



Managing Hypertension

in Primary Care in the Caribbean

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CARIBBEAN HEALTH RESEARCH COUNCIL

ST. AUGUSTINE, TRINIDAD & TOBAGO

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Disclaimer

These are general guidelines only and may not apply in the case of any particular individual patient. They should be applied bearing in mind the local situation. The health care worker should always use his/her clinical judgement and expertise.

Duality of Interest

No duality of interest was identified.

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PREFACE

One of the mandates of the Caribbean Health Research Council (CHRC) is to promote evidence-based practice and in 1995 and 1998 it produced two booklets: “Managing Diabetes in Primary Care” and “Managing Hypertension in Primary Care in the Caribbean” respectively. Those clinical guidelines were distributed throughout the Primary Health Care system of the entire English speaking Caribbean, targeting all primary care doctors, nurses, nurse practitioners and other health care personnel involved in the care of persons with diabetes and hypertension.

Since then, there have been significant advances in the management of the two conditions, hence the need for updated manuals that would take into account the most recent international guidelines and regional expert opinions on the management of high blood pressure, diabetes, obesity and related dyslipidemia.

These updated manuals are geared to the culture, economic situation and health care systems in the Caribbean and are designed to serve as key tools in improving patient care. Cultural and economic differences may call for different local strategies, but the most important goal is to ensure that these diseases are managed effectively, thus reducing morbidity and mortality.

This document provides a straightforward approach to the diagnosis as well as the management of hypertension at the primary care level. It stresses the importance of non-drug or lifestyle management as a necessary prerequisite and the need to educate patients, families and the community. It also offers the scope to rationalize and standardize management providing evidence-based recommendations as far as possible.

It is envisioned that these guidelines will be applied systematically and thus lead to improved care and outcomes in persons with hypertension in the Caribbean.

We also hope that the collaboration between the CHRC, the Pan American Health Organization (PAHO), regional opinion leaders and other agencies will accelerate a more effective and comprehensive approach to the prevention and control of chronic non communicable diseases.

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AIM & OBJECTIVES:

AIM:

To produce a unified, evidence-based approach to the management of hypertension in the Caribbean through both a patient-centred and a public health approach.

OBJECTIVES:

- To promote the primary prevention of hypertension through the adoption and maintenance of healthy lifestyles
- To promote early and accurate diagnosis of hypertension
- To improve the quality of care of persons with hypertension
- To prevent or delay the onset of co-morbid conditions of diabetes, obesity and dyslipidaemia
- To prevent and treat acute and long-term complications of hypertension
- To promote education and empowerment of patients, families, communities and health care workers.

INTRODUCTION

Hypertension is one of the most important preventable causes of premature mortality worldwide. The World Health Report 2001 indicated that high blood pressure is estimated to cause 7.1 million deaths annually i.e. about 13% of all deaths and comprises 4.4% of the global disease burden. In the Americas the number of persons with hypertension is conservatively estimated to be 140 million.

Prevalence figures for hypertension in populations over 40 years range widely. In the WHO MONICA¹ project, prevalence varied from 8% in Catalonia to more than 40% in Finland. In the Caribbean the prevalence of hypertension is estimated to be 26% and as high as 55% in studies of populations over 25 and over 40 years respectively. Hypertension is also the cause of considerable mortality in this region and figures from the Caribbean Epidemiology Centre (CAREC) show that hypertensive disease was the 5th leading cause of death in 2000. It should be noted that the leading causes of death were cerebrovascular disease (including stroke), heart failure and ischaemic heart disease, which are known complications of hypertensive disease. Hypertension is termed “the silent killer” as hypertensives are often asymptomatic.

The factors which contribute to hypertension are similar to those of the other major chronic non-communicable diseases such as obesity and diabetes. These include unhealthy diet, high salt intake, inadequate exercise and excessive use of alcohol. The prevalence of hypertension also usually rises with age.

Findings from the International Comparative Study of Hypertension in Blacks (ICSHIB) indicated that, among persons affected, the awareness of hypertension (>140/90 mmHg) was 65%, treatment was 50% and control 25%, with control rates ranging from 38% in Barbados to 13% in Saint Lucia. In the more recent Barbados Eye Studies, there was little or no improvement (awareness 63%, treatment 53% and

¹ Monitoring of Trends and Determinants in Cardiovascular Disease

control 19%). These figures point to the need for greater public education, improved access to services and greater cooperation between patient and health care worker to ensure adherence to treatment goals, since better control will dramatically reduce complications, morbidity and mortality.

Recent publications urge early and aggressive approaches to prevention and management of hypertension. A new category of pre-hypertension has been described and this warns of the need to start/continue the promotion of healthy lifestyles in those in this category. Tight control of the hypertension itself requires a patient centred approach of lifestyle modification and drug therapy.

Primary prevention of hypertension must be the goal of the health system and requires actions that target the general population as well as individuals, especially those at higher risk for hypertension. The commonality of many risk factors for hypertension and diabetes justifies an **integrated approach** to the prevention and control of both. The fact that cardio-vascular diseases resulting from hypertension and diabetes account for about 40% of Caribbean mortality further justifies this approach and highlights its urgency.

OVERVIEW OF HYPERTENSION

Hypertension may be classified aetiologically as primary or secondary.

Primary hypertension (formerly called essential hypertension) is found in the majority of patients (approximately 95%). No specific cause is identified.

Secondary hypertension: in a few cases, it may be due to identifiable causes such as:

- Drugs
- Renal disorders
- Endocrine disorders
- Coarctation of the aorta
- Neurological disorders

Risk Factors for Hypertension

Known modifiable risk factors for hypertension are:

- Obesity
- Excessive intakes of salt, fat (especially saturated fat), and calories
- Inadequate physical activity
- Uncontrolled hyperglycaemic states
- High alcohol consumption
- Tobacco use
- Low potassium intake
- Sleep apnoea
- Psychosocial stress is often implicated but difficult to measure.

Non-modifiable factors include:

- Age
- Race e.g. African ancestry
- Family history of hypertension or diabetes

If not properly treated, hypertension can lead to damage of the target organs - heart, brain, kidneys, eyes and vascular system (See Table 1). Proper management of hypertension can therefore lead to a reduction in the risk for these diseases.

Table 1:
Signs and Symptoms of End-organ Damage

Organ	Signs/Symptoms
Heart	Displaced and thrusting apex beat Left ventricular hypertrophy on ECG Angina or prior myocardial infarction Congestive heart failure
Brain	Transient ischemic attack Stroke
Kidney	Proteinuria Raised blood urea or creatinine
Eyes	Retinal changes: Grade 1- arteries narrow or tortuous Grade 2- arteriovenous nipping Grade 3- haemorrhages and/or exudates, Grade 4- papilloedema
Vascular system	Asymmetrical, absent or irregular pulses

Hypertension also has a strong relationship with obesity, insulin resistance and dyslipidaemias, with the co-existence of these disorders giving rise to the Metabolic Syndrome.

The management of the patient therefore requires careful assessment of the presence or absence of risk factors; damage to target organs; the other diseases associated with the Metabolic Syndrome; and the diseases to which hypertension makes a significant contribution.



SECTION I:

ESTABLISHING THE DIAGNOSIS OF HYPERTENSION

DEFINITION AND CLASSIFICATION

Blood Pressure (BP) is recorded by systolic and diastolic values. The systolic blood pressure is the maximum pressure in the arteries during contraction (systole) of the ventricles of the heart. The diastolic blood pressure is the pressure during relaxation (diastole). Observed BP readings form a continuum and cut-off points can be selected at specific points along this continuum to define hypertension or high blood pressure (HBP).

For many years, BP readings of systolic 160 mmHg and diastolic 95 mmHg had been the “cut-off” points recommended by the WHO Expert Committee on Arterial Hypertension.

In 1997, the Joint National Committee (JNC) on Prevention, Detection, Evaluation and Treatment of High Blood Pressure of the USA in its sixth report (JNC6) described three stages of high blood pressure associated with increasing risk of cardiovascular events and renal disease. It used cut-off points of 140 (systolic) and 90 (diastolic) mmHg to define hypertension (Stage 1), 160-179 (systolic) and 100-109 (diastolic) to define Stage 2 and ≥ 180 (systolic) and ≥ 110 (diastolic) to define Stage 3.

The seventh report of the Joint National Committee (JNC 7) in 2003 designates values of 120 - 139 / 80 - 89 as pre-hypertension, as patients with these values are at increased risk for progression to hypertension. Table 2 combines the salient features of JNC 6 and 7.

Table 2
Classification of Blood Pressure for Adults Aged 18 Years and Older*

BP Classification	Systolic Blood Pressure (mmHg)	Diastolic Blood Pressure (mmHg)
Normal	<120	<80
Pre-hypertension	120 – 139	80 - 89
Stage 1 Hypertension	140-159	90-99
Stage 2 Hypertension	≥160	≥100
Stage 3 Hypertension	≥180	≥110

Source: Sixth and Seventh Reports of the Joint National Committee on Prevention, Detection, Evaluation and Treatment of High Blood Pressure (USA).

*When not taking drugs or acutely ill, and based on 2 or more readings on 2 or more visits after initial screening. When systolic and diastolic values fall into different stages, the higher one is used.

Note that JNC 7 combines Stages 2 and 3, but it is useful in our setting to retain Stage 3 because of the **much** greater risk associated with these values and the greater urgency needed. It is also an indicator that a combination of 3 or more drugs is usually needed to control Stage 3.

SCREENING FOR HIGH BLOOD PRESSURE

In view of the very high prevalence of the disease in the Caribbean, screening for hypertension should be a routine part of every health care encounter for adults. Blood pressure monitoring should be carried out regularly in those at risk for hypertension. This includes persons with a family history of hypertension, stroke, heart disease or diabetes. In these persons, screening should also be done for diabetes and dyslipidaemia.

MEASUREMENT OF BLOOD PRESSURE BY AUSCULTATION

Standardized techniques should be used to measure blood pressure. At the first encounter, measure blood pressure in both arms and in the supine and standing position. On repeat visits, use the same arm, preferably the right arm. (BP in the right arm is consistently a few mmHg higher than in the left). Always take supine and standing BP measurements in the elderly or those with autonomic neuropathy to detect postural hypotension.

The Instrument

Mercury sphygmomanometers are considered by many to be preferable for measuring blood pressure, although there is a move to phase them out because of possible toxicity if mercury is spilt. They should be periodically checked for faults. Other instruments for measuring BP may include a validated electronic device. Aneroid manometers are the least accurate and often unreliable. Instruments used for measuring blood pressure should be properly maintained and calibrated regularly.

Cuffs of varying sizes, pediatric, standard, large adult and thigh, must **always** be available and must be kept in good condition. The cuff width must be at least two-thirds the circumference of the arm.

The Client

Care should be taken to make the client as comfortable as possible, alleviating any factors that could raise BP, such as client anxiety, pain or a full bladder. The client should wear short sleeves to ensure that the arm is exposed. He/she should not have smoked, exercised or ingested caffeine in the previous 30 minutes.

The Procedure

- Allow client to sit quietly for five minutes before the BP is measured. The BP is ideally taken in the sitting position with the back supported. Supine values tend to be slightly different with the systolic pressure higher by 2 to 3

mmHg and the diastolic pressure lowered by a similar margin. The arm should be resting comfortably at heart level.

- Wrap a cuff containing the correct sized bladder smoothly, snugly and evenly around the arm **with the middle of the balloon over the brachial artery**
- Palpate the brachial or radial pulse.
- Inflate the cuff and by palpation take the approximate systolic pressure, identifying the point when the pulse is obliterated. Deflate the cuff and then re-inflate to 20 mm above this value.

This overcomes the problem of the auscultatory or “silent gap” where sounds may disappear for a while and the true systolic value may be missed.

- Reduce the pressure slowly and steadily (2-3 mm per second), **listening with the bell of the stethoscope** over the brachial artery for Korotkoff sounds:
 - 1st Phase or Korotkoff 1 - **First appearance of faint, tapping sounds**, gradually increasing in intensity. This corresponds to the **systolic pressure**.
 - 2nd Phase – Brief period when sounds get softer and may disappear briefly (the silent gap)
 - 3rd Phase – Sounds become sharper
 - 4th Phase – There is distinct, abrupt muffling of sounds so that a soft, blowing quality is heard
 - 5th Phase – **The point at which sounds disappear**. This corresponds to the **diastolic pressure**. Sometimes there is no 5th phase; in that case the 4th phase should be noted as the diastolic pressure.

To augment sounds, if very soft, have the patient make a fist a few times.

The Reading

- Record all readings to the nearest 2 mm Hg, and NOT rounded off to the nearest zero or five.

- **Take at least 2 measurements** one to two minutes apart, and report as the mean of 2 readings that do not differ by more than 5 mmHg.
- If an unexpected reading is found or difficulty is experienced, ask a colleague to check the reading.

Training

Persons who take the blood pressure must be trained in correct techniques with periodic checks for reproducibility and absence of zero preference.

ESTABLISHING THE DIAGNOSIS AND RECOMMENDATIONS FOR FOLLOW-UP

The diagnosis of hypertension must be established by a doctor, medex² or nurse practitioner. A diagnosis of hypertension is not usually made on the basis of one elevated blood pressure reading.

- i. Patients with pre-hypertension but without diabetes, chronic renal failure or cardiovascular disease are treated with non-pharmacologic therapies such as weight reduction, sodium restriction and avoidance of excess alcohol. They should also have their blood pressure measured every six months since they are of significant risk of developing hypertension over time.
- ii. If persons with Stage 1 levels have no evidence of end organ damage, repeated BP measurements over three months are necessary.
- iii. If persons with Stage 2 levels have no evidence of end-organ damage, BP measurements should be repeated on at least one other occasion within one month.
- iv. Persons with Stage 3 levels with no evidence of end-organ damage should have their blood pressure measured within one week. In some cases

² Category of health care worker - similar to Physician Assistant

therapy should be started, if the risk level assessment so warrants (See Table 4). Higher levels e.g. $>210/120$, if associated with complications may constitute a Hypertensive Emergency (see page 46).

- v. 'Labile hypertensives' will show fluctuation of BP from normal to Stage 1 or higher hypertensive ranges and such patients should be monitored regularly. Persistence of diastolic readings above 90 mm Hg will usually indicate established hypertension.
- vi. The diagnosis of hypertension can be established on the basis of a single diastolic pressure > 100 mm Hg, **if there is evidence of target organ damage (Table 1)**. The patient should be classified as hypertensive with specific target organ disease, risk level assessed (see Table 4) and treatment begun.
- vii. Isolated systolic hypertension is diagnosed when there is an average of four readings ≥ 140 mm Hg on two occasions with a diastolic BP < 90 mm Hg (JNC 7 criteria). Isolated systolic hypertension should be carefully re-evaluated at intervals.
- viii. "White-coat hypertension" may occur in patients whose BP is raised only in the clinic but not at other times. A white-coat effect may further raise BP in a patient with hypertension.

Table 3 shows the diagnostic stages of hypertension and gives advice on the schedule for follow-up.

Table 3:
Summary of Recommendations for Follow-up

BP Classification	Blood Pressure (mmHg)	Follow up
Normal	< 120/<80	Recheck in 1-2 years.
Pre-hypertension	120-139/80-89	Repeat measurements every 6 months.
Stage 1	140-159/90-99	Repeat measurement in 3 months.
Stage 2	160-179/ \geq 100	Repeat within 1 month or sooner if there is target organ damage or if risk level warrants
Stage 3	\geq 180/ \geq 110	Repeat within 1 week or treat if there is target organ damage or if risk level warrants.
Hypertensive Emergency	>240 / 140 or >210/120 with complications	Refer for emergency management, but administer oral medication.

Note: If there is a difference between the systolic and diastolic categories, use the recommendations for the shorter follow-up period.

Once the diagnosis of hypertension is made, an assessment of risk should be calculated. This helps to estimate the combined effects of the risk factors and the risk of having a major cardiovascular event (fatal or non-fatal stroke) and myocardial infarct within the next ten years. Estimates are based on several factors including age, gender, smoking, diabetes, cholesterol, presence of target organ damage and history of cardiovascular or renal disease.³ The estimation of risk can be found in Table 4.

³ 2003 World Health Organization and International Society of Hypertension Statement of the Management of Hypertension

Table 4:
Stratification of Risk to Quantify Prognosis of Hypertension

Other risk factors and disease history	Blood pressure 140-159/90-99	Blood pressure 160-179/100-109	Blood pressure $\geq 180/110$
No others	Low risk	Medium risk	High risk
1 or 2 risk factors	Medium risk	Medium risk	Very high risk
3 or more risk factors or target organ damage or diabetes	High risk	High risk	Very high risk
Associated clinical conditions including cardiovascular disease and renal disease	Very high risk	Very high risk	Very high risk

Source: WHO-ISH Guidelines for the Management of Hypertension (1999)

Section II:

EVALUATING THE PATIENT

The objectives of evaluating patients with hypertension are:

- To assess the lifestyle and identify other cardiovascular risk factors and any disorders that may affect prognosis and guide treatment
- To determine whether there is a secondary cause of the high blood pressure
- To assess the presence or absence of end organ damage

THE INITIAL VISIT

Medical History

A comprehensive medical history is taken paying special attention to:

- i. Patient demographics
 - o Age, gender, ethnicity
- iii. History of risk factors for hypertension or cardiovascular disease:
 - o Dietary assessment (e.g. fat, calorie and sodium intake)
 - o Cigarette smoking (past or present; number daily and years smoked)
 - o Alcohol intake (drinks/day or week)
 - o Sedentary lifestyle/exercise/stress factors
 - o Pregnancy induced hypertension
- iii. Any history of:
 - o Cerebrovascular accident (stroke/transient ischaemic attack)
 - o Cardiac failure
 - o Ischaemic heart disease
 - o Kidney disease, e.g. proteinuria
 - o Peripheral vascular disease e.g. intermittent claudication (pain in legs on walking)
- iv. Drug history especially oral contraceptives (discontinue), non-steroidal anti-inflammatory drugs (NSAIDs), steroids, over-the-counter medications and alternative therapies.

- v. History of adverse reactions to anti-hypertensive drugs
- vi. Family history:
 - o hypertension and its complications
 - o diabetes
 - o coronary artery disease
 - o renal disease
 - o elevated cholesterol/hyperlipidaemia
 - o premature coronary artery disease or stroke (CVA)

Physical Examination

The main purpose of the physical examination is to identify organ damage and evidence that would indicate secondary hypertension.

Pay special attention to:

- Measurement of blood pressure
- Measurement of weight and height to determine BMI (see Appendix I)
- Measurement of waist circumference⁴
- Characteristics of pulse-inducing carotids and bilateral pulses and radio-femoral pulse delay (coarctation of the aorta)
- Location and character of the apex beat. Assess for left ventricular hypertrophy
- Examination of eyes using fundoscopy
- Examination of abdomen for renal masses or bruit, abdominal aneurysm
- Signs of anaemia (may indicate chronic renal disease)

⁴See "Protocol for the Nutritional Management of Obesity, Diabetes and Hypertension in the Caribbean", produced by the CFNI and PAHO WHO Office of Caribbean Program Coordination.

Laboratory Investigations and Other Diagnostic Procedures

The following laboratory tests should be conducted:

- Urine analysis (particularly for protein) and microscopy, if available
- Plasma creatinine, electrolytes, fasting lipid profile and full blood count (FBC)
- Fasting blood sugar
- ECG

Referral for additional investigations may be required:

- for resistant hypertension
- when secondary hypertension is suspected or
- to assess target organ damage

These investigations may include abdominal ultrasound, intravenous pyelogram (IVP), Vanillylmandelic Acid (VMA)+/- metanephrine studies, ambulatory blood pressure monitoring, echocardiography or angiography.

FOLLOW-UP VISITS

The timing of additional visits will depend on blood pressure control and the existence of complications or other diseases.

Every Visit:

- Measure and record blood pressure
- Measure weight for BMI calculation
- Elicit information on adherence to treatment, including taking medication the morning of visit
- Ask about symptoms/changes since last visit, and any adverse drug effects
- Stress importance of healthy lifestyle

Annual Visit:

- Update medical history
- Measure and record blood pressure
- Measure weight for BMI calculation
- Ask about lifestyle - diet, physical activity, tobacco and alcohol use.
Stress importance of healthy lifestyle
- Do laboratory investigations
 - plasma creatinine, electrolytes, fasting lipid profile and full blood count (FBC) and fasting blood sugar.
- Do an electrocardiogram

AMBULATORY BLOOD PRESSURE MONITORING

Ambulatory BP monitoring is warranted for:

- o Resistant hypertension
- o White coat hypertension
- o Hypotensive symptoms with drugs
- o Episodic hypertension
- o Autonomic neuropathy
- o Marked variability of blood pressure during the same visit or different visits

Section III:

MANAGEMENT OF HYPERTENSION

The aim of treatment is to lower blood pressure in order to prevent or delay complications, without impairing well-being. The goal blood pressure should be <140/90 mmHg, or <130/80 mmHg in persons with diabetes or renal disease, with emphasis on controlling the systolic blood pressure. For persons with pre-hypertension, the target should be <120/80 mmHg.

MANAGEMENT ACCORDING TO STAGE (SEE FIGURE, PAGE 36)

Pre hypertension (120-139 / 80-90)

- Emphasize lifestyle modification. Reassess at 6-12 months

Stage 1 Uncomplicated hypertension⁵ (140-159 / 90-99 mmHg)

- Initiate a trial of non-drug therapy for six to nine months. If control cannot be achieved, then **add** drug therapy. In patients achieving lifestyle change and whose BP is then controlled over a a period of 12 months, titrate drug therapy down and in a few cases it may be possible to withdraw drug therapy.

Stage 2 Uncomplicated hypertension⁵ (\geq 160/100 mmHg)

- Commence non-drug and drug therapies.

Note: Some patients in the lower limits of the range with multiple correctable risk factors may achieve significant reductions of BP on non-drug therapy alone. Such patients, if without target organ damage, may be given a trial of non-drug therapy alone. Most Stage 2 patients however will need 2 or more drugs and lifestyle change.

Stage 3 Uncomplicated hypertension⁵ (>180/110 mmHg)

- Commence non-drug and drug therapies and review frequently.
- No single drug will be adequate. Most Stage 3 patients will need 3 drugs or more and lifestyle change
- Postural hypotension and other adverse effects are more likely because of greater use of more powerful drugs and/or combined drug therapy.

⁵ Uncomplicated hypertension is defined as hypertension without evidence of target organ damage

- Non-adherence or poor adherence is a major problem and must always be considered. Withdrawal may cause rebound hypertension.

NON-PHARMACOLOGICAL MANAGEMENT

The cornerstone of treatment of both hypertension and diabetes is life-style modification (non-drug therapy). This is indispensable both for the prevention and management of ALL stages of high blood pressure.

Non-drug therapy alone may be adequate to control Stage 1 high blood pressure. Life style changes alone will be effective in reducing blood pressure to goal levels of <140/<90 mmHg in about 25% of patients. Effective lifestyle change may lower blood pressure by a similar magnitude as single drug therapy. Additional therapy is needed when lifestyle changes do not achieve blood pressure control.

The main strategies to be applied include:

i. Dietary measures

These are based on the DASH (Dietary Approaches to Stop Hypertension) Plan (Appendix 2) which aims at the following:

- Limiting use of salt to less than 2.4 grams of sodium (6 gm salt) per day i.e. no added salt in cooking or at table); avoid canned foods, salted meat, etc. This is particularly relevant in the Caribbean where diets are frequently rich in salt.
- Reducing excessive dietary fat (especially saturated fat and trans-fatty acids) to no more than 30% of calories. Saturated fat should not exceed 10% of total calories.
- Ensuring intake of fibre of at least 30-40 gm/day.
- Ensuring intake of potassium between 70-80 mmol/l daily. This can be achieved by a good selection of fruits and vegetables especially bananas, tomatoes and oranges as well as coconut water.

Where possible, the patient should be referred to a dietitian or nutritionist for advice.

ii. Physical Exercise

This should be undertaken for 30-60 minutes **at least** five times each week, but preferably daily. Walking is the easiest form of exercise for most people. Appendix III provides a guide to physical activity levels.

iii. Weight Management

This aims at the attainment and maintenance of desirable body weight i.e. BMI <25 or at least a significant reduction, if overweight or obese. There is a possibility of 5-20 mmHg decrease in systolic pressure for every 10kg (22lb) weight loss. Persons who need to lose weight should be referred to a dietitian or nutritionist.

iv. Reduction of Alcohol Intake

Alcohol use should not exceed 2 drinks/day for men and 1 drink/day for women. (1 drink = one ounce of spirits or 1 bottle of beer or 1 glass of wine)

v. Cessation of Tobacco Use

Tobacco should be avoided.

vi. Education

Every opportunity should be taken for education of the patient, with partner and relatives. The education should include diet, exercise and other lifestyle advice.

PHARMACOLOGICAL MANAGEMENT

General approach

The purpose of the pharmacological treatment of hypertension is the reduction of morbidity and mortality through the lowering of blood pressure.

Because of the long-term duration of the management of hypertension, **cost must be an important consideration in the choice of drugs**. Generic drugs of confirmed quality can be safely used and are widely available. Efficacy and outcomes as well as cost-effectiveness and adverse effects should also be considered.

Drug treatment must be tailored to the individual considering factors such as:

- Age and race
- The presence or absence of target organ damage
- The presence of other diseases such as diabetes, kidney disease and heart disease
- Patient preference

Antihypertensive Drugs

There is a wide range of drugs which are available for the treatment of hypertension. The different classes lower blood pressure by different means. The classes of antihypertensive drugs include:

Thiazide Diuretics help the kidneys eliminate salt and water and in a longer period of time dilate blood vessels. Examples of this class of drug are bendrofluazide and chlorothiazide.

Beta-blockers decrease the force and rate of the heart's contractions by binding to beta adrenoreceptors and prevent the action of norepinephrine and epinephrine. They also cause a decreased release of renin resulting in decreased production of angiotensin II and decreased release of aldosterone. Some beta-blockers (eg nadolol) bind to both beta 1 and beta 2 adrenoreceptors and are called non-selective. Other beta blockers (atenolol or metoprolol) bind only beta 1 adrenoreceptors and are termed selective.

Angiotensin-Converting Enzyme (ACE) Inhibitors block the angiotensin-converting enzyme which converts Angiotensin I to Angiotensin II, a potent vasoconstrictor. They inhibit the breakdown of the vasodilator bradykinin. Some examples include captopril (Capoten) and enalapril (Vasotec).

Calcium Channel Blockers (CCB) are also known as **calcium antagonists**. They are direct vasodilators. They slow movement of calcium into cardiac and smooth muscle cells leading to decreased contractility and vasoconstriction. Drugs in this class include amlodipine (Norvasc), verapamil (Isoptin) and diltiazem (Cardizem).

Angiotensin Receptor Blockers (ARBs) are also known as **Angiotensin II Receptor Antagonists**. They block the action of Angiotensin II. They relax blood vessels and cause decreased peripheral vascular resistance. An example is valsartan (Diovan)

Alpha-Blockers decrease cardiac contractility and vasoconstriction. Drugs in this class include prazosin (Minipress) and terazosin (Hytrin).

Vasodilators widen blood vessels and decrease peripheral vascular resistance. They are almost never used alone. Examples of this class include hydralazine (Apresoline) and minoxidil (Loniten).

Other classes of antihypertensive drugs include:

- Centrally acting such as methyldopa (used in the treatment of hypertension in pregnancy)
- Aldosterone blockers
- Neutral Endopeptidase Inhibitors (NEPs)
- Renin Inhibitors (first example to be approved by the FDA soon)

All classes of hypertensive drugs have specific indications and contraindications for use in particular patient groups. Table 5 provides some of this information.

Table 5:
Hypertensive Drugs: Their Indications and Contraindications

Class of Drug	Indications	Contraindications	Comments
Thiazide Diuretics	Heart failure Elderly patients Systolic hypertension Diabetes	Gout Dyslipidaemia Sexually active males	Drug of choice for most patients including blacks Inexpensive Effective
Beta-blockers	Angina Post-myocardial infarct Tachyarrhythmias Heart failure Pregnancy Diabetes	Asthma and chronic obstructive pulmonary disease Athletes and physically active patients Peripheral vascular disease	Cheap Effective Black patients are less responsive to these drugs
ACE-Inhibitors	Heart failure Coronary artery disease Post-myocardial infarct Diabetic nephropathy	Pregnancy Hyperkalaemia Bilateral renal artery stenosis	Often less effective in Blacks Persistent, irritating cough may require use of another drug
Calcium channel blockers (calcium antagonists)	Angina Elderly patients Systolic hypertension Peripheral vascular disease	Heart block Congestive heart failure	Tend to be expensive Very effective in Blacks
Alpha-Blockers	Prostatic hypertrophy Glucose intolerance Dyslipidaemia	Postural hypertension Pregnancy Urinary incontinence	Avoid using alone
Angiotensin Receptor Blockers	Heart failure Cough from use of ACE inhibitors	Pregnancy Bilateral renal artery stenosis Hyperkalaemia	Similar to ACE Inhibitors but absence of cough May have fewer and less severe side effects Tend to be expensive

A core of drugs should be adequate for standard therapy in most cases. These include:

- **Diuretics** e.g. bendrofluazide (low dose, 1.25 mg or 2.5 mg).
- **Long acting calcium antagonists** e.g. verapamil, sustained release, for special situations
- **Angiotensin-Converting Enzyme (ACE) Inhibitors** e.g. captopril (25-50 mg b.d.) or generic enalapril (5-20 mg once or twice daily)
- **Beta-blockers** are all equally effective but long-acting preparations (e.g. nadolol, 80 mg) and cardio-selective blockers (e.g. atenolol, 50 mg) are ideal because of once daily dosing.
- **Others.** These include Reserpine, Centrally acting alpha-agonists, methyldopa (250 mg or 500 mg nocte), and Vasodilators e.g. hydralazine (50 mg – 100mg) twice daily

Health care providers should familiarize themselves with the drugs in the formulary, paying attention to indications, dosage, side effects, contraindications and drug interactions.

Other drugs may be required in specific instances in spite of very much higher costs e.g. Angiotensin Receptor Blockers (ARB) for diabetic hypertensives who have cough with an ACE Inhibitor, alpha blockers for men with co-existent prostatic hypertrophy, and other calcium channel blockers. But it must be remembered that for every patient treated with a very expensive calcium channel blocker or ARB, 50 to 100 patients could be treated with a low dose thiazide! This is a matter for urgent recognition by all health care providers.

The principles of treatment include:

- ◆ Begin therapy with the lower dose range available for a particular agent, in an effort to reduce adverse effects. If there is a good response but the pressure is still short of adequate control, it is reasonable to increase the dose of the same drug, provided that it has been well tolerated.
- ◆ The use of appropriate drug combinations to maximize hypotensive efficacy while minimizing side effect. It is often preferable to add a small dose of a second drug rather than increasing the dose of the original drug.
- ◆ Changing to a different drug class altogether if there is very little response or poor tolerability to the first drug used, before increasing the dose of the first drug used or adding a second drug.
- ◆ The use of long-acting drugs providing 24-hour efficacy on a once daily basis. The advantages of such drugs include improvement in adherence to therapy and minimization of blood pressure variability, as a consequence of smoother, more consistent blood pressure control.

*World Health Organization
International Society of Hypertension
1999*

Drug Therapy Guidelines

- i. Start treatment with a low dose thiazide diuretic, based on strong evidence for improved outcome and lower cost. **Diabetes is not a contraindication to the use of low dose thiazide.**

Remember

Thiazides are the most effective drugs in black populations and potentiate the action of most other drug classes. They are equally efficacious compared with newer, more costly drugs and therefore they are the most cost-effective.⁶

⁶Antihypertensive and Lipid –Lowering Treatment to Prevent Heart Attack Trial (ALLHAT) 2002

- ii. If control is not achieved with a thiazide alone, add an ACE inhibitor or a long acting calcium channel blocker. The calcium channel blockers are however, more costly drugs except for generic verapamil. (Amlodipine will shortly become generic).
Reserpine is an adrenergic antagonist with central action. It is inexpensive and should also be considered as a second line antihypertensive agent.
- iii. If control is not achieved, combination therapy with a thiazide diuretic, ACE inhibitor and calcium channel blocker should be initiated.
- iv. If satisfactory control is still not achieved, a low dose, long-acting beta blocker (atenolol 50 or 100 mg according to the size of the patient and severity of blood pressure) should be added. Note that beta-blockers have more absolute or relative contraindications (asthma, peripheral vascular disease), and Black patients are less responsive to them.
- v. There is justification for use of a limited range of other much more costly agents in special circumstances e.g. long acting calcium channel blockers, (angina or if patient is intolerant of most other drugs) and alpha blockers (prostatic hypertrophy). A persistent, dry cough may limit the use of ACE inhibitors and this is the only current indication for the use of an angiotensin receptor blocker (ARB) in our setting. ARB and ACE inhibitors both preserve renal function and are strongly recommended for treatment of hypertension in persons with diabetes.
- vi. Combination drugs may improve adherence and in some cases are very rational, e.g. ACE inhibitor + low-dose thiazide. However these fixed dose combinations do not allow the dose of any of the component drugs to be increased independently. Furthermore, although they may improve adherence, they may cost more than the separate ingredients.

COMPLICATED AND RESISTANT HYPERTENSION

Resistant hypertension is diagnosed if the BP is uncontrolled on 3 or more drugs; or the BP is persistently elevated $\geq 155/95$ on three or more drugs. Resistant hypertension is an indication for referral, unless it is clearly due to non-adherence or non-compliance.

In complicated hypertension there is evidence of target organ damage (Table 1).

- Ideally, refer complicated and resistant hypertensives for specialist care.
- In general, start drug treatment immediately and review frequently to guarantee an adequate response.
- **Refer patients with severe retinopathy (retinal haemorrhage or papilloedema) immediately to hospital as emergencies.**
- In patients with difficult-to-manage and resistant hypertension, determine adherence, **then refer for further assessment** (including screening for possible underlying condition e.g. renal or endocrine disorders) (See Table 1).

Causes of Resistant Hypertension

Patient related:

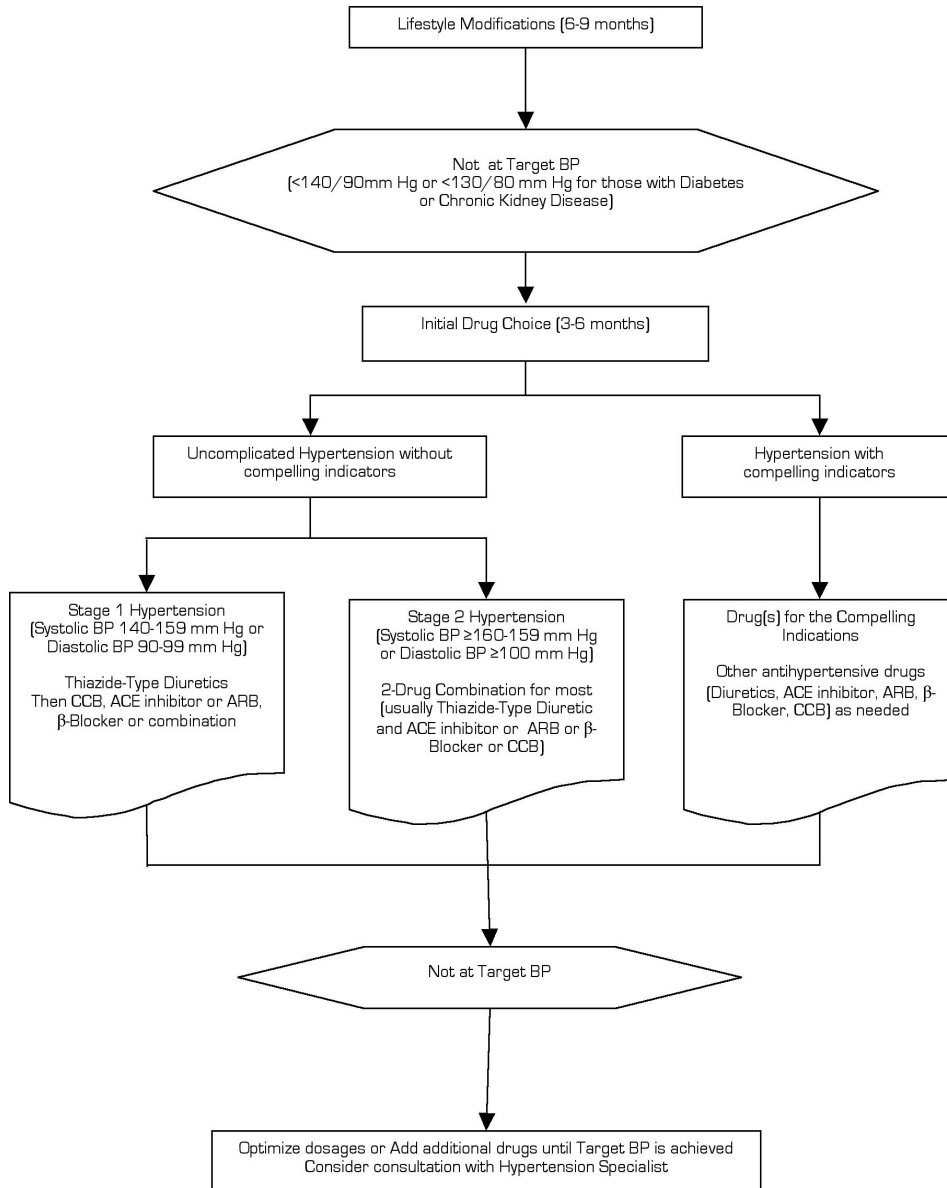
- The most common causes include poor adherence to drug therapy including:
 - o misunderstanding of dosing
 - o running out of tablets
 - o illiteracy
 - o unreported adverse effects and /or
 - o distrust of doctor or drug.
- Failure to modify lifestyle, e.g. weight gain, alcohol use or high salt intake
- White coat hypertension

- Unsuspected underlying cause, e.g. renal or endocrine
- Volume overload:
 - o High sodium intake
 - o Renal impairment
 - o No diuretic or inadequate diuretic

Doctor or prescription related:

- Spurious – due to failure to use large cuff on large arm (common!) or other errors related to how the blood pressure is taken
- Drug problems:
 - o Inadequate doses
 - o Inappropriate combinations – commonly no diuretic is prescribed
 - o An NSAID is being taken – often for osteoarthritis (substitute paracetamol)
 - o Steroids or over the counter drug or “alternative” medicines.

Figure:
Algorithm for the Treatment of Hypertension



ADHERENCE

Adherence to therapy is one of the difficulties facing persons with hypertension. The disease is life-long and the pharmacological treatment may cause more symptoms than the disease. Non-adherence may be the result of several factors such as:

- o Side effects of the drugs
- o Absence of hypertensive symptoms causing a false sense of security
- o Cost of drugs
- o The number of drugs which the person with hypertension may have to take
- o Use of alternative therapies

Adherence requires a motivated patient. Some strategies which may be applied are:

- o Reduction in the number of daily doses of the drugs by using combination drugs
- o Patient education

WITHDRAWAL

Patients who are well-controlled through drug therapy may be able to reduce or stop their antihypertensives. This should be done gradually and the patient monitored regularly and carefully. Persons who are young and who maintain a healthy lifestyle are more likely to be successful.

EDUCATION

Disease management is greatly enhanced by the patient's appreciation of the disease, implications if left untreated, benefits of treatment and need for long-term uninterrupted treatment.

Patients should know the name(s) of drug(s) being taken and should be asked to bring current tablets on visits to clinic. N.B. Names of drugs and instructions must be written legibly and the drugs checked by the prescriber. Patients should be educated on how to use the drugs.

Self monitoring, using an electronic instrument, can be helpful in some patients who are difficult to control or may have “white coat” hypertension. The results should be recorded and reviewed by the health care team.

GUIDELINES FOR REFERRAL

Indications for referral to a higher level of care include:

- Clinical suspicion of secondary hypertension
- All complicated hypertensives
- Patients with severe retinopathy (haemorrhage and papilloedema) (emergency malignant hypertension)
- Failure to respond to treatment (Resistant Hypertension) or large postural drop of BP not obviously due to a specific drug
- Raised serum creatinine or low plasma potassium (absence of a diuretic)
- Haematuria, proteinuria or cells in urine
- Suspicion of white coat hypertension

A patient’s relevant clinical and laboratory data should be included in the referral letter from the Health Centre. Interim treatment should be given. Similarly, once the consultation is completed, information on laboratory evaluation, diagnosis and current treatment regimen should be sent back to the Health Centre.

Section IV:

MANAGEMENT OF HYPERTENSION IN SPECIAL SITUATIONS

THE ELDERLY

The elderly population is widely defined as those persons who are ≥ 65 years old. The treatment of hypertension in the elderly, up to age 80 years, confers substantial health benefits (SHEP study⁷). Family members or caregivers should be involved in the management of the patient.

Special Problems of the Elderly

Some of the features which may apply to this age-group:

- Presence of other diseases (e.g. osteoarthritis, glaucoma, diabetes, heart disease)
- Patients are often on drug therapy for other disorders, leading to drug interactions and aggravation of hypertension e.g. by NSAIDs.
- Adherence with therapy may be poor if they are not properly instructed, cannot read the labels or have poor memory.
- They are more susceptible to adverse drug reactions.
- They may be prone to postural hypotension. Therefore the BP of the elderly should be taken lying, sitting and then standing to check for postural effects.

Non-drug Treatment

- This is the same as for any other patient except that the level of physical activity is dictated by the patient's condition along with the social and physical environment. In general, advise moderate aerobic exercise for at least 20 minutes per day, preferably every day to establish a routine. See also Appendix 3.
- Restrict alcohol as even small amounts may increase postural hypotension.

⁷ Systolic Hypertension in the Elderly Program

- Refer to dietitian/nutritionist and medical social worker for assessment, in-depth counselling and support if necessary, and try to see with closest relative or partner. Particular attention must be paid to decreasing dietary sodium.
- Advise use of high-potassium foods such as bananas, oranges, tomatoes, coconut water at least once daily unless renal impairment is present (creatinine should be monitored).

Drug Therapy

The choice of drug treatment should be individualized, but note:

- High incidence of arrhythmias, cardiac failure, cerebro-vascular disease
- High rates of impaired renal function (often associated with reduced clearance of drugs and potassium)
- Methyldopa is associated with increased risk of postural hypotension which may be worse in the elderly.

Recommendations for Drug Therapy

Patients without arrhythmias:

- Start drug therapy with low dose of thiazide e.g. bendrofluazide 1.25 or 2.5 mg/day. If response is poor, add:
- Methyldopa: 250-500 mg once daily, at night, in women only, as this may cause erectile dysfunction in men, OR
- ACE inhibitor

Patients with arrhythmias:

These include atrial fibrillation or other supra-ventricular arrhythmias) or ischaemic heart disease.

- Refer for expert treatment.
- Use a beta-blocker, preferably one given once daily (e.g. atenolol 25-50mg) or long acting calcium antagonist (e.g. verapamil, sustained release)

THE DIABETIC PATIENT

There is an increased prevalence of diabetes among hypertensive patients. In the Caribbean, diabetes is present in about one-third of hypertensives.

This frequent co-existence is related to:

- The high prevalence of both in the community.
- Relation between insulin resistance and hypertension.
- The high rates of chronic renal disease among diabetic patients.

Management

The target blood pressure should be lower than in the non-diabetic i.e. less than 130/80.

Non-drug treatment

Lifestyle modification is of paramount importance in the management of the hypertensive patient with diabetes. Efforts should be targeted at proper nutrition, **regular exercise and increased routine physical activity**, the avoidance of tobacco and moderate use of alcohol.

Please refer to “Managing Diabetes in Primary Care in the Caribbean.”

Drug treatment

- Most hypertensive diabetics will need 2 or more drugs for control, in addition to lifestyle change.
- Thiazide therapy rarely affects glycaemic control **at low doses** and can be used without concern in the majority of diabetics.
- Beta-blockers may mask symptoms of hypoglycaemia and may also compromise peripheral circulation.
- Postural hypotension may be very troublesome in diabetics with autonomic neuropathy.

Recommendations

- Use thiazide **at low dose**, e.g. bendrofluazide 1.25 or 2.5 mg/day plus adequate dietary intake of potassium. Potassium supplements or potassium sparing/thiazide combinations are rarely needed.
- If control is inadequate add:
 - ACE inhibitor, especially if proteinurea present, OR
 - Methyldopa **in women only** as it may compound impotence in men
 - Atenolol, OR
 - A generic ACE inhibitor (see below).
- If control is **still** unsatisfactory on two drugs, use triple therapy such as thiazide plus beta blocker, plus ACE inhibitor, if proteinuria is present.
- Beta-blockers are somewhat contraindicated but water-soluble forms (e.g. atenolol, 50 mg once daily) may be used if there is no peripheral vascular disease.
- Long acting calcium channel blockers (CCB) e.g. verapamil are useful especially if ischaemic heart disease is present. Avoid short acting nifedipine.
- ACE inhibitors are rarely effective on their own in black subjects, are ineffective in older black subjects and should always be added to thiazide. They may delay proteinuria, and with thiazide help control potassium balance, and should be used in patients with insulin dependent diabetes or diabetic nephropathy, or co-existent heart failure. Avoid if creatinine is 260 mmol/l or greater. ACE inhibitors (usually with a diuretic) are more effective and may be less expensive than most CCBs. In Type 2 diabetes, ARBs can replace ACE inhibitors, if not effective or if the ACE inhibitor causes cough.

THE PATIENT WITH CARDIAC FAILURE

- Start with a diuretic and low dose ACE inhibitor e.g. generic captopril 12.5 -50 mg twice daily or enalapril 20 mg once or twice daily.
- Review drug therapy being taken for other diseases
- Furosemide may be needed as a diuretic. This drug is NOT a more potent antihypertensive but will be needed if there is fluid overload.
- Low dose cardio-selective beta blockers may be useful, e.g. metoprolol 25 – 50 mg or carvedilol. But use with caution.

THE PATIENT WITH RENAL FAILURE

- Substitute furosemide for thiazide and refer.
- Use potassium and ACE inhibitors with caution.

THE PATIENT WITH MYOCARDIAL INFARCTION

- Both beta blockers and ACE inhibitors improve outcome and are the drugs of choice.
- A diuretic may be added if needed.

THE PATIENT WITH ANGINA

Beta blockers and long acting, generic calcium antagonists are the drugs of choice

THE PREGNANT PATIENT

The treatment of the pregnant woman who has been under treatment for hypertension must be modified.

- Use methyldopa as the first choice and if necessary, hydralazine (with beta blocker, or tachycardia results and blood pressure goes back up!)

- Beta blockers including metoprolol are safe in late pregnancy.
- Diuretics, ACE inhibitors and ARBs are contraindicated.

THE PATIENT WITH OSTEOARTHRITIS

- Avoid NSAIDs.
Use paracetamol as the first line drug – always to be taken BETWEEN meals to achieve effective blood levels.

HYPERTENSIVE EMERGENCIES

- Patients with BP >240 / 140 (repeated more than once, with correct size cuff) or with BP >210 / 120 and complications e.g. hypertensive encephalopathy, Grade 3 or 4 retinopathy (accelerated or malignant hypertension) or severe hypertensive complications should be referred for emergency care.

REFERENCES & ABBREVIATIONS

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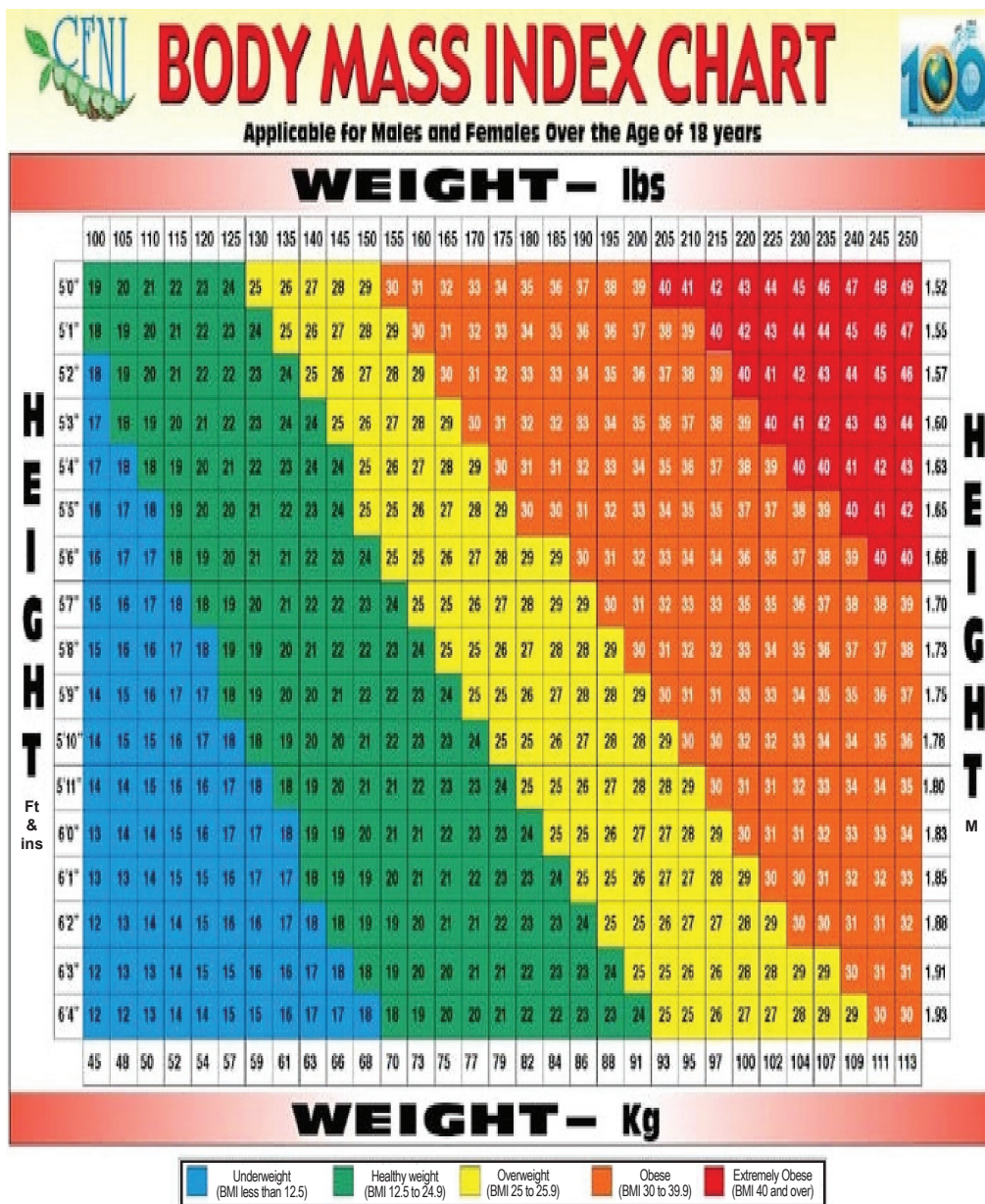
ABBREVIATIONS

ACE	Angiotensin-converting Enzyme
ALLHAT	Antihypertensive and Lipid Lowering Treatment to Prevent Heart Attack Trial
ARB	Angiotensin Receptor Blocker
BMI	Body Mass Index
CCB	Calcium Channel Blockers
CHRC	Caribbean Health Research Council
CVA	Cerebrovascular Accident
JNC	Joint National Committee on Prevention, Detection, Evaluation and Treatment of High Blood Pressure
NSAIDs	Non-Steroidal Anti-Inflammatory Drugs
PAHO	Pan American Health Organization
SHEP	Systolic Hypertension in the Elderly Program
WHO	World Health Organisation



APPENDICES

Appendix I: Body Mass Index (BMI) Chart for Identifying Target Weight



Produced by the Caribbean Food & Nutrition Institute - A Specialized Centre of the Pan American Health Organization/World Health Organization - 2002

Body Mass Index classification

BMI	Weight/height ² (kg/m ²)
Normal	20 - 24.9
Overweight	25 - 29.9
Obese	30 - 39.9
Morbidly obese	40+

How to use the BMI Charts

1. Take the weight of the client (ensure that this is accurately taken) and record it.
2. Take the height of the client (ensure that this is accurately taken) and record it.
3. On the BMI chart use the top or bottom column headings (top heading shows weight in pounds and bottom shows weight in kilos) to find the weight measured.
4. On the BMI chart use the left or right row headings (left margin shows height in feet and inches and right shows height in meters) to find the height measured.
5. Using the weight and the height identified, see where the weight column and height row meet. This will give you the Body Mass Index (BMI) of the person measured.
6. Using the guide at the bottom of the BMI Chart, check the colour of the square to identify the classification of the client.

Example 1:

1. Person's weight is 190 lbs (86 kg)
2. Person's height is 5ft 9 inches (1.75 m)
3. The number in the box where the weight column and height row intersect is 28.
4. BMI is 28 and colour of box is yellow, which is classified as Overweight.

Feet & Inches	lbs				
	180	185	190	195	200
5'7"					
5'8"					
5'9"			28		
5'10"					
5'11"					

Appendix II: The DASH (Dietary Approaches to Stop Hypertension) Plan
(Adapted)

The DASH Plan			
Food Group	Servings	Examples	Significance
Whole Grain products	7-8 per day	Whole wheat bread, Cereals, Oatmeal	Major source of fibre
Vegetables	4-5 per day	Tomatoes, carrots, beans, spinach, cabbage, broccoli	Rich in potassium, magnesium & fibre
Fruits	4-5 per day	Bananas, oranges, melons, apples	Rich in potassium, magnesium & fibre
Low fat/non-fat dairy food	2-3 per day	Skimmed milk, low-fat yogurt, non-fat cheese	Major sources of calcium & protein
Meats, poultry & fish	≤2 per day	Eat chicken and/or fish instead of red meat. If not, select lean cuts of red meat. Avoid frying.	Major sources of protein & magnesium
Nuts, seeds & legumes	4-5 per week	Almonds, peanuts, sunflower seeds, kidney beans, lentils	Major sources of protein, magnesium, potassium & fibre

Appendix III: Guide to Physical Activity Levels

Level of Activity	Examples
Light	Office work, cleaning house, walking
Moderate	Walking briskly, gardening, cycling,, tennis, dancing, swimming, light weight training, climbing stairs
Strenous	Jogging, competitive swimming and tennis, aerobic workout, vigorous dancing
Very Strenous	Running, intense aerobic workout, intense weight training, football

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