associated with a reduction in platelet aggregation and improved endothelial function.

11. saturated fatty acids

The intake of food with a high saturated fatty acid and/or cholesterol content is associated with LDL cholesterol elevation, and should be low.

FOOD WITH A HIGH SATURATED FATTY ACID AND/OR CHOLESTEROL CONTENT

egg yolk,
full-cream dairy products – milk, butter, cheese, yoghurt, …
meat - especially organ meats which are high in cholesterol - sausages, polony, salami and other fatty processed meats,
food made with palm, coconut and palm kernel oil.

12. trans-fatty acids [trans-fats]

Food containing trans-fatty acids should be avoided. They lower HDL cholesterol and increase LDL cholesterol and the risk of atherosclerosis. Two to 5 % of the total fatty acid content in the milk and body fat of ruminants [cows, sheep, goats] are in the trans form. Artificial trans-fats, formed by partially hydrogenating vegetable oil, have displaced natural solid fats and liquid oils in the restaurant, fast food, snack food, fried food, and baked goods industry, and in shortening used for deep frying in the home.

In countries where the use of trans-fatty acids is not yet banned, they constitute 30-45% of the fatty acid content of commercial and industrial food products. Margarines may contain up to 15% trans-fatty acids by weight.[51]

13. meat

The intake of meat, especially from ruminants, should be limited. Meat should be used as a flavour, not as the main item of a meal. The fat content of meat is affected by the method of preparation – especially high when fried or roasted, lower when grilled.

FOOD CONTAINING TRANS FATTY ACIDS

hard and soft margarines, vegetable oil blends,
non-dairy creamers and milk blends,
tinned meat and fish dishes, commercial bottled sauces,
snacks and crackers, candies/sweets, ice-cream,
industrial confectionaries sold in packets and cartons,
shop bread and cake,
commercial doughnuts, muffins, pies, cookies, scones, …
French fries, most/all other take-aways and fast-foods,
restaurant food – usually prepared with fat high in trans fatty acids,
full-cream dairy products, beef and mutton.

14. dairy products

Dairy products are a good source of protein, calories, vitamins and minerals. An adequate intake is advised. Fat-free products are preferred.

15. salt – sodium chloride

The daily sodium intake should not exceed 1,500 mg [2/3 teaspoon table salt]. Food containing added salt should be avoided, or if not possible, at least strictly limited. Note that several helpings of small amounts of salt can add up to a large salt intake. People must select, prepare and eat food with little salt and eat only few commercially processed and prepared food items that contain added salt.

FOOD CONTAINING ADDED SALT

salty snacks, crisps, pickles,
buns, pastries, cakes, shop bread,
commercially blended spices,
spreads, sauces, chutneys, atchas,
mayonnaise and most cheeses,
bacon, sausages, polony, meat pies,
smoked and pickled meat and fish,
most tinned foods, dehydrated soups,
most commercial breakfast cereals.

16. dietary supplements and fad diets

Dietary supplements such as potassium and magnesium salts rather than tablets may be used and wheat and oat bran can be added to food. Pregnant hypertensives should use magnesium. People with renal impairment should not use potassium and magnesium. Vitamin, omega-3 fatty acid, and phytosterol are best avoided.

Fad diets, including the so-called low-carb diets, should not be followed.

17. Patients suffering from renal impairment should:

- restrict protein intake
- not use potassium and magnesium supplements
- maintain an adequate calorie intake

18. labels

Read the labels of commercially prepared food for data on ingredients.
The following cut-off values are advised.

CUT-OFF VALUES	
FOOD ITEM	**DAILY INTAKE**
fat - total calories	± 15%
unsaturated fatty acids	≥10%
saturated fatty acids	< 5%
trans fatty acids	0%
cholesterol	< 300 mg
free sugars	0%
dietary fibre	> 14 g

Summary of recommendations on diet

Small, frequent, regular, raw and slow-cooked meals made from affordable, in-season, fresh, natural [not artificial, transgenic, packaged], locally grown and tended produce, eaten slowly and enjoyed in friendly company and pleasant surroundings are best. Drink water before and during a meal – and occasionally a glass of wine.

SUMMARY OF DIETARY RECOMMENDATIONS

MEALS SHOULD BE

- varied within food groups
- balanced between food groups
- balanced within each meal or snack
- adequate to meet need [age, habitus, activity]

FOOD SHOULD BE

- served in small portions
- eaten 5 or more times per day
- culturally acceptable and feasible
- in season, available, accessible and affordable
- correctly prepared, tasty, fresh, clean and edible
- minimally salted, sweetened or refined
- taken with water or a calorie-free or low calorie drink
- suitable for the whole family and all disease states
- enjoyed in a relaxed and convivial atmosphere

Particular emphases:

- Diabetics must eat small frequent meals and snacks, and avoid "free" sugars.
- People with dyslipidaemia must restrict their intake of saturated fats.
- People who have had a myocardial infarction or a cerebral thrombosis should regularly eat oily fishes [about 2/week] or plant food high in α-linolenic acid such as linseeds, walnuts and soya beans and if possible mustard and rape seed oil.
- Pregnant women are strongly advised to eat very little, if any, fish because of the presence of mercury in fish – extremely toxic to the developing foetus.

13.2.2 tobacco

Smoking cessation has a dramatic short-term and a large long-term effect on cardiovascular mortality in smokers as well as in non-smokers exposed to second-hand smoke.[52] Among smokers the risk of sudden death and acute myocardial infarction, declines within days or months after cessation. British male doctors observed over 50 years had a 25% excess mortality from ischaemic heart disease due to smoking. In those who stopped smoking at age 50 the excess mortality rate was halved. Those who stopped smoking at age 30 years avoided almost all risk of excess mortality.[53] The protective effect of quitting after myocardial infarction is more than that from standard drug treatments.[54] Reducing tobacco use, as opposed to stopping, does, however, not lower the risk of dying from all causes.[55]

Advice on how to stop smoking and how to avoid second-hand smoke should be given to patients verbally and in writing [see hand-outs in appendix]. Compliance should be monitored and re-enforced at every encounter. The use of telephonic reinforcement has been shown to improve the rate of quitting. Text messaging could have similar effects.

> "One of the most simple and cost effective of all medical interventions is for doctors to tell every smoker they encounter in their work that giving up the habit is one of the most important things they can do for their health." [56]

DISEASES LINKED TO TOBACCO

- several cancers
- arterial and arteriolar disease:
  - coronary heart disease
  - cerebro-vascular disease
  - renal and visual impairment
  - peripheral arterial disease
- reduced resistance to infection
- respiratory disease and disability
- disorders of nutrition and digestion
- female and male reproductive disease
- premature senility

13.2.3 alcohol

The socially complex association of alcohol consumption with eating undermines attempts at interpreting the apparently contradictory data of the role of alcohol in cardiovascular disease.

There is evidence that moderate alcohol consumption promotes cardiovascular health, especially if taken with meals. In a cohort of 8,867 physically active, professional men who ate a healthy diet, did not smoke and were not overweight [BMI <25], moderate alcohol consumption [15 – 30g or about 1.5 to 3 drinks per day] further reduced the risk for myocardial infarction over 16-years [57]. In a larger unselected cohort in the same study, 11,711 hypertensive subjects who drank 1 to 2 drinks per day had a lower rate of myocardial infarction than abstainers. The rate of stroke and of cardiovascular and all-cause mortality was the same for both groups.[58] The cardio-protective properties of alcohol, however, may be outweighed by its detrimental effects, especially if intake is high or binge drinking is the preferred drinking mode. The evidence that any direct harmful cardiovascular effect would be reduced as intake decreases is not strong. There is, however, no general rule on the safe upper limit of alcohol intake; it depends on the social context and the individual's overall health.

Because alcoholic drinks provide calories, a reduction of intake might be expected to result in weight loss and its attendant benefits. Alcohol, including red wine and beer, elevates blood pressure but reducing alcohol intake to moderate levels in heavy drinkers may reduce blood pressure by 2 - 4 mm Hg.[4] Red wines and spirits are associated with elevated HDL cholesterol levels and possibly a reduced coronary heart disease risk, but only people over the age of fifty tend to benefit.[59]

Alcohol use is a risk factor for other components of the metabolic syndrome. Many other diseases are also linked to alcohol use and abuse.

DISEASES LINKED TO ALCOHOL USE AND ABUSE

anxiety and depression, psycho-social dysfunction,
psychological and physical dependency,
dyspepsia and gastritis,
acute and chronic alcoholic liver disease,
acute and chronic pancreatitis,
insulin dependent and brittle diabetes,
hypertension, dyslipidaemia, visceral obesity,
heart failure, gout, gluteo-femoral obesity,
psychosis, epilepsy, peripheral neuritis,
sexual impotence, gynaecomastia, shrunken testes,
foetal alcohol syndrome and other reproductive disorders,
parotitis and skin lesions,
anaemia and other haematological disorders,
cancer of the tongue, mouth, throat, gullet and liver, …
reduced resistance to infections,
increased surgical and accident risk.

Because the alcohol-foetal syndrome with its attendant congenital abnormalities is associated with alcohol use in pregnancy, alcohol should not be used at all by pregnant women or by women contemplating pregnancy, the first weeks being critical. Children and adolescents should also not use alcohol. Binge drinking is forbidden.

The 2003 USA hypertension guidelines[60] and the 2005 USDA dietary guidelines[9] recommend limiting alcohol intake to 1 USA drink [see page 7 above] per day for women and light-weight men and 2 USA drinks for men of average size.[18]

Patients should be helped not to use tobacco or abuse alcohol. Those who already do so, should be helped to stop.

HOW TO PREVENT PATIENTS FROM STARTING TO USE TOBACCO AND ABUSE ALCOHOL

be a good role model
encourage role models, teachers, parents and significant others to set a good example
build self-confidence to resist peer pressure
encourage recreational and cultural pursuits
remove alcohol adverts from waiting areas
display supportive material and posters

HOW TO HELP PATIENTS STOP USING TOBACCO OR ABUSING ALCOHOL

take a detailed tobacco and alcohol history
inform patients why they personally should stop
discuss with them how to stop
supply them with written material if wanted*
monitor change and reinforce messages
provide support to reduce [before and after] stress
enlist the help of family, friends and colleagues
refer for professional assistance when necessary
prescribe anti-craving medication when necessary

* see appendix for hand-outs

13.2.4 physical activity

In addition to improving cardio-pulmonary function, exercise also lowers blood pressure, helps to maintain weight loss, positively impacts on lipid and glucose metabolism, lowers C-reactive protein, promotes musculo-skeletal and psychological

well-being and reduces cardio-vascular and all cause morbidity and mortality. The intensity and duration of exercise are independently associated with cardiovascular and general health benefits and a sense of well-being. Leisurely strolling is better than aggressive striding in promoting cardiovascular health and walking on cobble-stones has been shown to reduce blood pressure. The effects are dose-dependent.

Thirty minutes of moderately strenuous aerobic exercise at least 4 times per week is usually recommended. This is, however, just not a realistic prescription for the majority of healthy people never mind for those suffering from - and on medication for - hypertension and/or one or more diseases associated with hypertension. Advice on using stairs instead of lifts and escalators and getting off a bus stop or two earlier and walking the rest of the way, is both sensible and practical.

SUMMARY - EFFECTS OF PHYSICAL ACTIVITY

improves cardio-pulmonary function
lowers blood pressure
helps to maintain weight loss
positively impacts on lipid and glucose metabolism
lowers C-reactive protein
reduces cardio-vascular morbidity and mortality.
promotes musculo-skeletal health
promotes psychological well-being
reduces all cause morbidity and mortality.

Everybody should, however, be advised to be as physically active as their personal circumstances allow and to use every possible opportunity for walking.

EVERYBODY CAN BE PHYSICALLY ACTIVE

- no need to attend a gym, to jog or lift weights
- no need to “work up sweat” - also not sustainable
- low levels of regular routine activity are beneficial
  - cleaning the house, gardening, mowing the lawn
  - walking up and down stairs and to and from shops
  - playing ball, walking and cycling with the family
  - dancing and racquet sports
  - in-door, regular calisthenics and physical jerks
- partake in work-related physical activity
- limit time spent watching TV and using computers

13.2.5 psycho-social stress

Some patients could benefit from directed counselling and assistance, but all will respond to a sympathetic hearing. Health educator members of a chronic disease care team could address this need.

13.2.6 reduced or no dependence on medicines

Societies are becoming medicalised - a pill for every ill. Medicines that elevate blood pressure [see list on page 8] should be avoided. Patients should be advised to use alternative appropriate and safe medicines. Drugs used to treat hypertension and its associated diseases may also paradoxically elevate the blood pressure and precipitate or aggravate glucose intolerance and dyslipidaemia [see pages 46 and 47].

all together

The JNC7 USA guideline[4] quotes evidence of a reduction of between 21 and 55 mm Hg in systolic blood pressure from weight reduction, the DASH diet,[41] regular strenuous physical activity, and salt and alcohol restriction. In another study, blood pressure levels of <120/80 mm Hg were achieved in 35% of subjects after 6 months of intensive counselling to be physically active and to eat a diet high in fruit, vegetables, and low-fat dairy products and low in salt, fats, red meats, sweets, and beverages containing sugars.[61] At a hypertension clinic run by the author, 46% of patients with mild and moderate hypertension achieved fair blood pressure control [≤140/90 mm Hg] without the use of hypotensive agents in 7 months on a non-experimental, in-house non-drug programme, incorporating all the above.[62]

Even small reductions in blood pressure and other risk factors for associated conditions have, because of their high prevalence in the community, a large effect upon population health.[63] Self-management with a non-drug programme of the large number of people with the metabolic syndrome who can reliably be identified without professional input, would significantly reduce the rate of disease, disability and death, as would treating in primary care the many individual patients at low risk - even if only with a non-drug programme. Prioritising patients with added “low or moderate cardiovascular risk” as recommended by the South African Hypertension Society[64] in an attempt to reduce overall costs, is neither cost-effective nor feasible.[65]

summary of general measures:

- healthy dietary practices
- no tobacco use and as little as possible exposure to second-hand smoke
- moderate or little alcohol intake
- physical activity - as much as possible
- stress management
- avoidance of drugs which elevate blood pressure and precipitate or aggravate associated diseases and risk factors

SUMMARY OF PERSONAL GENERAL MEASURES AND THEIR DIRECT EFFECTS													
PERSONAL GENERAL MEASURES	SITE OF PREVENTIVE ACTION												
	risks		metabolic syndrome					complications of hypertension					
	PIA	ICF	HT	IGT	VO	DLP	EUA	CHD	CVA	PVD	IRF	MHT	CCF
Eating the CHD diet													
appropriate calorie intake	x		x	x	x			x	x				x
complex carbohydrates ≥ 60% calories			x	x	x								
legumes ≥ 3imes per week		x	x	x		x					x	x	
vegetables at each meal [5/day]		x	x	x	x	x		x					
fruit [not fruit juice] 1 – 2 per day		x	x			x		x					
low fat dairy products			x			x		x					
fish 1-3 per week		x	x			x		x	x				
little or no added sodium			x										x
little or no added sugars			x	x	x	x							
little or no meat, especially if fatty					x	x	x				x		
vegetable oil as food dressing		x	x			x		x		x	x	x	
≥ 3 glasses of water per day							x				x		
≥ 5 small meals or snacks per day	x	x	x	x	x	x		x					
Cultivating healthy habits													
no exposure to tobacco smoke	x	x	x			x		x	x	x	x	x	
moderate alcohol use		x	x	x	x	x	x						
regular physical exercise		x	x	x	x	x		x	x				
stress management	x		x	x				x					
Avoiding certain drugs													
oral contraceptives		x	x	x	x	x			x	x		x	
corticosteroids		x	x	x	x	x							x
sympathethicomimetics			x			x			x	x			
NSAIDs and COXIBs		x	x					x	x		x	x	
high doses of diuretics			x	x		x	x						
high doses of β-blockers	x			x		x							
methyldopa			x										x

summary of general measures that could lower blood pressure and directly improve the total risk profile

Key to abbreviations:

PIA physical inactivity, ICF = increased clotting factors, HT = hypertension, IGT = impaired glucose tolerance, VO = visceral obesity, DLP = dyslipoproteinaemia, EUA = elevated uric acid, CHD = coronary artery disease, CVA = cerebro-vascular disease, PVD = peripheral vascular disease, IRF = impaired renal function, MHT = malignant hypertension, CCF = cardiac failure/increased Na and water retention.

The indirect effects of risk factor reduction on target organ damage is not shown.

13.3 drug treatment of hypertension

When non-drug measures, conscientiously and systematically applied for at least 6 months - less under certain situations - cannot on their own maintain blood pressure at the desired target, then drugs should be added. Concomitant non-drug intervention enables fewer drugs and lower doses to be effective, reduces the number and severity of side-effects, and promotes drug efficacy.

13.3.1 General principles:

- start low and go slow
- advise patients that drugs should be taken with food
- encourage perfect compliance with dosage and timing
- forewarn patients on potential drug side-effects and advise them how to manage those they may experience
- be aware of tachyphylaxis [loss of effect over time]
- never stop drugs abruptly
- be sensitive to cost and affordability
- try to accommodate patient preferences
- ensure sustained drug availability - for patient and care provider
- follow a step-care approach – up and down

The recommendations on which drugs to use are based on the following considerations:

- efficacy
- side-effects
- contra-indications and drug interactions
- frequency of dosage
- availability and cost
- combination drugs

1 efficacy

Diuretics are very efficacious agents, especially in low-renin subjects[9] such as blacks and the elderly. Tachyphylaxis, however, occurs when the subject converts to a high-renin status following diuretic-induced sodium, potassium and magnesium loss. To prevent this, the dosage should be low - equivalent to 12.5mg hydrochlorothiazide - and potassium intake should be adequate, preferably high.

β blockers, ACE [angiotensin converting enzyme] inhibitors and ARBs [angiotensin receptor blockers] inhibit the renin-angiotensin system and are less effective in subjects with low and normal renin levels than in subjects with high renin levels. CCB [calcium channel blockers] like diuretics are effective in low renin subjects.[13]

2 side-effects

Most side-effects are dose-related. Concomitant adherence to non-drug measures enables low drug doses to be effective. The combined use of two or more drugs from different classes in low doses also reduces side-effects. This is one of the underlying principles of the challenging new concept of the so-called “polypill” - 6 drugs.[66]

Diuretics in high doses increase the cardio-vascular risk profile [associated with the development of glucose intolerance, dyslipidaemia, and hyperuricaemia]. β blockers cause triglyceridaemia, lower HDL cholesterol, mask the symptoms of hypoglycaemia in some diabetics, increase the incidence of diabetes, and cause bronchospasm. The reduced effort tolerance induced by β blockers may be a limiting side-effect as well as an indication for use in subjects with heart failure or a hyperkinetic circulation. Their use in combination with diuretics increases the risk of developing diabetes.[67] Sexual impotence is a common side-effect of diuretics and β blockers

AAAs [anti-adrenergic agents] like methyldopa and reserpine can interfere significantly with the quality of life, causing depression, drowsiness, fatigue and lethargy, thereby also aggravating non-adherence to treatment. They cause sodium and water retention with consequent loss of efficacy. Sexual impotence is a common side-effect. The rapid drop in blood pressure resulting in postural hypotension and “first dose” syncope with short-acting CCBs, other vasodilators and α-blockers can be prevented with perfect compliance and by always [including after a missed dose] starting with a low dose. All these drugs are, however, not recommended - except for methyldopa in pregnancy.

Non-specific side-effects such as headache, nausea, palpitations, and allergic reactions occur with most drugs and are generally unpredictable.

3 cautions, contra-indications and adverse drug interactions

Anti-hypertension agents from the same class should not be combined.

β blockers should not be combined with diuretics nor should either be used separately in high doses in subjects at risk of developing diabetes. In fact, the use of β blockers is now questioned. A study that showed that the use of atenolol in a combination regimen was less efficient in reducing the incidence of stroke, cardiovascular events, all-cause mortality and diabetes than a regimen without atenolol, was prematurely stopped because of this observation despite the results not being statistically significant.[68] In another study when atenolol was compared with placebo or no treatment, there were no outcome differences in all-cause and cardiovascular mortality, or myocardial infarction despite big differences in blood pressure reduction. The risk of stroke was, however, lower in the atenolol group.[69] An earlier large meta-analysis, however, concluded that the risk of major cardiovascular events was directly related to blood pressure level.[70] The contradictory findings may be due to the use of atenolol and may not apply to all blockers, or to the high dose used [50 - 100mg] or because outcome analysis was not stratified according to the patients’ total risk profile.

CCBs with direct cardiac effects such as verapamil should not be used with β blockers. CCBs with mainly vascular effects should not be used with α blockers and other vasodilators. AAAs should not be combined with β blockers.

NSAIDs [non-steroidal anti-inflammatory drugs] should not be used with potassium-sparing diuretics and drugs acting on the renin-angiotensin system, or in patients with renal impairment. COXIBs should not be used at all; perhaps NSAIDs also not

Regular monitoring of metabolic side-effects is mandatory to forestall adverse drug effects and in achieving the objectives of treatment.

INDICATIONS FOR CAUTION	
CONDITION OR SITUATION	**DRUG CLASS**
impaired renal function	low ceiling [thiazide-like] diuretics
gout	diuretics
pregnancy	diuretics, ACE inhibitors, ARBs
heart failure	CCBs
unstable angina	CCBs
sinus bradycardia and heart block	β blockers
asthma and chronic bronchitis	β blockers
peripheral vascular disease	β blockers
diabetes, IGT* and visceral obesity	β blockers, diuretics
pilots and public transport drivers	AAAs
elderly [≥ 60 years]	AAAs

* IGT = impaired glucose tolerance

4 frequency of dosage

The use of long-acting drugs which enables a once daily dosage schedule is conducive to good compliance. Peaks and troughs in blood pressure levels as occur with short-acting drugs taken more often than twice daily may cause postural hypotension and syncope and are associated with poor compliance and outcome.

5 cost and availability of drugs

Only generic drugs should be used. The prescribed agent must be available without interruption, in the appropriate packaging, and in the correct strength. Tablets, even if scored and reasonably sized, should not have to be broken for routine use.

Packs of 28 tablets or multiples there-of should be issued and patients should attend for routine follow-up at 4-weekly [28 days] intervals or multiples thereof. This facilitates the use of pill counts as a compliance-monitoring tool if appointments are similarly scheduled. This concurrence enables same day of the week appointments, promotes service and patient organisation, and reduces pill wastage.

6 combination drugs

These should be used if available in the correct dose and competitively priced.

13.3.2 recommended drugs

RECOMMENDED DRUGS AND DOSAGE			
CLASS	**NAME**	**DOSE**	
		usual	frequency
diuretic	HCT	12.5 mg	daily
β blocker	atenolol	25 mg	daily
ACE inhibitor	lisinopril	10 mg	daily
CCB	nifedipine retard	20 mg	bd
AAA	methyldopa	250 mg	bd

The list is restricted to drugs that are available in primary care in the South African public sector. Reserpine and hydralazine should no longer be used. Reserpine is an anti-adrenergic agent. It is less effective than atenolol with which it should be replaced and has in some patients dangerous depressive side-effects. The correct dose formulation [0.1mg] is not available and it is more expensive than atenolol. Hydralazine should not be used because it is associated with tachyphylaxis due to sodium and water retention, causes postural hypotension and needs to be taken 4 times/day.

Methyldopa, also an anti-adrenergic agent, should be used only in pregnant hypertensive women where it has been shown to be safe for both mother and child. It is relatively expensive, and is associated with significant neurological side-effects and with tachyphylaxis due to sodium and water retention.

13.3.3 drug treatment paths and steps - routine protocol

ALL drug steps and paths go BOTH ways. Movement forwards or backwards depends on blood pressure levels monitored over 4 consecutive visits [called a cycle]. The usual interval between visits should be 4 weeks; it may be extended for logistic reasons but should not exceed 12 weeks. The interval between visits for pregnant women and for patients with grade 4 hypertension should be 1 – 2 weeks only

The blood pressure lowering effect of drugs is cumulative and takes time to become manifest. It is therefore important not to rush up and down the drug steps and paths.

definition of responses – BP lowering effect

good response	=	all readings within a cycle ≤ target levels
fair response	=	3 or 4 readings within a cycle that have moved down to a lower grade
poor response	=	3 readings within a cycle that have not moved down to a lower grade

INDICATIONS FOR FORWARD AND BACKWARD MOVEMENT

forward movement [more drugs]: a poor response

in the presence of:

- good compliance with the non-drug programme
- perfect compliance with drug use

and in the absence of:

- factors which elevate blood pressure
- acute mental or physical stress [including hunger]

backward movement [fewer drugs]: a good response

Path A and steps A1 - A4: diuretic and β-blocker

A1 hydrochlorothiazide [HCT] 12.5 mg x daily

1. If the response to the first cycle is poor go to step A2.1
2. If after an initial fair response,
   the response becomes poor go to step A2.2

A2.1 stop hydrochlorothiazide, use atenolol 25 mg x daily

If the response to step A2.1 is poor go to step A2.2

A2.2 use hydrochlorothiazide 12.5 mg x daily + atenolol 25 mg x daily

If the response to step A2.2 is poor go to step A3

A3 use hydrochlorothiazide 12.5 mg x daily + atenolol 50 mg x daily

If the response to step A2.3 is poor go to step A4

A4 use hydrochlorothiazide 25 mg x daily + atenolol 50 mg x daily

If the response to path A is poor, stop path A and go to path B.
If the response to any step in path A remains good for 3 cycles, go backwards.

Path B: calcium channel blocker [nifedipine retard 20 mg x bd]

If the response to path B is poor,
check serum potassium [K] as a proxy for renin status[71] and stop path B

1. If serum K is normal [normal/low renin], go to path C step C1.
2. If serum K is low [high renin], go to path D step D1.

If the response to path B remains good for 3 cycles,
go backwards: B → A3 → A2.2 → A1

Path C and steps C1 – C2: calcium channel blocker and diuretic

C1 nifedipine retard 20 mg x bd + hydrochlorothiazide 12.5 mg x daily

If the response to step C1 is poor, go to step C2

C2 nifedipine retard 20 mg x bd + hydrochlorothiazide 25 mg x daily

If the response to step C2 is poor, check serum K again and stop step C2

1. If the serum potassium is still normal, go to path E.
2. If the serum K is now low, go to path D step D1.

If the response to C1 or C2 remains good for 3 cycles,
go backwards: path C2 → C1→ B → A3 and so on.

Path D and steps D1 – D2: calcium channel blocker and β-blocker

D1 nifedipine retard 20 mg x bd + atenolol 25 mg x daily

If the response to step D1 is poor, go to step D2

D2 nifedipine retard 20 mg x bd + atenolol 50 mg x daily

If the response to D2 is poor:

- go back to an earlier step and path with an equivalent response
- evaluate and reinforce compliance with non-drug measures

If after about 3 cycles the response is still poor:

- go forward again
- repeat these backward and forward steps at least once
- if the response remains poor refer for specialist management.

If the response to D1 or D2 remains good for 3 cycles,
go backwards: path D2 → D1 → B → A2.1 → non-drug; Do NOT use a diuretic .

Path E and steps E1 – E3: calcium channel blocker, β-blocker and diuretic

E1 nifedipine retard 20 mg x bd + atenolol 25 mg x daily + HCT 12.5 mg x daily

If the response to step E1 is poor, go to step E2

If the response to step E1 remains good for 3 cycles,
go backwards to step C1→ B → and so on.

E2 nifedipine retard 20 mg x bd + atenolol 25 mg x daily + HCT 25 mg x daily

If the response to step E2 is poor go to step E3
If the response to step E1 is good go backwards to step E1→ C1 and so on.

E3 nifedipine retard 20 mg x bd + atenolol 50 mg x daily + HCT 25 mg x daily

If the response to step E3 is poor:

- go back to an earlier step and path with an equivalent response
- evaluate and reinforce compliance with non-drug measures

If after about 3 cycles the response is still poor:

- go forward again
- repeat these backward and forward steps at least once
- if the response remains poor, refer for specialist management.

If the response to E3 remains good for 3 cycles,
go backwards to step E2 or E1 → C1 and so on

13.3.4 exceptions to the above protocol:

1. If the use of a β blocker is contra-indicated or not advisable, use the ACE inhibitor, lisinopril.

2. Use only methyldopa 250 mg x bd in all pregnant women. It should be started immediately an elevated blood pressure reading has been confirmed with 3 readings at least 20 minutes apart. Start general measures at the same time.

3. Start drug treatment at step A2.1 with a β blocker in hypertensives with isolated coronary artery disease.

4. If the blood pressure is very high [grade 4], correctly taken on 3 occasions, at least 20 minutes apart, in the absence of factors which acutely elevate blood pressure, or if accelerated or malignant hypertension is present, in the absence of significant renal impairment [≤ grade 2] start path A1 immediately. Start general measures at the same time. Re-assess in 1 week.

5. If, in addition, renal impairment is present, start immediately at step A2.2 [using an ACE inhibitor instead of a β blocker]. If renal impairment is severe [grade 3-4] use a loop diuretic [furosemide 40mg daiy] instead of hydrochlorothiazide. Start general measures, stressing a low protein intake and adequate calories.

This is the only situation in which treatment is started with two drugs. Patients with severe renal impairment should be referred for specialist management as soon as possible.

6. In hypertension-related emergencies, administer the appropriate drugs immediately while waiting for urgent transfer to hospital.

DRUGS TO USE IN HYPERTENSION-RELATED EMERGENCIES	
CONDITION	**DRUGS**
encephalopathy	atenolol 5mg IV
pulmonary oedema	O_2 + morphine 10mg IMI + furosemide 40mg IV
severe pre-eclamspia	IV electrolyte solution + $MgSo_4$* ≤ 4g IV [in 15 minutes]
eclampsia	IV electrolyte solution + $MgSo_4$ + diazepam 5 mg IV

* $MgSo_4$ = magnesium sulphate[72]

13.4 drug management of associated conditions

Aspirin [75 mg daily] could be prescribed, if the blood pressure is controlled and not otherwise contra-indicated to hypertensive patients > 50 years of age without any associated condition and to all including those < 50 years with associated diseases. Its use in pregnancy is probably best avoided. Evidence of harmless beneficence in all situations is not un-controversially established.

Statins have been recommended for hypertensives > 50 years, irrespective of the level of total or low density lipoprotein cholesterol, and for all hypertensives including those < 50 years with associated diseases.[9] Non-drug measures must be followed.

Drugs used in the management of other associated diseases such as diabetes and in the management of other risk factors such as obesity, smoking, and alcohol abuse are not considered.

14 REFERRAL BETWEEN DIFFERENT LEVELS OF CARE

There are 4 situations:

1. from primary care for urgent admission for specialist in-patient care
2. from primary care to out-patient specialist care
3. from specialist care to primary care for routine management with the above protocol with or without specialist supervision
4. from specialist care to primary care for management not using above protocol, under the supervision of specialist care, on a case by case basis

The criteria for referral depend on the level of expertise at the primary care facility.

1. The following should be referred for urgent specialist in-patient care:

   - hypertensive encephalopathy
   - pulmonary oedema
   - severe pre-eclamspia and eclampsia

2. The following should be referred from primary care to specialist care:

   2.1 hypertensive patients with:

   - accelerated or malignant hypertension
   - refractory congestive cardiac failure *
   - moderate and severe coronary artery disease *
   - grade 3-4 renal impairment *

   2.2 hypertensives who cannot tolerate the side-effects of recommended or available drugs

   2.3 hypertensives in whom the recommended drugs are contra-indicated

   2.4 patients with refractory hypertension = inadequate response to repeated backward and forward cycles ending in steps D2 or E3

   2.5 patients suspected of suffering from secondary hypertension

   2.6 non-obese children [< 18 years] with blood pressure ≥ 160/90 mm Hg

   2.7 pregnant hypertensives:

   - in whom control is not good after 2 – 4 weeks of drug treatment
   - with severe hypertension, renal impairment or diabetes
   - mild and moderate pre-ecalmpsia

* in facilities without medical practitioners, patients with milder forms of disease should also be referred for specialist care.

15 IMPLEMENTATION OF THE GUIDELINES

All public sector departments of health, all medical and allied training institutions and all private sector medical care practitioners and organisations should buy into the guidelines by participating in their final formulation, by replacing all pre-existing guidelines with them, and by publicising them widely.

Public sector service providers must be assured of access to the recommended equipment, drugs, stationery, training, and support.

Political will and commitment on the part of the medical establishment, national department of health, all other government institutions and civil society is essential.

16 APPENDIX

1. hand-outs for tobacco and alcohol - front and back on A4 page
2. average [desirable or ideal] body mass cross-tabulated with age and height

SOME SUGGESTIONS ON HOW TO STOP SMOKING

Reduce or stop your smoking **cues**:

- drink water instead of coffee
- stop drinking alcohol
- encourage your family and friends to give up smoking
- ask others not to smoke in front of you
- avoid places and situations where people smoke
- leave the eating table immediately after a meal

Eat properly:

- eat at least 5 small, regular meals or snacks per day
- do not miss a meal or snack
- avoid salty, sweet and fatty food

Fight the craving for smoking by drinking **water**.

Learn to **relax** without cigarettes or tobacco. Try:

- slow deep breathing exercises or yoga
- walking, jogging or any other exercise programme
- an interesting and useful hobby

Choose a day to stop. Try today.

Put aside the money that is saved for something special.
Positively enjoy better health without tobacco smoke.

IF SMOKERS STOP SMOKING
THEIR HEALTH AND EVERYBODY ELSE'S HEALTH
WILL IMPROVE

THIS IS WHAT TOBACCO SMOKE CAN DO TO EVERYBODY

Smoking-related diseases are responsible for more than 50% of premature deaths and are the commonest cause of ill-health and disability.

Tobacco smoke pollutes the air we all share. Environmental tobacco smoke makes everybody sick, the smokers' families [including their unborn children], their friends, their co-workers. Everybody who has to breathe the air polluted by smokers can get the same diseases. The amount of damage depends on how much tobacco poison is inhaled or ingested [also from chewing tobacco], age and general state of health. Children and older people are worst affected, especially when they are ill.

Tobacco smoke damages everybody's lungs. People exposed to tobacco smoke develop chronic obstructive airways disease [COAD]. This consists of 3 conditions: emphysema, peripheral airways disease and chronic bronchitis. Sufferers from COAD are unable to breathe properly. Breathing out is particularly difficult. They struggle for life with every breath they take. They cough and spit. They wheeze.

Tobacco smoke causes everybody to get many chest and head colds as well as other infections because tobacco smoke also reduces the body’s resistance to infections and other stress factors. Tobacco smoke causes itchy eyes, dry nose and sore throat. People especially small children often develop asthma from living in a tobacco smoke environment. Tobacco smoke can bring on an attack in asthmatics.

Tobacco smoke increases the chances of suffering and dying from all forms of cancer. The risks of developing any cancer are increased in people who drink alcohol as well as smoke tobacco. Cancer of the lip, tongue, mouth, throat, voice-box, gullet, lung, pancreas, kidney and bladder are particularly common among smokers and among people who inhale second-hand smoke from tobacco polluted environments. Few cancers can be cured.

Tobacco smoke reduces the blood supply to all parts of the body, increasing the risk of getting a heart attack and a stroke as well as kidney damage and in diabetics foot gangrene, and causing impotence, chest pain on effort, pain in the calf on walking.

Tobacco smoke interferes with nutrition - appetite is poor, food is not tasty, and digestion and absorption are impaired. Smokers tend to use a lot of salt and spices. They prefer to drink very strong coffee. This is because their sense of taste and smell has been damaged.

Tobacco smoke causes impotence [sexual weakness]. It stops women having periods. Pregnant women often have miscarriages. Tobacco smoke prevents the normal growth and development of the unborn baby. Babies of women exposed during pregnancy to tobacco smoke may be born early, small or deformed.

Smokers look ugly, dry, pasty and pinched.
Their fingers and teeth are stained.
They stink, their clothes stink and their homes stink.

Smokers are a fire hazard. They waste money.

PEOPLE WHO DRINK ALCOHOL NEED TO KNOW ITS EFFECTS

Alcoholic drinks contain ethyl alcohol, a poison which affects every part of the body. In time permanent physical and mental damage occurs.

Psychological effects

Ethyl alcohol is a depressant, not a stimulant. Even small amounts depress brain function. At first the drinker feels relaxed. Soon vision becomes less sharp. Reaction time increases. Motor coordination deteriorates and the person becomes unable to perform precise movements. Self-control is reduced. Speech becomes slurred. They may see double. They may pass out or have fits.

Taking decisions, working with machines, climbing ladders, crossing roads, driving vehicles can all be risky.

The immediate effects of alcohol can be severe if a lot is taken over a short period of time by someone who is tired, hungry, worried or sick.

As more alcohol is taken the effects get worse. Drinkers may become rude, quarrelsome, aggressive and violent. They may say and do things that hurt or annoy those they love, respect or fear. They increase the risk of exposure to unsafe sexual practices and of motor vehicle accidents whether as a driver or a pedestrian.

The long-term effects of alcohol are worse. They become depressed and anxious. They forget things, behave badly and get into trouble. They are at risk of being involved in accidents. They act irresponsibly, steal, cheat, lie and fight. They neglect themselves, their family, their friends and their jobs. Their families break up and they lose their jobs.

People become psychologically dependent on alcohol. This may progress to physical dependence. They then have an uncontrollable craving for alcohol. They cannot limit or stop their alcohol intake and they may tolerate large amounts. They tend to drink at all times, especially early in the morning.

They may suffer memory black-outs which can last for days. They may see and hear things that are not there.

Without alcohol these alcoholics can get the "shakes". They are restless and easily startled. They feel nauseous and frightened. They are sweaty and hot. If they do not get some alcohol within about 48 hours they may develop severe withdrawal effects with acute and disturbing visual hallucinations [pink elephants]. This is a medical emergency from which they may die.

Physical effects

Alcoholics suffer from stomach pain, nausea and vomiting. They may bleed from an injured stomach lining and vomit the blood or pass it in their stool. They may collapse if they lose a lot of blood quickly. If they lose blood slowly they become anaemic and feel tired and weak.

If the liver is damaged they will become weak and yellow. Their abdomen and legs will be swollen. They may suffer episodes of confusion. They may also vomit blood, this time from bleeding veins in their gullet. The whole body may itch badly and uncontrollably.

If the pancreas is injured they may not be able to use the food that they eat. It will pass straight through. They may develop diabetes. They may also suffer acute attacks of pancreatitis with very severe stomach and back pain. This can cause collapse and sudden death.

Alcohol affects the nerves and brain permanently. The gait of alcoholics becomes unsteady. Their hands shake badly and they suffer from "pins and needles". Their legs may be very painful as well as paralysed. Alcohol causes fits and madness. Head injuries, another common but delayed cause of epileptic fits, occur often among drunk people.

Alcoholics may develop heart failure, gout and high blood pressure. Their bones become brittle and may break easily. They become sexually impotent. Men develop breasts and their testes shrink. Women may be unable to fall pregnant or be unable to carry their babies to term. If they do not miscarry, they often give birth to small, physically deformed or brain-damaged babies.

Alcohols look ugly. Their skin is thin, flushed and may be covered with sores and dilated vessels that look like small spiders. Their nose is big and red and their face square with swellings under the chin [enlarged parotid glands].

They are at risk of getting cancer of the tongue, mouth, throat, voice-box, gullet and liver. Resistance to infections especially TB and HIV is down. Wounds heal poorly and surgical operations are dangerous.

In the final stage of chronic alcoholism all the systems in the body are damaged. Social and psychological functioning is severely impaired.

Even a small amount of alcohol is now poorly tolerated so that this source of solace is lost. There is no relief from mental anguish and physical pain.

The following data have been extracted from tables on insured persons in the USA [Society of Actuaries, Build and Blood Pressure Study, volume 1, Chicago, 1959] with interpolations by the editors of Geigi Scientific Tables [7th edition]

AVERAGE WEIGHTS [MASS] OF ADULT WOMEN

Height [in shoes]	average mass in kilogrammes in indoor clothing age grouped in years							
cms	15-16	17-19	20-24	25-29	30-39	40-49	50-59	60 +
147	44	45	46	48	52	55	56	57
148	45	46	47	49	52	56	57	58
151	46	47	48	50	53	57	58	59
152	46	47	49	51	54	57	59	59
154	47	48	50	52	55	58	59	60
155	48	49	50	52	55	59	60	61
156	49	50	51	53	56	59	61	61
157	50	51	52	54	57	60	61	62
159	51	52	53	54	57	61	62	63
161	52	53	54	56	59	62	64	65
162	53	54	55	56	60	63	65	66
164	54	55	56	57	60	64	66	67
165	55	56	57	58	61	65	67	67
166	56	57	57	59	62	65	68	68
169	57	58	59	61	63	67	70	70
170	58	59	60	61	64	68	70	71
171	59	60	61	62	65	69	71	72
172	60	60	61	63	66	70	72	73
175	61	62	63	65	68	72	74	75
176		63	64	66	69	73	75	
178		64	65	67	70	74	76	
180		66	67	69	72	76	79	

AVERAGE WEIGHTS [MASS] OF ADULT MEN

Height in shoes	average mass in kilogrammes in indoor clothing age grouped in years							
cms	15-16	17-19	20-24	25-29	30-39	40-49	50-59	60 +
152	44	51	55	58	59	60	61	60
153	45	52	56	58	60	61	62	61
155	46	52	56	59	60	62	63	61
157	48	54	58	60	62	63	64	63
159	49	55	59	61	63	64	65	63
160	50	55	60	62	64	65	65	64
162	53	57	61	64	65	67	67	66
164	54	58	62	64	66	68	68	67
166	56	60	63	66	68	70	70	69
167	57	61	64	67	69	70	71	70
169	58	62	65	67	70	72	72	71
170	60	63	65	68	71	73	73	72
172	61	64	67	69	72	74	74	73
174	63	65	68	71	74	75	76	75
175	64	66	69	72	74	76	77	76
178	66	68	71	74	77	79	79	78
179	67	69	72	74	78	80	80	79
181	69	71	74	77	80	82	83	82
183	70	72	75	78	81	83	84	83
185	72	74	77	80	83	84	85	85
186	73	75	78	81	84	86	87	86
188	74	76	79	82	85	87	88	87
189	75	77	79	83	86	88	89	88
190	76	78	80	84	87	89	90	89
192		79	81	85	88	90	91	91
193		80	82	86	90	92	93	92

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