GUIDELINES FOR THE

MANAGEMENT

OF

HYPERTENSION

Ministry of Health
Jamaica

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Dr. Camille Christian Shelton
Consultant Cardiologist
Expert Panel on Hypertension

Dr. Sonia Copeland
Director
Health Promotion and Protection Branch

Dr. Kevin Harvey
Chief Medical Officer

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Authors: Dr Hazel Laws[2], Dr Tamu Davidson –Sadler[1], Dr Trevor Ferguson[2], Dr Camille Christian[5], Dr Marilyn Lawrence – Wright[17], Dr Keith Campbell[18], Dr Jacqueline Duncan[3], Dr Richard Wilson[3], Dr Kaushal Singh[3], Professor Rainford Wilks[2], Professor Marvin Reid[12], Dr Knox Hagley[7], Dr Carron Gordon[2], Professor Errol Morrison[2], Professor Rosemarie Wright-Pascoe[2], Dr. Michael Boyne[2], Professor Marshall Tulloch – Reid[2], Ms. Andrea Hunt[2], Mr. Godfrey Xuereb[6], Mr. Owen Bernard[8], Dr. Jacqueline Gernay[9], Dr. Gerardo DeCosio[9], Dr. Curtis Yeates[4], Dr. Robert Parkes[5], Mrs Marva Lawson- Byfield[1], Dr Denise Duncan – Goffe[1], Mrs Michelle Douglas Shaw[1], Mrs Princess Thomas Osbourne[1], Dr. Eva Lewis-Fuller[1], Mrs. Leila McWinney-Dehaney[1], Dr. Yvette Williams[1], Ms. Andriene Grant[1], Ms. Natricha Levy[1], Dr. Elizabeth Ward[1], Dr. Deanna Ashley[1], Ms. Karen Prendergast[1], Dr Judith Kirlew[1], Mrs Sharmaine Edwards[1], Ms Takese Foga[1], Dr Myo Lwin[11], Sherril Josephs Williams[13], Zeen Lalor[14], Dr Sonia Davidson[15], Mrs Rose Robinson Hall[2], Mrs. Violet Griffith[1], & Dr Peter Swaby[10], Iyanna Wellington[1] , and Shirley Hibbert[1].

[1]*Ministry of Health*
[2]*The University of the West Indies*
[3]*The Regional Health Authorities*
[4]*Cornwall Regional Hospital*
[5]*Kingston Public Hospital*
[6]*Caribbean Food and Nutrition Institute*
[7]*The Heart Foundation of Jamaica*
[8]*The Diabetes Association of Jamaica*
[9]*Pan American Health Organization/World Health Organization*
[10]*HOPE Worldwide, Jamaica*
[11]*National Public Health Laboratory*
[12]*Caribbean College of Family Physicians*
[13]*Jamaica Association of Nurse Practitioners*
[14]*Jamaica Community Health Aide association*
[15]*Complementary Medicine Specialist*
[16] *Jamaica Association of Social Workers*
[17] *The University Hospital of the West Indies*
[18] *May Pen Hospital*

Abbreviations

ABPM	:	Ambulatory Blood Pressure Monitoring
ACEI	:	Angiotensin Converting Enzyme Inhibitor
ARB	:	Angiotensin Receptor Blocker
BB	:	Beta Blockers
BMI	:	Body Mass Index
BP	:	Blood Pressure
CAM	:	Complementary and Alternative Medicine
CCB	:	Calcium Channel Blocker
CCF	:	Congestive Cardiac Failure
CKD	:	Chronic Kidney Disease
CNS	:	Central Nervous System
CVD	:	Cardiovascular Disease
CVS	:	Cardiovascular System
EGFR	:	Estimated Glomerular Filtration Rate
HBAIC	:	Hemoglobin A 1 C (glycated hemoglobin)
HBPM	:	Home Blood Pressure Monitoring
HDL-C	:	High Density Lipoprotein Cholesterol
JADEP	:	Jamaica Drug for the Elderly Programme
K	:	Potassium
LDL-C	:	Low Density Lipoprotein Cholesterol
LVH	:	Left Ventricular Hypertrophy
MI	:	Myocardial Infarction
Na	:	Sodium
NCDS	:	Non- communicable Diseases
NHF	:	National Health Fund
NSAIDS	:	Non-steroidal Anti-inflammatory Drugs
NYHA	:	New York Heart Association
OCP	:	Oral Contraceptive Pill
OH	:	Orthostatic hypotension

TC : Total Cholesterol

TG : Triglyceride

TOD : Target Organ Damage

WC : Waist Circumference

WHO : World Health Organization

BACKGROUND

Hypertension is among the leading risk factors for mortality in the world (1). It was responsible for 7.5 million deaths (12.8% of global deaths) in 2004 (1, 2). In 2008, the estimated prevalence of hypertension globally in adults 25 years and over was 40% (2). In the Caribbean region, in particular the Caribbean Epidemiology Center (CAREC) member countries, hypertension has been stated as one of the five causes of death since 1985 (3). This epidemic spurred a landmark summit on non-communicable diseases held in Port - of Spain, Trinidad in 2007, where Heads of government of the Caribbean Community (CARICOM) issued a declaration, "Uniting to stop the epidemic of chronic NCDs." The CARICOM leaders declared that they are committed to provide quality care to persons with NCDs (4-6).

In 2008, the landmark Jamaica Health Lifestyle Survey (JHLS - II), revealed the estimated prevalence of hypertension in Jamaica is 25 % among persons 15-74 years old. Of those with hypertension, 50% are aware of their condition and 40% are on medication (7). Of those hypertensive patients on medication only 41% are controlled (7). Therefore the burden of hypertension remains high in Jamaica.

Based on the foregoing, The Chronic Disease & Injuries Prevention Unit, of the Health Promotion and Prevention Division of the Ministry of Health is seeking to improve the quality of care provided to persons affected by this prevalent chronic illness. This is one strategy to reduce premature mortality due to NCDs by 25% by 2025. The Core Technical Advisory Committee on hypertension was created in September 2013. The panel members were selected from all stakeholder groups involved in the management of hypertension and based on expertise in internal medicine / hypertension (n=4), geriatrics (n=1), cardiology (n=2), nursing (n=2), physiotherapy

(n=1), epidemiology (n= 2), nutrition (n=1), primary care (n=5), pharmaceutical (n=1), complementary and alternative medicine (n=1), social work (n=1), health promotion (n=1) and laboratory specialist (n=1). The panelists guided the revision and update process. The guidelines (2007 version) were appraised using the Appraisal of Guidelines Research & Evaluation (AGREE II) Online tool and the gaps were identified (8). The gaps and consequent scoping questions were further discussed by the panelists. The gaps and questions directed the literature search for the latest evidence on which to base the up-dated recommendations. The expert panel aimed to use the WHO guideline development methodology as a framework in the development of appropriate recommendations (9). The panelists discussed the quality of the evidence and arrived at consensus on the up-dated recommendations.

The broad health question covered by these guidelines is: "what are the standards of care in the management of hypertension in Jamaica?" The scope of these guidelines include screening, diagnosis and management of persons with hypertension, and some recommendations regarding the management of hypertension in special situations like the elderly, in the diabetic patient and in patients with renal and cardiac failure. The overall aim of these guidelines is to provide screening, diagnostic and therapeutic recommendations that are shown to improve the health outcomes of persons affected with hypertension. They are intended for adult patients affected by hypertension, their clinicians and other health professionals involved in their care in the ambulatory care setting. **Clinical judgment always precludes these recommendations in the management of patients.** These recommendations must always be applied to the clinical context of each patient with adjustments made for patient factors like co-morbidities and individual preferences.

I. INTRODUCTION

INTRODUCTION

Blood pressure (BP), the haemodynamic process dependent on cardiac output and total peripheral resistance, is the pressure within the systemic arterial circulation. The systolic blood pressure is the maximum pressure during ventricular contraction / systole and the diastolic pressure is that which obtains during ventricular relaxation / diastole. Normal blood pressure (BP) fluctuates throughout the day; it lowers as you sleep and rises in acute stressful situations and tends to rise with age (10). Blood pressure measurement is indicated when screening patients for hypertension, in monitoring the effectiveness of management of hypertension and when an assessment of cardiovascular function is required (11).

Normal adult (age 18 and over) blood pressure is defined as systolic pressure less than 120 mmHg and diastolic pressure less than 80 mmHg (11). Higher pressure readings are indicative of pre-hypertension and hypertension (Table 1). Pre-hypertension is not a disease entity, but a designation/label that identifies persons at high risk of developing hypertension. Such persons require lifestyle modification to reduce their risk. Systolic hypertension is the most common form of hypertension seen in persons 60 years and over, and this is characterized by isolated elevated systolic blood pressure (10- 13). The systolic blood pressure goal for this age group is < 150 mmHg and the diastolic is <90 mmHg (13).

Approximately 95% of adults with high blood pressure have primary/ essential hypertension, where-by the cause is unknown but the interplay of a number of genetic and environmental risk factors seemed to be implicated (14). Secondary hypertension, accounts for 5% of the hypertensive population, it occurs as a result of an underlying disease or even secondary to the use of drugs (14). Hypertension is a major modifiable risk factor for other cardiovascular diseases, stroke and kidney disease (10, 15).

Hypertension is often asymptomatic and may result in significant target organ damage without the patient being aware of this and thus stresses the importance of screening. Atherosclerosis, that is, atherosclerotic changes in arteries and arterioles is the main pathological process leading to arterial disease in the heart, brain and periphery. The rate of progression of atherosclerosis is influenced by hypertension and the other cardiovascular risk factors (abnormal lipids, elevated blood sugar, physical inactivity, unhealthy diet and tobacco use) (16). Uncontrolled hypertension can lead to rapid progression of atherosclerosis and target organ damage including angina, myocardial infarction, stroke and eye and kidney disease (16). Hypertensive disease can result in an accelerated phase (BP ≥ 180/110 mmHg) in which severe arteriolar changes result in extensive tissue damage over a period of days. This is called malignant hypertension

which is a medical emergency which requires immediate reduction of BP to limit target organ damage.

Hypertension is the most common chronic condition that is managed by primary care physicians and other health practitioners (14). In Jamaica about one quarter of adults 15 – 74 years are affected and half of these persons are un-diagnosed (7). Of those diagnosed only 40% are on medication and of those on medication only 41% are controlled (7). Success in treating hypertension has been limited. Therefore, there is an urgent need to improve and achieve optimal control of hypertension at the individual - level and also at the population- level. The management of hypertension is one of the most common interventions in primary care in Jamaica. It is critical to identify and employ more effective evidence -based approaches to achieve optimal control of this condition. The aim is to effectively screen those at risk, diagnose early and manage aggressively.

II.DEFINITION AND CLASSIFICATION OF HYPERTENSION

The definition and classification of hypertension was posited in the "Seventh Report of the Joint National Committee (JNC - 7) on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure" in 2003, and is still currently used (12). **Table 1** shows the cut-off blood pressure values that label patients as having normal blood pressure, "pre-hypertension", stage 1 and stage 2 hypertension. Persons with pre-hypertension are at twice the risk for developing hypertension as those with lower BP values and should be advised to practice lifestyle modification.

These blood pressure values are based on office blood pressure measurement levels. Evidence now show the importance of ambulatory blood pressure monitoring (ABPM) and home blood pressure monitoring (HBPM) and that both are useful adjuncts to office blood pressure monitoring (17 -19). The cut-off blood pressure values are not the only variables determining the need for and type of treatment. The literature has confirmed the critical importance of quantifying the total cardiovascular risk of patients. The estimation of total cardiovascular risk ultimately determines the management plan for each patient (WHO 2007) (16).

TABLE 1: CLASSIFICATION OF BLOOD PRESSURE (ADULTS AGES 18 YEARS AND OLDER†)

Blood Pressure Classification	*Systolic Blood Pressure (mm Hg)	*Diastolic Blood Pressure (mm Hg)
Normal	<120	<80
Pre-Hypertension	120–139	80–89
Stage 1 Hypertension	140–159	90–99
Stage 2 Hypertension	≥160	≥ 100

*Individual is classified according to the higher blood pressure (diastolic or systolic) category

Source: Chobanian AV, Bakris GL, Black HR, Cushman WC, Green LA, Izzo JL et al. Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure. Hypertension. 2003; 42:1206-1252. Available from: http://www.hypertensionaha.org. Doi:10.1161/01.HYP.0000107251.49515.c2

This definition of high blood pressure remains reasonable and unchanged (JNC 8)[13].

III. EVALUATING THE PATIENT

1. **Identifying the at risk patient**
2. **History**
3. **Clinical Examination**
4. **Initial Laboratory Investigation**
5. **Measurement of Blood Pressure**
6. **Establishing the Diagnosis**
7. **Assessment of Total Cardiovascular Risk**
8. **Recommendations for Follow-up and Treatment**

III. 1 IDENTIFYING THE AT RISK PATIENT

Hypertension is a prevalent condition in Jamaica and physicians should always have a high level of suspicion for high BP when attending to patients. The major risk factors for hypertension include:

1. Pre-hypertension: systolic BP 120- 139 mmHg and diastolic blood pressure 80 - 89 mmHg
2. Older age: the risk of hypertension increases with age
3. Being overweight (BMI 25.0 - 29.9 kg/m^2) or Obese (BMI ≥ 30 kg/m^2) and Waist Circumference higher than the threshold for abdominal obesity: Men : ≥ 94 cm (≥ 37 inches); Women: ≥ 80 cm (≥ 32 inches)
4. Race/ ethnicity: hypertension is particularly common in blacks
5. Unhealthy lifestyle habits:
    - Physical inactivity
    - Smoking tobacco
    - Drinking too much alcohol
    - High salt intake
    - Inadequate potassium intake
6. Family history of hypertension (genetic predisposition)
7. Personal medical history of certain chronic conditions:
    - Diabetes mellitus
    - High cholesterol
    - Sleep apnea

- Kidney Disease
- Gestational hypertension

III. 2 HISTORY

MEDICAL HISTORY

The medical history should reveal previous/first diagnosis of hypertension, current blood pressure values along with present medication. Ascertain comprehensive information regarding present medication including: efficacy, side effects, adverse effects and adherence. Enquire about symptoms of target organ damage including heart disease, peripheral vascular disease, kidney disease, and brain and eye disease. Enquire about other cardiovascular (CVD) risk factors including: family history of CVD, kidney disease, thyroid disease, and use of drugs like oral contraceptive pills (OCP), non -steroidal anti-inflammatory drugs (NSAIDS) and anti-depressants.

Personal medical history

- Time of first diagnosis of hypertension, current & past BP values

Review of systems to check for symptoms of target organ damage & sleep apnea

- CVS: chest pain, shortness of breath, pedal edema, syncope, palpitations
- Renal: thirst, polyuria, nocturia, hematuria,
- Peripheral arteries: cold extremities, pain in legs on walking,
- Brain & mental health: headaches, vertigo, syncope, motor or sensory deficits, memory loss, cognitive dysfunction, symptoms of anxiety
- Eye: impaired vision
- sleep apnea (from patient and partner): snoring day time

Past medical history to rule out causes of secondary hypertension & organ damage

- Hematuria, chronic kidney disease, muscle weakness, tetany, thyroid disease, dyslipidemia, left ventricular hypertrophy, ischemic heart disease, arrhythmias, transient ischemic attacks, stroke and cognitive dysfunction.

Obstetric History

- Hypertension in pregnancy

Drug History

- Current antihypertensive medication - efficacy, side effects, adverse effects and adherence
- Use of drugs that can cause secondary hypertension - Oral contraceptive medication, non- steroidal anti-inflammatory drugs, anti psychotics, anti-depressants, flu medication, energy drinks,

Family History

- Chronic kidney disease - polycystic kidneys

- Premature cardiovascular disease, dyslipidemia, hypertension

Social History; Nutrition & Exercise History

- Smoking; Alcohol & Substance use- Cocaine, amphetamines
- Dietary habits and physical activity levels

Table 2. Main data from the personal and family medical history

III. 3 CLINICAL EXAMINATION

Physical examination findings should establish the diagnosis of hypertension, provide evidence of obesity and other risk factors, confirm signs of target organ damage and signs of secondary hypertension. Physical examination includes:

1. BP measurement (see pages 27 - 29) in both arms (initially) supported at heart level and if there is consistent inter-arm difference, the arm with the higher pressure should be used subsequently (patient should be in sitting position)(22). BP taken in the standing position is sometimes necessary to detect significant postural variation (elderly and diabetic patients; some medications).

   BP measurements must always be interpreted with the heart/ pulse rate because resting heart rate is an independent predictor cardiovascular morbidity (19).

2. Weight

   - Weight and height should be measured to calculate Body Mass Index (BMI)

   $$BMI = Wt\ (kg) \div Ht^2\ (m)\ [\ kg/m^2]$$

   Normal weight : BMI < 25.0 kg/m^2; Overweight: BMI 25.0 - 29.9 kg/m^2;

   Obese: BMI ≥ 30 kg/m^2

3. Measure waist circumference (WC) which is a component of metabolic

syndrome[20-21]:

The recommended WC threshold for abdominal obesity[20-21]: Men : ≥ 94 cm (≥ 37 inches); Women: ≥ 80 cm (≥ 32 inches)

4. Mucous Membranes: (anaemia may be due to chronic renal disease).
5. Eye examination (xanthomas) and fundoscopy-examination of the optic fundi (papilloedema)
6. Heart − Location and character of apical impulse (LVH) and assessment of cardiac sounds.
7. Auscultation for carotid, femoral, abdominal aortic bruits and palpation of peripheral pulses
8. Respiratory System -rales /crepitations (congestive cardiac failure [CCF])
9. Abdominal examination - renal masses and/or bruit and enlarged liver(CCF) .
10. Neck examination – palpation of the thyroid gland
11. CNS – higher mental function; motor function and sensory function; cranial nerves (signs of stroke)

III . 4 INITIAL LABORATORY INVESTIGATION

Routine laboratory tests that are recommended prior to initiation of therapy:

1. Urine- analysis & microscopy: urinary protein, blood, abnormal urinary sediments
2. Test for micro-albuminuria particularly if patient has diabetes & CKD (micro-albumin dipstick (specimens should be first morning void).
3. Complete blood count.
4. Blood chemistry: serum creatinine, blood urea nitrogen, K, Na, lipid profile (TC, HDL- C, LDL-C & TGs); Ca & eGFR
5. Blood sugar − fasting and 2-hr post-prandial for all patients initially and annually (for screening for Diabetes Mellitus). At present we do not recommend the use of HbA1c for screening and diagnosis of Diabetes Mellitus because our local laboratories are not using the standardized methods for measuring this parameter.
6. Chest x-ray as indicated – heart failure, cardiac abnormality
7. Electrocardiography: 12-lead Electrocardiogram can identify old MI, LVH which are indicative of target organ damage.

8. Abdominal ultra-sonography as indicated to identify renal disease or other primary cause of hypertension.

III . 5 MEASUREMENT OF BLOOD PRESSURE

Accurate measurement of blood pressure is essential for proper diagnosis and management of hypertension. Review articles and guidelines for blood pressure measurement have been published and should be consulted for details (Pikering TG. et al Hypertension 2005[22]; Williams JS et al NEJM 2009[11]). Key points in blood pressure measurement are given below. A useful video demonstration is available at the following URL: http://www.nejm.org/doi/full/10.1056/NEJMvcm0800157.

1. **Instrument**

- Blood pressure measurement involves the use of a stethoscope and one of three types of sphygmomanometers:1) an aneroid manometer, 2) an automated electronic device (hybrid) and 3) mercury which is no longer preferred because of the potential for environmental contamination. Blood pressure instrument should be appropriately validated and calibrated at six month intervals (11).

- The ideal "cuff-bladder" length should be least 80% and the width should be at least 40% of the arm circumference to ensure accurate readings (22). Markings on the cuff should indicate the appropriate range or arm circumferences for which the cuff is appropriate. Paediatric measurements are more accurately recorded with a paediatric -sized cuff.

Table 3: Ideal Blood Pressure Cuff dimensions[11,22]

Arm Circumference of Patient (cm)	Cuff Bladder Dimensions (cm)
22- 26	12 x 22 (Small adult arm)
27 -34	16 x30 (Adult arm)
35 -44	16 x 36 (Large arm)
45 -52	16 x 42 (Adult thigh)(for the very obese)

2. **Position of patient**

- The patient should be seated quietly with back supported and feet on the floor for at least five minutes prior to measurement with the upper arm resting comfortably at heart level. BP should be checked in both arms initially. If right & left arm values are consistently different, the arm with the higher pressure should be used subsequently (22). Measurement of BP in the standing position is sometimes indicated, especially in persons at risk for postural hypertension (OH) (elderly patients and patients with diabetes mellitus).

3. P**atient preparation**[11, 22]

- Care should be taken to make the patient as comfortable as possible, alleviating any factors that could raise the blood pressure, e.g. extremes in room temperature, patient anxiety, and/or bladder distension. Ideally, patients should not have eaten, engaged in exercise, smoked or ingested alcohol or caffeine (caffeine containing beverages) within 30 minutes of the measurements. Patient should be instructed to be quiet during the process and 5 minutes should elapse before the first reading is taken (22).

4. **Procedure**

- The cuff should be wrapped smoothly, snugly and evenly around the arm with the middle of the balloon over the brachial artery and the cuff inflated. The lower end of the cuff should be 2 to 3 cm above the ante-cubital fossa. The approximate systolic pressure should then be estimated as BP at which the radial pulse is obliterated (pulse -obliteration pressure) (11).
- Place the bell of the stethoscope over the brachial artery. Initiate the auscultatory blood pressure measurement by inflating the cuff to a level of 20 to 30 mm Hg above the pulse- obliteration pressure (11). (This overcomes the problem of the "silent gap"/"auscultatory gap" where sounds may disappear for a while and the true systolic value may be missed).
- The cuff is then deflated slowly, at approximately 2 mm per second, until the first appearance of clear, repetitive tapping sounds that gradually increase in intensity − this signifies phase 1 of Korotkoff sounds. **This is the systolic blood pressure (11, 22).**
- During phase 2 -there are audible murmurs in the tapping sounds. Muffled changes in the tapping sounds occur in phases 3 & 4. Phase 5 is the level at which the sound disappears is recorded as the **diastolic pressure**. ***In the event that the sound does not disappear the level at which it becomes muffled should be recorded as the diastolic pressure (11, 22).***

  Obtain at least two blood pressure measurements at intervals of one minute in order to decrease measurement error, use the average of the readings.
- Measurements should be made in both arms at initial assessment. When there is a significant difference between arms (>10 mmHg) the arm with the higher pressure should subsequently be used for assessment (19, 22).

II . 6 ESTABLISHING THE DIAGNOSIS

1. **A diagnosis of hypertension is made if BP is consistently ≥140/90 mm/Hg, that is,** a persistent systolic value equal to or greater than 140 mm Hg and/or diastolic value equal to or greater than 90 mm Hg with at least four (4) BP readings being taken on two occasions.
2. If initial BP readings are between 140/90 mm Hg and less than 160/100 mmHg and there is no evidence of target organ damage, BP measurements should be repeated on two other occasions within one month, HBPM & ABPM can help in making diagnosis (see pages 33 & 34).
3. If initial reading is greater than or equal to 160/ 100 mmHg, this patient is likely to have hypertension, if no TOD; review patient within two weeks
4. Diagnosis can be established on basis of a **single BP pressure ≥ 160/ 100 mm Hg, if there is evidence of target organ damage,** the patient should be classified as hypertensive with specific target organ disease (**See table 4).**

Table 4: Target Organ Disease Secondary to Hypertension

Vascular Disease	Cerebro-vascular Disease
Endothelial dysfunction Atherosclerosis Arterial stenosis & aneurysms	Hypertensive encephalopathy Intra-cerebral haemorrhage Cerebro-vascular accident Vascular dementia Retinopathy
Renal Disease	**Heart Disease**
Albuminuria Proteinuria Chronic Renal Impairment Renal Failure	Left Ventricular Hypertrophy Coronary micro-angiopathy Coronary Artery Disease Myocardial Infarction Arrhythmias (AF) Heart Failure

5. If initial readings are >180/110 mm Hg and / or if there is evidence of acute target organ, manage as hypertensive urgency/ emergency

(see section IV . 7 on page 59).

6. 'Labile hypertension' is a clinical impression characterized by transient but substantial increases in BP (23).

It can be asymptomatic or associated with headache, palpitations or flushing and is sometimes attributed to emotional stress. There are no specific guidelines for its diagnosis and management (23). Affected patients should be monitored regularly and specific management is based on clinical decision making(23).

AMBULATORY AND HOME BLOOD PRESSURE MONITORING

AMBUATORY BLOOD PRESSURE MONITORING (ABPM)

Ambulatory blood pressure monitoring is useful in the clinical evaluation of patients with hypertension because it is shown to predict long term end organ damage like LVH (18). Ambulatory blood pressures are usually measured by the patient wearing a portable BP device that measures blood pressure every 15-20 minutes during daytime and every 30-60 minutes during sleep over a 24 hour period (14, 18). The device should be appropriately validated and calibrated regularly. ABPM provides unique data: 1) 24 hour average BP, 2) Daytime BP, 3) Night time BP, 4) nocturnal dipping of BP and 5) BP load which is the percentage of time that BP readings exceed the hypertension threshold during 24 hours (should be < 20%)(14,18).

Ambulatory blood pressure monitoring (ABPM) is particularly useful in the following clinical situations :

- Suspected white coat hypertension
- Suspected episodic hypertension
- Hypertension resistant to increasing medications
- Autonomic dysfunction
- Patients with symptoms of hypertension

Ambulatory blood pressure monitoring is not indicated for population screening for hypertension .

DEFINITION OF HYPERTENSION USING ABPM RESULTS[18]

- **24 hour average BP** – Normal BP defined as BP< 115/75 mmHg, and hypertension as BP≥ 130/80 mmHg
- **Daytime (awake) BP** – Normal BP defined as BP< 120/ 80 mmHg, and hypertension defined as BP≥ 135/ 85 mmHg
- **Night-time (asleep) BP** – Normal BP defined as BP< 105/65mmHg, and hypertension defined as BP ≥120/75

HOME BLOOD PRESSURE MONITORING (HBPM)

Cost factor as well as unavailability of ABPM monitors resulted in home blood pressure monitoring being advocated as a useful adjunct to office BP measurements (17). HBPM involves the use of more affordable HBPM devices that are validated. HBPM should be performed daily but preferably at least 3 to 7 days prior to the doctor's visit and this is repeated every 3 months. The frequency of monitoring depends on the level of BP control (17). An average BP reading ≥ 135/ 85 mmHg is indicative of hypertension (17).

HBPM is particularly important for patients[17] :

- who exhibit poor compliance with treatment because patient self monitoring of blood pressure facilitates their involvement with their management.
- in whom close BP monitoring is mandatory as in 1) pregnant females, 2) Diabetic patients with hypertension and 3) patients with Chronic Kidney Disease

III . 7 ASSESSMENT OF TOTAL CARDIOVASCULAR RISK

The initial evaluation of the patient with hypertension includes:

1) Confirmation of the diagnosis of hypertension

2) Assessment of total cardiovascular risk because hypertension is only one of the several cardiovascular risk factors that require attention.

Evaluate all patients with hypertension (without established cardiovascular disease) through: 1) History taking, 2) Physical examination, and 3) Diagnostic testing in order to identify other cardiovascular risk factors (see below).

Cardiovascular risk factors include:

Major risk factors

- Hypertension
- Age (Men older than 55, women older than 65)
- Diabetes Mellitus
- Dyslipidemia (Elevated LDL -C, TC or low HDL -C)
- Estimated GFR < 60mL/ min
- Family history of premature cardiovascular disease
- Microalbuminuria
- Obesity
- Physical inactivity
- Tobacco usage

Target Organ Damage

Heart/ Vascular system

- Left ventricular hypertrophy
- Ischemic heart disease/ previous MI
- Heart failure
- Peripheral arterial disease

Brain

Stroke/ Transient ischemic attack

Dementia

Data from the above evaluation can be applied to a published or electronic risk prediction tool that can be used to estimate the individual's ten year risk of having major cardiovascular events. The " WHO/ISH" Risk Prediction Charts - AMR-B Figure 6 and Figure 9 are appropriate prediction tools that can be utilized in the Jamaican population (See Appendix # 1). These charts can be accessed using the following URL:

http://cvdrisk.nhlbi.nih.gov/

III. 8 RECOMMENDATIONS FOR FOLLOW - UP AND TREATMENT

Follow-up and Monitoring[12]

The overall goals of treatment are to:1) manage hypertension and 2) address all the identified risk factors for cardiovascular disease. Once antihypertensive drug therapy is initiated, most patients should return for follow-up and adjustment of medications at scheduled intervals until the BP goal is reached. More frequent visits will be necessary for patients with stage 2 hypertension, with complicating co-morbid conditions and target organ disease (12). Serum potassium and creatinine should be monitored at least once per year (12).

After BP is at goal and stable, follow-up visits can usually be at 3- to 6-month intervals. The frequency of visits is dictated by the level of control of the associated conditions and the results of the laboratory tests. The other identified cardiovascular risk factors should be treated to their respective goals and appropriate lifestyle modifications should be promoted vigorously (12). Low-dose aspirin therapy should be considered only when BP is controlled, because the risk of haemorrhagic stroke is increased in patients with uncontrolled hypertension (12).

IV. TREATMENT OF HYPERTENSION

1. Overall goals of management of hypertension

2. Management according to stage

3. Non- Drug therapy (Lifestyle modification)

4. Self monitoring, self management & stress management

5. Drug therapy guidelines

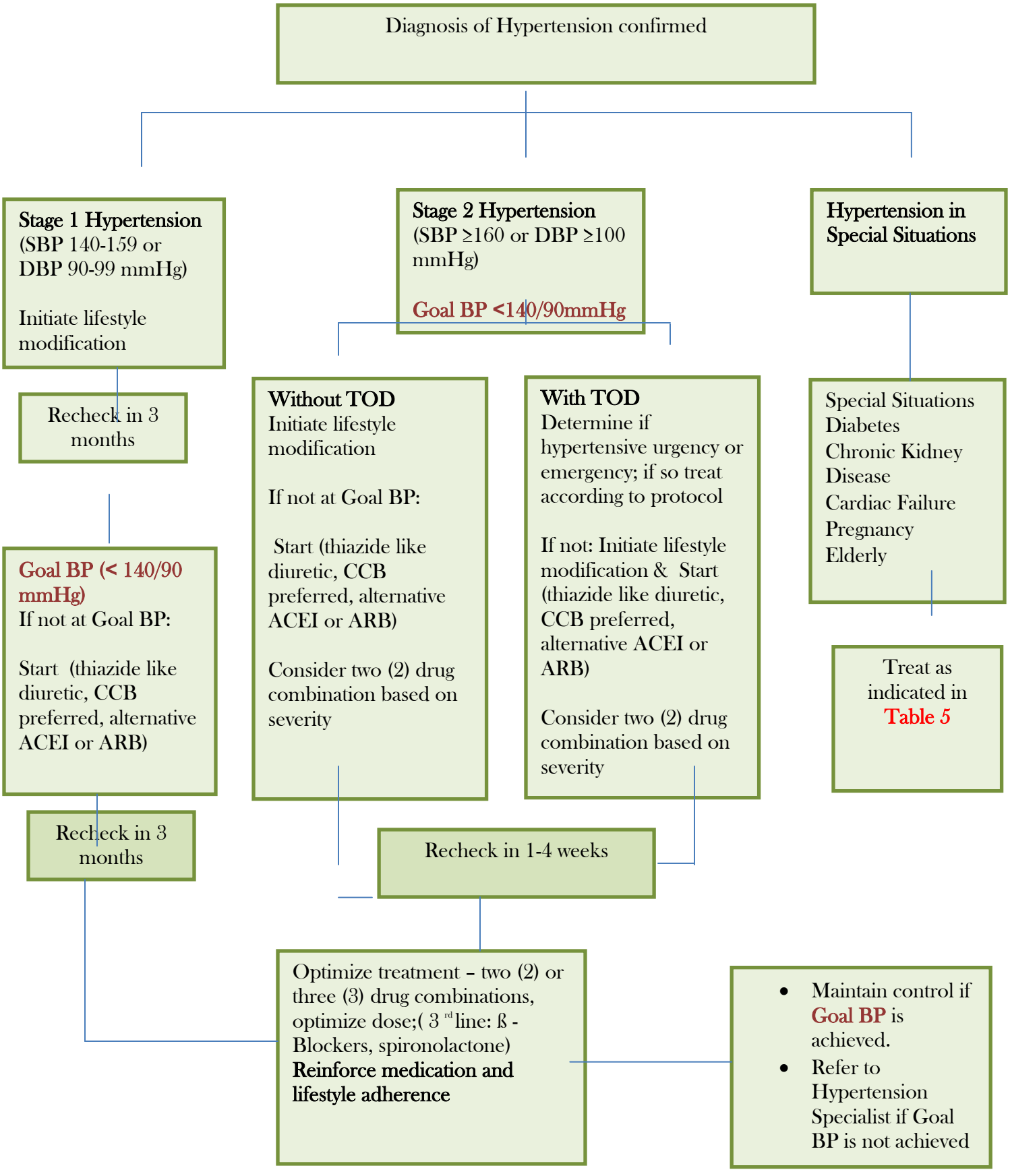
6. Identification and management of Resistant Hypertension & Secondary Hypertension

7.Treatment of Complicated Hypertension

8.Complementary & Alternative Medicine

9.Annual Review

Figure 1: Hypertension Guideline Treatment Algorithm for Adults ≥ 18 years



Key for Figure 1: SBP: systolic blood pressure; DBP: diastolic blood pressure; TOD: target organ disease; CCB: calcium channel blocker; ACEI: Angiotensin-converting enzyme inhibitor; ARB: Angiotensin receptor blocker; ß - blocker: beta Blockers

TABLE 5: MANAGEMENT OF HYPERTENSION

Without TOD BP (mm Hg)	**Management Plan**
Pre-Hypertension 120-139/80- 89 **Goal BP: <120/80**	Lifestyle Modification.
Stage 1 140–159/90-99 **Goal BP <140/90**	Lifestyle Modification. for 3 to 6 months If BP ≥140/90 mmHg initiate drug therapy with 1st line: CCB or thiazide-like diuretic; 2nd line: ACEI or ARB
Stage 2 ≥160/100 mmHg **Goal BP <140/90** Without TOD	Lifestyle Modification. 2 Drug Combinations based on severity. 1st line: CCB or Thiazide- like diuretic; 2nd line: ACEI or ARB; If third drug is needed use alternative 1st line drug (CCB or thiazide) **Select a drug treatment titration strategy** A. Maximize first medication before adding second or B. Add second medication before reaching maximum dose of first medication or C. Start with 2 medication classes concurrently. Follow-up monthly until goal BP is achieved
Special Situations BP (mm Hg)	**Management Plan**
Stage 2 + TOD ≥160/100 **Goal BP <140/90**	Lifestyle Modification & two (2) drug combinations: 1st line: thiazide- like diuretic or CCB; 2 nd line: ACEI or ARB; If a third drug is needed use the alternative 1st line drug; 3rd line: ß- Blockers, spironolactone, Follow-up weekly.
Diabetes **Goal BP <140/80**[29]	Lifestyle Modification. 1st line: ACEI or ARB; 2nd line:CCB or thiazide-like diuretic; If a 3rd drug is needed use alternative second line drug (thiazide or CCB); 3 rd line: ß -Blocker (Low dose ASA recommended in patients with diabetes + increased cardiovascular risk; 10- year risk > 10%[29])
Chronic Kidney Disease[30] **Goal BP < 140/90 or <130/80**[30]	Lifestyle Modification. 1st line:ARB or ACEI; 2nd line: diuretic - Furosemide or indapamide; 3 rd line:spironolactone (Goal BP <140/90 :if no proteinuria) (Goal BP< 130/80with proteinuria [30])
Congestive Cardiac Failure (CCF)	Lifestyle Modification. ACEI or ARB + ß-blocker (when CCF controlled)+loop diuretic+ spironolactone; consider hydralazine + isosorbide dinitrate.
Pregnancy	Lifestyle Modification; Refer to High Risk Ante Natal Clinic. Methyl Dopa, Hydralazine, ß-Blocker (in late pregnancy) NB: ACEI and ARB are contra-indicated in pregnancy
Elderly(> 60 years) **Goal BP <150/90**[13]	Lifestyle Modification; Avoid prolonged NSAID use. Decrease dosage of anti-hypertensives in renal impairment. Caution: Postural hypotension.
Chronic Pain	Lifestyle Modification. Avoid prolonged use of NSAID.

IV. 1 OVERALL GOALS OF MANAGEMENT OF HYPERTENSION

1. To emphasize lifestyle modification, which is the cornerstone of the management of hypertension [13, 14].
2. To achieve/ attain control of hypertension, which is determined by the goal BP for the specified age of the affected patient[13].
   - If goal BP is not achieved in one to three months, increase dose of initial drug or add a second -line drug
   - Monitor patient until goal BP is attained
   - If goal BP is not achieved with two drugs, add a third -line drug
   - Do not use drugs from the following two classes together in the same patient: ACEI and ARB
   - If goal BP is not achieved with above strategy, refer patient to hypertension specialist
3. If patient has hypertension and another associated disease, the aim is to achieve the specified clinical target for that co-morbid condition.
4. If patient has other identified cardiovascular risk factors, the aim is to treat to their respective goals/clinical targets and promote appropriate lifestyle modifications.
5. To help the affected patients understand that the management of hypertension requires life-long commitment and that the patient is responsible for self monitoring and self management.

IV . 2 MANAGEMENT ACCORDING TO STAGE

1. **Pre-hypertension (120-139/80-89mm Hg):** Lifestyle Modification is the mainstay of management of affected persons.

2. **Stage 1 hypertension (SBP 140–159 &/ or DBP 90–99 mm Hg):** Non-Drug Therapy / Lifestyle modification is the mainstay of management of affected persons see below section IV . 3 (page 46). Re-evaluate patient in three months and if goal BP (<140/ 90 mmHg) is not achieved, then **add drug therapy**. The preferred drugs of choice are thiazide -like diuretics and calcium channel blockers (CCB) section IV. 5.

3. **Stage 2 (without target organ disease) hypertension (SBP ≥ 160 & / or DBP ≥ 100 mmHg):** Lifestyle modification/ non-drug therapy is the mainstay of management of affected persons in conjunction with drug therapies. Patients in the lower limits of the range with multiple correctable risk factors, but without target organ damage, can be given a trial of non-drug therapy alone. Such persons can achieve significant reductions of BP on non-drug therapy alone. Follow-up patient monthly until goal BP (<140/90 mmHg) is achieved. If goal BP is not achieved, add

drug therapy which includes the following preferred drugs: 1) Thiazide -like diuretic or calcium channel blockers (CCB); or 2) Angiotensin-converting enzyme inhibitor (ACEI) or Angiotensin receptor blocker (ARB).

Stage 2 (with target organ damage) hypertension: Determine if patient has hypertensive urgency or emergency; if so treat according to protocol see section IV . 7. If hypertensive urgency or emergency is ruled out commence lifestyle modification and drug therapy simultaneously and these include: 1) Thiazide -like diuretic or calcium channel blockers (CCB); 2) Angiotensin-converting enzyme inhibitor (ACEI) or Angiotensin receptor blocker (ARB); or 3) If a third drug is needed use alternative first line drug; 4) If goal BP is still not achieved, add another drug like ß - Blocker or spironolactone .

- Undertake frequent review until satisfactory fall in BP is attained.
- The majority of patients will need two or more agents from different classes of anti-hypertensive medications to be adequately controlled. Reinforce lifestyle modification which must be maintained throughout life.
- If goal BP is not achieved after utilizing the above mentioned approach refer patient to the hypertension specialist.

IV . 3 LIFESTYLE MODIFICATIONS (NON-DRUG THERAPY)

- Life style modification is the cornerstone of the management of all stages of hypertension.
- All affected persons should adhere to the measures outlined.
- It has the potential to provide adequate control of blood pressure in persons with pre-hypertension and stage 1 hypertension.
- A prolonged period of time is required for lifestyle modifications to become fully effective.
- Persons should be repeatedly encouraged and reassured in their efforts to adhere to the recommended measures.
- Whenever possible, members of the patient's family should be encouraged to adopt the measures which constitute non-drug therapy.

Therapeutic lifestyle interventions

Nutritional Interventions

Dietary approaches that have been shown to reduce BP:

- Salt reduction: dietary sodium should be reduced to ≤ 100mmol/ 2.4g per day.
- Diet rich in potassium and calcium
- Reduction in saturated fats, margarine and hydrogenated oils

- reduction in refined carbohydrates (sugars)
- Intake of complex carbohydrates and high fibre foods
- Increase intake of fresh fruits and vegetables

For more specific nutritional interventions See *Protocol for the Nutritional Management of Obesity, Diabetes and Hypertension in the Caribbean, CFNI, PAHO/WHO Office of Caribbean Programme Co-ordination 2004 which can be accessed at URL: http://www.paho.org/cfni/index.php?option=com.*

Physical Activity Interventions

Physical activity can be incorporated into the activities of daily living or it can be a formal exercise regime as indicated below.

Benefits of Exercise

- Dynamic aerobic exercise training reduces resting blood pressure in persons who are hypertensive (5-7 mmHg) and normotensive. The reduction is more pronounced in those who are hypertensive. Training also reduces sub-maximal exercise blood pressure.

Exercise Testing

- Exercise testing may be necessary for those wishing to engage in vigorous exercise
- Exercise testing is a non-invasive procedure used to evaluate an individual's capacity for dynamic exercise involving standard test methods including BP monitoring, electrocardiography and ergometric protocols (e.g.treadmill, cycle, walk test)
- Medical clearance is given to an individual after determining if they can tolerate vigorous exercise activity.

Exercise prescription

Aerobic

- Frequency: 5 - 7 days per week
- Duration : 30- 60 minutes (May be accumulated in several 10 minute bouts per day)
- Intensity: 40-70% of heart rate reserve
- Mode: Primarily large muscle group aerobic activities e.g brisk walking, jogging, cycling, swimming

Resistance

Resistance training should be low resistance, high repetitions

Patient advice about exercising

- Warm up before and cool down after exercise
- Wear proper foot wear
- Ensure adequate intake of fluids

Contraindications to exercise

- Exercise should not be done if resting SBP is > 200mmHg and DBP > 110 mmHg
- Uncontrolled hyperglycemia
- febrile illness
- unstable angina or acute myocardial infarction
- Acute heart failure

Special considerations and precautions

- Beta blockers attenuate heart rate response and may decrease exercise capacity particularly in persons without myocardial ischaemia. Rating of perceived exertion should be used to monitor exercise intensity instead of heart rate
- Alpha 1 blockers, alpha 2 blockers , calcium channel blockers and vasodilators may cause post-exercise hypotension so gradual and extended cool-down must be emphasized following the exercise session
- Exercise should be terminated in SBP exceeds 200 and DBP exceeds 105 mmHg.
- Valsalva manoeuvres during resistance training should be avoided

REFERRALS SHOULD BE MADE TO EXERCISE SPECIALISTS SUCH AS PHYSIOTHERAPISTS/PHYSICAL THERAPISTS WHEN NECESSARY

Weight Control

- Overweight and obese patients should be encouraged to eat smaller portions, decrease calorie intake and increase physical activity. An average weight loss of 5.1kg is associated with a mean systolic BP reduction of 4.4 mmHg and a mean diastolic reduction of 3.6mmHg (24).

Others lifestyle interventions

- Avoidance of use of tobacco/ cigarette smoking.
- Limit alcohol intake - not exceeding 2 drinks (men) or 1 drink(women) daily; 1 drink= ½ oz or 30 mL of ethanol (e.g. rum or whiskey), 12 oz of beer or 5 oz of wine or 1.5oz of 80-proof liquor[12].
- Adopt measures to cope with and reduce stressful situations.

Lifestyle modification / non-drug therapy must be initiated at diagnosis and maintained throughout life.

V. 4 SELF MONITORING; SELF MANAGEMENT & STRESS MANAGEMENT

Self Monitoring

Hypertension control can only be achieved when affected patients are motivated to take their medication as directed and to establish and maintain a health promoting lifestyle. All patients with hypertension should be encouraged to acquire a preferred home blood pressure monitoring (HBPM) device which can be: (i) a semi-automated (manual cuff inflation) or (ii) automated electronic device that measures BP at the level of the upper arm (17). HBPM measurements have been confirmed as useful adjuncts to the conventional office blood pressure measurements when monitoring hypertension. Patients with hypertension and other co-morbid conditions such as diabetes mellitus should also self monitor other clinical parameters like blood glucose.

Self Management

Self management speaks to the patient's responsibilities in the management of hypertension. The patient affected by hypertension is responsible for managing this condition for the rest of his/her life. Self management involves:

1. Adherence to clinical appointments - patient is expected to keep all appointments and work with doctor and health team to achieve control of hypertension
2. Adherence to medication regimes- patient is expected to adhere to all medications prescribed. Patient is expected to discuss adherence challenges with the attending physician. Patient should declare the use of /discuss complementary and alternative products with doctor
3. Home blood pressure monitoring (HBPM) see page 36.

4. Adherence to lifestyle modification (see page 46) refers to the establishment and maintenance of healthy habits such as : (i) eating healthy foods -fruits, vegetables, whole grains, low -fat dairy foods and potassium rich foods (ii)reducing salt in diet, (iii) maintaining healthy weight - losing weight if overweight or obese, (iv) increasing physical activity- exercise for at least 30 minutes per day, (v)limit alcohol intake, (vi) no smoking of tobacco products and (vii) stress management

Stress Management

Stress is a constant, inevitable part of life. Stress impacts everyone. Stress is a biological and psychological response that occurs when a stressor/ threat is encountered(25). The stressful situations evoke the stress response which is caused by the release of stress hormones namely cortisol and adrenaline. The stress response is characterized by increase in heart rate, rapid breathing, sweating, rise in BP, decrease in digestive activity and elevation of the blood glucose levels. Stress can be transient whereby the stress response subsides quickly or it can be chronic whereby it persists for a prolonged time. Chronic stress has been shown to contribute to: hypertension, atherosclerosis, brain /psychological changes (anxiety and depression) and obesity (26). It is important that patients with hypertension manage and reduce their stress levels as much as possible .

Approaches to stress management[26]

- Body scan: pause and release muscle tension by relaxing muscles throughout the body(lower tense shoulders, relax abdominal muscles)
- Breathe deeply and rhythmically using deep abdominal muscles

- Physical activity involving rhythmic repetitive exercise such as walking running, swimming, bicycling and rowing . Exercise burns off the stress hormones and helps to achieve the relaxation response
- Seek social support: confidants, friends, acquaintances, co- workers, relatives and spouses can provide emotional support that can help affected person cope in stressful situations
- Meditation and prayer
- Cognitive restructuring- change the way you look at things

IV. 5 DRUG THERAPY GUIDELINES

- Lifestyle modification should be emphasized as the cornerstone of management.
- Management of patients with hypertensive complications and especially those who present with an acute illness, e.g. stroke, requires careful assessment and astute use of drug therapy (withhold use of antihypertensive drugs in patients presenting with stroke until proper assessment).

Pharmacological Treatment

1. **Diuretics**

Table 6: Diuretics[12,14]

Class	Drug	Usual dose range (mg/day)
Thiazide & thiazide -like diuretics		
	Hydrochlorothiazide	12.5 - 25
	Indapamide	1.25 - 2.5
	Bendrofluazide	2.5
Loop diuretics		
	Furosemide	20 (bd) - 40 (bd)
Potassium sparing diuretics		
	Spironolactone	25 - 50

- These agents work by increasing excretion of sodium by the kidneys and may also have some vasodilator effects (14)
- Thiazide and thiazide- like diuretics can be used as first line drugs in the treatment of every patient who requires drug therapy, unless compelling reasons dictate otherwise (14).
- The main metabolic side effects of these drugs include: hypokalemia, hyperglycemia and hyperuricemia (12, 14).
- Diuretics are very effective in reducing BP when combined with ACEI, ARB & CCB

2. **Calcium Channel Blockers**

Table 7: Calcium Channel Blockers[12, 14]

Class/ Type	Drug	Usual dose range (mg/day)
Dihydropyrdine type		
	Long acting Nifedipine SR	20 - 80 (twice per day dosing)
	Adalat	30 - 60 (once per day)
	Amlodipine	2.5 - 10 (once per day)
	Felodipine	2.5 – 10 (once per day)
Non-dihydropyridines		
	Verapamil Diltiazem	120 - 480 (once or twice /day)

- These agents reduce BP by blocking inward flow of calcium ions through the L channels of arterial smooth muscle cells (14).
- The main side effect of these drugs is peripheral edema
- They are used as first line drugs in the treatment of Stage 1 & 2 hypertension
- They reduce BP effectively when combined with ACEI and ARBs

3. Angiotensin-Converting Enzyme (ACEI) Inhibitors

- These drugs act by inhibiting the conversion of angiotensin I to angiotensin II which raises BP and they are also vasodilators (14)
- They are helpful in patients with heart failure (improves cardiac performance), post myocardial infarction, diabetes and kidney disease(14)
- Their main side effects: cough, angiooedema and hyperkalemia;
- Contraindicated in pregnancy (12)

Table 8: **Angiotensin-Converting Enzyme (ACEI) Inhibitors**[12,14]

Class/ Type	Drug	Usual dose range (mg/day)
ACEI	Enalapril	10 - 40 (once or divided into twice per day)
	Lisinopril	5 - 40
	Perindopril	4 - 8
	Ramipril	2.5 - 10
	Catopril	12.5 - 100

4. Angiotensin Receptor Blockers (ARB)

- They reduce BP by blocking the action of angiotensin II on its AT 1 receptor which then prevents the vasoconstrictor effects of this receptor (14)
- They do not cause cough and seldom causes edema
- Do not combine angiotensin-converting enzyme (ACEI) inhibitors and angiotensin - blockers in the same patient (12, 14)
- Contraindicated in pregnancy (12, 14)

Table 9: **Angiotensin Receptor Blockers (ARB)**[12.14]

Class/ Type	Drug	Usual dose range (mg/day)
ARB	Candesartan	8 - 32 (once per day)
	Irbesartan	150 - 300 (once per day)
	Losartan	25 - 100 (once per day)
	Telmisartan	20 - 80 (once per day)
	Valsartan	40 - 160 (once per day)

5. **ß - Blockers:**

- They reduce cardiac output and also decrease the release of renin from the kidney (14)

- They are beneficial in patients with history of myocardial infarction and heart failure (12, 14)
- Not recommended in patients at risk for diabetes
- Main side effects: reduced sexual function and reduced exercise tolerance

ß - Blockers include[12, 14]:

i. Metoprolol: 25 mg twice daily(low dosage) or 50 - 100 mg twice daily (usual dosage)

ii. Bisoprolol: 2.5 mg once daily (low dosage) or 5 - 10 mg once daily(usual dosage)

iii. Atenolol: 25 - 100mg once per day

iv. Propanolol: 40 - 160 mg twice per day

6. **Combined α- Blockers & ß- Blockers [12,14]:**

i. Carvedilol: 3.125 mg twice daily (low dosage) or 6.25 - 25 mg twice daily (usual dosage)

ii. Labetolol: 100 - 300mg twice daily

7. **Central α - Agonist**: Methyldopa: 125 - 500mg twice daily

Used in treatment of hypertension in pregnancy

8. **Direct Vasodilator:**

i. Hydralazine: 25 -100 mg twice daily

IV. 6 IDENTIFICATION & MANAGEMENT OF RESISTANT HYPERTENSION & SECONDARY HYPERTENSION

Resistant hypertension is defined as a BP that remains above goal in spite of concurrent use of three antihypertensive agents of different classes at maximal doses. One should ensure that other attributable factors be ruled out, such as:

- inaccurate measurement of BP with use of an inappropriately sized cuff
- non-compliance with medication
- suboptimal antihypertensive therapy
- poor adherence to lifestyle and dietary approaches in the management of elevated BP
- white coat hypertension

The addition of other agents such as low dose spironolactone may be useful if there are no contraindications such as an elevated potassium blood level or evidence of chronic renal failure.

Patients with resistant hypertension should be referred to a specialist for further investigations and management.

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Secondary hypertension is high blood pressure caused by another medical condition. If **suspected, refer to a specialist for further investigation and management.**

IV. 7 TREATMENT OF COMPLICATED HYPERTENSION

Hypertensive urgency is severe hypertension (systolic BP >180mmHg and/or diastolic BP >120mmHg) without the presence of symptoms or signs of acute end-organ damage. Generally, the mean arterial pressure should not be lowered by more than 25 to 30% in the short term period of hours to days. This is done with the use of oral antihypertensive agents.

Hypertensive emergency is present when there is severe hypertension with associated end-organ damage, e.g.

- Cardiac:-
    - myocardial infarction/ischemia,
    - acute pulmonary oedema,
    - aortic dissection,
- Neurologic:-
    - hypertensive encephalopathy,
    - cerebro- vascular accident/cerebral infarction,
    - subarachnoid hemorrhage,
    - intracranial hemorrhage,
- Renal- acute renal failure

The absolute level of BP itself is less important because more modest increases in BP may lead to critical end-organ damage.

Parenteral administration of BP lowering drugs is advocated to carefully reduce the BP within minutes but caution is advised to prevent an excessive hypotensive response that can lead to ischemic complications. Parenteral agents used include but are not limited to nitroprusside, nitroglycerin, calcium channel blockers, labetalol and hydralazine. Oral antihypertensive agents lower the BP more slowly than parenteral ones and should therefore be used as second line agents. The patient should be referred to a hospital setting for acute management.

Malignant hypertension is a type of hypertensive emergency characterized by grade IV retinopathy and fibrinoid necrosis of arterioles and small arteries causing the clinical manifestations of end-organ damage. It is treated in a similar manner as hypertensive emergency above.

IV. 8 Complementary & Alternative Medicine (CAM)

Complementary and Alternative Medicine (CAM) is defined by National Centre for Complementary and Alternative Medicine (NCCAM) as a group of diverse medical and health care systems, practices and products comprised of the following five (5) categories:

A) **Alternative Medical Systems** such as Homeopathic Medicine, Naturopathic Medicine, Traditional Chinese Medicine & Ayurveda

B) **Mind -Body Interventions** designed to enhance the mind's capacity to affect bodily function, such techniques include meditation, prayer, mental healing and therapies using various art forms like art and dance.

C) **Biological Based Therapies** including vitamins, minerals and herbal products/ botanicals

D) **Manipulative & Body based Methods** based on manipulation of body parts including chiropractic and osteopathic manipulations and massage.

E) **Energy Therapies** involving the use of energy fields including: i) bio-field therapies like Reiki and (ii) Bio-electromagnetic based therapies.

Complementary and Alternative Medicine (CAM) therapies are increasingly used to reduce blood pressure/ in the management of hypertension (27). CAM approaches to blood pressure reduction include the use of: herbal /medicinal substances ; mind-body interventions including slow breathing (Qigong) and transcendental meditation and alternative medical systems like acupuncture (27). There is expanding evidence supporting CAM approaches to blood pressure reduction however further research is warranted to confirm their benefits in terms of cardiovascular outcomes (27).

Picking et al. (2011) showed that the prevalence of self medication with medicinal plants in Jamaica is 72.6% (28). In that study 26.7% of respondents used conventional pharmaceuticals concomitantly with herbal/ medicinal plants. Picking et al. (2011) provide a comprehensive list of the fifty most commonly used herbal/ medicinal products in Jamaica ranked by prevalence (28). Concomitant herb - conventional drug use was highest for conditions affecting the respiratory and gastro-intestinal systems and hypertension. Of note, physicians' awareness of concomitant conventional drug - herb use was particularly low at 19.4% (28). Reasons cited for non-disclosure:1) expectation of a negative reaction from the doctor, 2) perception that there was no need to report such use and 3) they were simply not asked.

Based on the foregoing, primary care physicians need to inform themselves about the various CAM treatment modalities and during history taking physicians should routinely enquire about CAM usage in the self management of hypertension. It is our considered opinion that where scientific support is not forthcoming to explain any benefit of the use of a herbal product / medicinal plant extract, then it should be discouraged and cautioned against as a possible harmful practice. Based on the expanding body of literature on this subject the following should be noted:

1. Some CAM products and practices are beneficial.
2. CAM products and practices are not without side effects and adverse effects.
3. It is dangerous for patients with hypertension to substitute conventional anti-hypertensive medication with CAM products and practices
4. It is dangerous for hypertensive patients to take conventional anti-hypertensive medication along with CAM products (without knowing all the facts about drug interactions).

5. Hypertensive patients should not be using CAM products and practices without informing their- physicians
6. Patients must be advised that it is critical to declare the use of CAM products and practices prior to all surgical procedures.

IV . 9 ANNUAL REVIEW

General

- Body weight
- Waist circumference
- Mucous membranes − checking for anaemia

Cardiovascular System

- Pulse − Characteristics
  - − Status of peripheral pulses. Check for Carotid bruit
- Heart − Size and sounds.
- Jugular Venous pressure.
- Presence of oedema.
- Electrocardiogram − as deemed necessary

Fundoscopy

- Arteriolar changes
- Presence of haemorrhages, exudates, papilloedema

Urinalysis

- Check for protein, blood and glucose

Referral

- Assessment for referral to Dietician, Internist/Cardiologist, Ophthalmologist, Nephrologist

V. MANAGEMENT OF HYPERTENSION IN SPECIAL SITUATIONS

1. **The Team Approach to Management**

2. **The Elderly**

3. **The Diabetic Patients**

4. **The Patient with Cardiac Failure**

5. **The Patient with Renal Failure**

6. **The Pregnant Patient**

7. **The Patient with Chronic Pain**
8 . **Patient with Obstructive Apnoea**

V .1 THE TEAM APPROACH TO MANAGEMENT

The team approach to health care, is important in view of the multi-faceted nature of many diseases. The patient is the most important member of that team. The combined efforts, knowledge, attitude and skills of the team can help to ensure safe and effective management of the patient with hypertension. It is imperative that each member of the medical team values and enlists the skills that other members contribute to the overall management of the patient and also includes the patient in his/her own management.

The following are some of the responsibilities of various members of the health care team in the management of the patient with hypertension.

The Physician

- Diagnoses medical problems
- Performs medical procedures
- Co-ordinates and prescribes therapy
- Assumes overall supervision of the team
- Reviews/approves guidelines and clients' management protocol
- Refers clients for specialized care

Nurse Practitioner

- Diagnoses medical problems
- Co-ordinates client management
- Refers clients for specialized care

Nutritional Personnel

- Take responsibility for nutritional care
- Assess nutritional status
- Determine nutrient needs
- Recommend appropriate diet therapy
- Prepare care plan in collaboration with client
- Instruct client on the diet and care plan
- Monitor nutritional care processes
- Evaluate effectiveness of nutritional intervention
- Provide training and nutrition intervention for the other members of the health care team

Nurse

- Assumes central role in overall care and communicates with relevant members of the health care team.
- Communicates with clients/care-givers on relevant aspects of the medical procedures and plans as well as nutritional care.
- Ensures documentation of all relevant information.

The Pharmacist

- Recommends appropriate drug therapy.
- Acts as liaison to identify and inform the team as well as client and significant others about possible drug-nutrient interactions and side effects of medication.
- Educates the client on appropriate procedures for taking certain drugs e.g. before or after meals, or avoiding certain foods while taking medication.

The Community Health Aide

- Visits clients at home
- Encourages patient adherence to lifestyle, medication and clinic visits
- Refers client from community to health centre.
- Monitor and encourage self -care, self - monitoring and self - management

V .2 THE ELDERLY

Defined by the United Nations as those ≥60 years old and this target population accounts for 11.3% of the Jamaican population. A number of features are common to this age-group. **The characteristic features of the elderly include:**

1. Systolic hypertension - with systolic BP > 150 mmHg[12]
2. Three to four fold increase in cardiovascular risk [12]
3. Co-morbidities - presence of other diseases (e.g., osteoarthritis, glaucoma, diabetes, heart disease and renal impairment)
4. Poly-pharmacy -patients are often maintained on multiple drugs /medications for other disorders leading to drug interactions and aggravation of hypertension
5. Increased susceptibility to adverse drug reactions.
6. Increased susceptibility to orthostatic/ postural hypotension (OH) where-by there is a substantial decrease in BP (> 20 mmHg in SBP & > 10 mmHg in DBP) when patient stands from the supine position (12). The risk of orthostatic hypotension is further increased by the presence of diabetes mellitus with autonomic neuropathy. OH potentiates the older person's risk of falling, an occurrence which is potentially hazardous in this target

group. OH can be aggravated by drugs like: diuretics, nitrates, α and ß - blockers.

7. Increased risk of cognitive impairment and dementia which can have negative impact on adherence to management of hypertension.

Considerations in the management of elderly patients with hypertension.

The goal BP for elderly persons with hypertension is <150 / 90 mmHg[13]. Management of elderly patients involves:

A. Lifestyle modification:

- weight loss (through reduction in caloric intake and exercise) and reduction in salt intake are particularly beneficial in the elderly(12).
- The type, intensity, duration and frequency of exercise depend on the functional status of the elderly person. The functional status can be determined by using readily available screening tools like:1) Lawton & Brody instrumental activities of daily living scale and 2) Katz Index of independence in basic activities of daily living scale. In general, advise moderate aerobic exercise for at least 30 minutes per day, preferably every day but at least four (4) times per week.
- Advise use of high-potassium foods at least once daily such as bananas, pumpkin, coconut water, (assess renal function).
- Limit alcohol intake

- Cessation of smoking tobacco

B. **Drug therapy**

The choice of drug treatment should be individualized and is usually impacted by:

- Presence of co-morbid conditions and compelling indications (diabetes, arrhythmias, ischemic heart disease, cardiac failure and chronic kidney disease)
- Increased risk of orthostatic / postural hypotension.
- Poly-pharmacy - maintenance on multiple drugs for other co-morbid conditions

The dose and frequency of dosing can also be affected by co-morbid conditions like renal disease which is associated with reduced clearance of drugs.

Recommendations regarding specific drug classes:

1 st line: thiazide & thiazide -like diuretics or CCB

2 nd line: ACEI or ARB

3 rd line: Alternative first line drug (diuretic or CCB)

Thiazide and thiazide -like diuretics should be used with caution in elderly persons who are at increased risk of falling (older person who experienced a fall within the last year). When monitoring elderly persons, BP should always be measured in two positions: supine and standing positions. If ACEI or ARB is used monitor potassium levels.

Elderly patients with ischaemic heart disease:

- Use a Beta-blocker, (Bisoprolol, Metoprolol or Atenolol).
- In patients with atrial fibrillation or myocardial infarction refer to specialist for treatment.

In elderly patients with cardiac failure:

- Start with Furosemide and add low dose ACE inhibitor and Beta-blocker. Introduce Beta-blocker after heart failure is controlled (e.g. Carvedilol or Bisoprolol)
- Review drug therapy being taken for other diseases and refer patient to specialist for further treatment.

Recommendations

Refer to dietician/nutritionist, health educator and medical social worker for assessment and in depth counselling:

- Dietary counselling
- Financial support – JADEP, National Health Fund

V. 2 THE DIABETIC PATIENTS

There is an increased prevalence of diabetes in hypertensive patients. In the Caribbean, diabetes is present in one-third of hypertensive patients. This frequent co-existence is related to:

- The high prevalence of both in the community
- The increased frequency of chronic kidney injury among diabetic patients, caused by micro-vascular and macro-vascular complications or chronic pyelonephritis
- The presence of insulin resistance in diabetics

Patients affected by hypertension and diabetes should have continuous monitoring of both parameters (BP & blood glucose) at home (self monitoring) and at routine office visits. **The goal blood pressure for patients diagnosed with hypertension & diabetes is: <140mmHg SBP and < 80 mmHg DBP[29]. This is evidence based at this time (see summary of evidence below).**

Table 10: Summary of evidence regarding goal BP for patients with hypertension & diabetes

International Guideline	Goal SBP (mmHg)	Level of Evidence	Goal DBP (mm Hg)	Level of Evidence
ADA 2014 [29]	< 140	B (supportive evidence from cohort studies)	<80	B
JNC 8 2014[13]	<140	E (expert opinion)	<90	E
ESH/ESC [19]	<140		<85	

Management of patients with hypertension and diabetes involves lifestyle modification which remains the cornerstone of treatment and drug therapy. Lifestyle modification includes the following:

A. Nutritional interventions : a nutritionist/ dietician recommended diabetic diet with reduced refined sugars, reduced calories (if patient is overweight or obese), adequate amounts of potassium and calcium, increased fruits and vegetables.
B. Exercise interventions see section IV. 3
C. Other lifestyle interventions - limit alcohol intake (men≤ 2 drinks/day and women ≤ 1 drink/day) (Each drink is 15 mls ethanol [12oz beer or 5 oz wine]) and quit smoking tobacco.

D. Drug therapy:

- 1st line: ARB or ACEI
- 2nd line: CCB or diuretics
- If a third drug is needed use alternative 2nd line drug (CCB or diuretic)

  (NB: If patient is on ARB or ACEI monitor serum creatinine, eGFR and potassium levels)

V .4 THE PATIENT WITH CARDIAC FAILURE

Cardiac failure occurs when the heart is incapable of maintaining appropriate cardiac output to accommodate tissue perfusion and metabolic requirements or does so at an elevated filling pressure (12).

Cardiac failure is a compelling indication for the use of ACEIs. ACEIs reduce mortality in affected patients (stage A/ NYHA class)I (12).

Angiotensin Receptor Blockers (ARBs): are used in patients intolerant to ACE Inhibitors (e.g. dry cough) or those already on ARBs.

Beta-Blockers : are used in the management of cardiac failure . They should be

used in cardiac failure stage B/ NYHA class I and stage C/NYHA II- III[12].

- Should be used when NYHA Class 2-4 CCF has stabilized[12]
- Carvedilol, Metoprolol and Bisoprolol respectively have been shown unequivocally by many multicenter trials to confer overall and event-free survival benefits in heart failure.
- Carvedilol confers better exercise tolerance by improving left ventricular ejection and blunting adrenergic drive than metoprolol and bisoprolol.

Aldosterone Antagonist:

- Aldosterone antagonist, like spironolactone, achieves fluid removal and improves survival of patients with heart failure by 30% and lower the risk of hospitalization by 35% and improves symptoms (RALES Trial) (monitor potassium levels)

Loop Diuretics e.g. Furosemide

- Does not confer mortality benefit but improves symptoms and signs of fluid overload (by decreasing preload)
- Monitor urea and electrolytes while on loop diuretics - patients can develop intravascular depletion resulting in increasing BUN. Patients can also develop electrolyte abnormalities

- Large doses of oral furosemide (80 mg and greater) are often necessary in patients who also have renal impairment

Other Antihypertensive Drugs

- Hydrallazine + ISDN (Isordil)
    - Can be used in severe pulmonary oedema
    - Less effective than ACE Inhibitors
    - Requires multiple daily doses

A low salt diet as well as fluid restriction should be encouraged in all heart failure patients.

V .5 THE PATIENT WITH RENAL FAILURE

THE PATIENT WITH CHRONIC KIDNEY DISEASE (CKD)

Chronic kidney disease is defined as:

1. eGFR < 60 ml/min/ 1.73m^2
2. The presence of albuminuria > 300mg/day or
3. ACR values > 200mg albumin/g creatinine (spot urine samples can be used to determine ACR

The goal BP depends on the presence or absence of proteinuria as stated below:

- If patient is a non-diabetic adult with CKD + no proteinura: Goal BP ≤140/ ≤90 mmHg[30]
- If patient is a non-diabetic adult with CKD + proteinuria: Goal BP ≤ 130/≤80 mmHg[30]
- If adult patient has diabetes and no proteinuria: Goal BP ≤140/ ≤90 mmHg[30]
- If adult patient has diabetes with proteinuria: Goal BP ≤ 130/≤80 mmHg[30]

The mainstay of treatment is lifestyle modification and drug therapy.

Lifestyle modification:

1. Achieve /maintain a healthy weight (BMI: 20 -25)
2. Lower salt intake: < 2g/day
3. Exercise intervention compatible with cardiovascular health and tolerance. Patient should be able to exercise for at least 30 minutes , five times per week.
4. Limit alcohol intake and quit smoking

Drug Therapy:

1st line: ARB or ACEI

2nd line: Diuretic which can be indapamide, a loop diuretic or spironolactone

- Monitor K+ levels. If > 5.1, discontinue ACE Inhibitor, Spiranolactone, and reduce K+ in diet (Bananas, oranges, coconut water etc.)
- Refer patients needing 3 or more medications for further assessment and management to a specialist

V .6 THE PREGNANT PATIENT

- Refer to high risk antenatal clinic
- Avoid ACE inhibitors and ARBs –teratogenic
- Methyldopa and Hydralazine are safe
- Beta-blockers are safe in later pregnancy

V .7 THE PATIENT WITH CHRONIC PAIN

- Use of NSAIDS and Cox 2 Inhibitors in patients with renal disease **should be carefully** monitored. They may lead to deterioration of renal function and the risk of gastro-intestinal haemorrhage may increase.
- Acetominophen is an effective analgesic in the absence of joint effusion but, NSAIDS, must only be taken at regular intervals for a limited period of time.

VI . 8 PATIENT WITH OBSTRUCTIVE SLEEP APNEA (OSA)

There is a clear association between OSA and the development of hypertension, especially nocturnal hypertension. Suspect the presence of OSA if:

- Obese: BMI **>** (30 kg/m^2)
- Elevated nocturnal BP readings on an ambulatory BP report
- Symptoms of snoring, irregular breathing during sleep, witnessed apnoea, restless sleep or chronic morning fatigue .
- Confirm its presence with a formal sleep study and refer to an appropriate specialist

VI. INDICATIONS FOR REFERRAL

1. Medical

2. Medical Social Worker

VI. 1. MEDICAL

Patients who require a higher level of care may be referred based upon a variety of clinical situations which may be categorized as:

- Non-urgent (seen 1-2 months) – BP not markedly elevated
- Urgent (seen within 1 week) – Markedly elevated BP without TOD
- Emergency (same day) – Markedly elevated BP with TOD.

  Use of telephone contact is vital for consultation and ensuring continuity of care. A patient's relevant clinical and laboratory data should be included in the referral letter from the Health Centre. Similarly, once the consultation is completed, information on laboratory evaluation, diagnosis and current treatment regime should be sent back to the Health Centre.

Indications for referral to a higher level of care include:

1. Clinical suspicion of secondary hypertension.
2. Complicated hypertension: hypertensive urgency, hypertensive emergency/ malignant hypertension
3. Severe retinopathy e.g. haemorrhage/exudates; papilloedema
4. Difficulty in achieving satisfactory control of blood pressure despite patient being on three or more drug combinations.
5. Raised serum creatinine or persistent ~~hypokalemia~~ (in the absence of a diuretic).
6. Haematuria, proteinuria or cells in urine.
7. Evidence of cardiac failure.
8. Evidence of CKD requiring two more drugs

VI.2. MEDICAL SOCIAL WORKER

Indications for referral to the Medical Social Worker's services include[31 - 33]:

Social Indicators

- Living alone, especially the elderly.
- Large family/overcrowding.
- Low income, underemployment and unemployment.

Behavioural Indicators

- Not keeping appointments.
- Non-compliance with therapeutic measures.
- Frequent hospital admissions.

Stress Indicators

- Family crisis (sudden death, job loss etc.).
- Inter-personal problems at home or work.
- Dysfunctional coping mechanisms.

Social work recognizes that there are intra-psychic and interpersonal dynamics that can precipitate, as well as sustain hypertension. Together and singly, they constitute major risk factors that (a) impede individuals from complying and adhering to treatment (b) work against the quality of medical monitoring that would allow for any necessary adjustments to their medications, as their high blood pressure changes over time.

Stressors can reduce an individual's resilience and some may have difficulty in sustaining the necessary changes in real life. Therefore, giving information about this disease is not enough.

As part of a multidisciplinary approach, the social worker can contribute to management in two fundamental ways[31 -33]:

(1) Help to improve the psychosocial and intra-psychic dynamics that are associated with hypertension by assessing the individual's needs for psychosocial support and help in improving those dynamics that may ensue from multiple and chronic stressors by providing individual and family counseling and referrals for relevant social services. Some examples of these stressors are:

- Anxiety
- Unresolved post traumatic stress
- Being a victim or a perpetrator of domestic violence
- Dissolution of marital and non-marital relationships
- Unemployment/ No health insurance
- Mental illness of a family member
- Family member misusing/abusing drugs or alcohol
- An incarcerated family member
- Caring for family member with a disability

(2) Assist clients in overcoming barriers to the necessary changes in their lifestyle.

These include the following:

- Adherence to taking their medications
- Weight loss

- Daily physical activity
- Reducing stress
- Improving coping skills
- Improving their nutrition
- Support their motivation to strengthen adherence to lifestyle changes and medical regimen
- Promote and support self monitoring of blood pressure in order to strengthen a necessary physical - patient partnership for managing the disease.
- Challenge their use of such defense mechanisms as denial and suppression

VII. PRIMARY PREVENTION: REDUCTION OF RISK FACTORS FOR HYPERTENSION

Primary prevention of hypertension must be the aim of the entire health care system and health team. This requires national programmes of public education and in particular patient and family education to reach all those at greatest risk. The benefits of healthy life styles must be emphasized.

Risk Factors should be identified and addressed. These should be reduced in all patients and the general population through carefully designed chronic disease prevention and control programmes. Known risk factors for hypertension are:

- Genetic predisposition.
- Obesity.
- Dietary factors (see*Protocol for Nutritional Management of Obesity, Diabetes and Hypertension in the Caribbean*).
- Sedentary type of living with little or no time devoted to physical exercise.
- High alcohol consumption on a regular basis.
- Gestational hypertension.
- Diabetes.

Intervention strategies

The commonality of many risk factors for hypertension and diabetes justifies an integrated approach to their reduction and the prevention and control of both. The fact that cardiovascular diseases resulting from hypertension and diabetes account for about 40% of Caribbean mortality further justifies this approach and highlights its urgency.

- **Dietary measures should aim at:**
    - Control of caloric intake.
    - Reduction of excess body weight.
    - Limiting use of sodium.
    - Ensuring adequate intake of potassium through regular consumption of fresh fruits and vegetables.
    - Adequate fibre intake and control of fat (mainly saturated) intake - to retard the atherosclerotic process.
- **Physical exercise should be**:
    - Undertaken daily or at least five (5) times each week
    - Sustained for at least 30 minutes on each occasion. Walking is the easiest and most practical activity (See Appendix 1&2 for details)

- **Other measures**:
    - Proper control of hyperglycaemic states will lead to reduction in the development of chronic renal disease and resulting hypertension.
    - Alcohol consumption should be restricted to 20 grams of ethanol per day at most; men: 2 bottles of beer, 8 ounces of wine or 2 one ounce drinks of spirits and women: 1 bottle beer, 4 ounces wine or 1 ounce spirit.
    - Tobacco use should be stopped.

Education

Patient compliance is greatly enhanced by an understanding of the disease and implications of inadequate treatment. The benefits of long-term uninterrupted treatment should be highlighted.

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 must be written legibly on labels.

Self-monitoring, using an electronic instrument, can be helpful especially in some patients who are difficult to control or may have "white coat" hypertension, i.e. BP is raised only in the doctor's office or hospital.

VIII APPENDICES

1. **WHO/ISH Risk Prediction Charts**
2. **Exercise Guide**
3. **Activities and Calories Burned Per Hour (Rank order)**
4. **Calculating Body Mass Index**
5. **Normogram for calculating Body Mass Index**
6. **How Much Weight Should I Lose**

2. Instructions on how to use WHO/ISH (World Health Organization/International Society of hypertension) risk prediction charts

The charts provide approximate estimates of cardiovascular disease (CVD) risk in people who do not have established coronary heart disease, stroke or other atherosclerotic disease. They are useful as tools to help identify those at high cardiovascular risk, and to motivate patients, particularly to change behaviour and, when appropriate, to take antihypertensive, lipid-lowering drugs and aspirin.

How do you use the charts to assess cardiovascular risk?

- First make sure that you select the appropriate charts using information in table 1
- If blood cholesterol cannot be measured due to resource limitations, use the charts that do not have total cholesterol
- Before applying the chart to estimate the 10-year cardiovascular risk of an individual, the following information is necessary
  - Presence or absence of diabetes[1]
  - Gender
  - Smoker or non-smoker
  - Age
  - Systolic blood pressure[2]
  - Total blood cholesterol (if in mg/dl divide by 38 to convert to mmol/l)

Once the above information is available proceed to estimate the 10-years cardiovascular risk as follows.

Step 1 Select the appropriate chart depending on the presence or absence of diabetes[1]

Step 2 Select male or female tables

Step 3 Select smoker or non smoker boxes[3]

Step 4 Select age group box (if age is 50-59 years select 50, if 60-69 years select 60 etc)

Step 5 Within this box find the nearest cell where the individuals systolic blood pressure (mm Hg) and total blood cholesterol level (mmol/l)[4] cross. The colour of this cell determines the 10-year cardiovascular risk.

---

1. A person who has diabetes is defined as someone taking insulin or oral hypoglycaemic drugs, or with a fasting plasma glucose concentration above 7.0 mmol/l (126 mg/dl) or a postprandial (approximately 2 hours after a main meal) plasma glucose concentration above 11.0 mmol/l (200 mg/l)on two separate occasions). For very low resource settings urine sugar test may be used to screen for diabetes if blood glucose assay is not feasible. If urine sugar test is positive a confirmatory blood glucose test need to be arranged to diagnose diabetes mellitus.
2. Systolic blood pressure, taken as the mean of two readings on each of two occasions, is sufficient for assessing risk but not for establishing a pretreatment baseline.
3. All current smokers and those who quit smoking less than 1 year before the assessment are considered smokers for assessing cardiovascular risk.
4. The mean of two non-fasting measurements of serum cholesterol by dry chemistry, or one non-fasting laboratory measurement, is sufficient for assessing risk.

Practice points

Please note that CVD risk may be higher than indicated by the charts in the presence of the following:

- already on antihypertensive therapy
- premature menopause
- approaching the next age category or systolic blood pressure category
- obesity (including central obesity);
- sedentary lifestyle;
- family history of premature coronary heart disease (CHD) or stroke in first degree relative (male < 55 years, female < 65 years);
- raised triglyceride level (>2.0 mmol/l or 180 mg/dl);
- low HDL (high density lipoprotein) cholesterol level (< 1 mmol/l or 40mg/dl in males, < 1.3 mmol/l or 50 mg/dl in females);
- raised levels of C-reactive protein, fibrinogen, homocysteine, apolipoprotein B or Lp(a), or fasting glycaemia, or impaired glucose tolerance;
- microalbuminuria (increases the 5-year risk of diabetics by about 5%) (38, 83, 85);
- raised pulse rate.
- socioeconomic deprivation

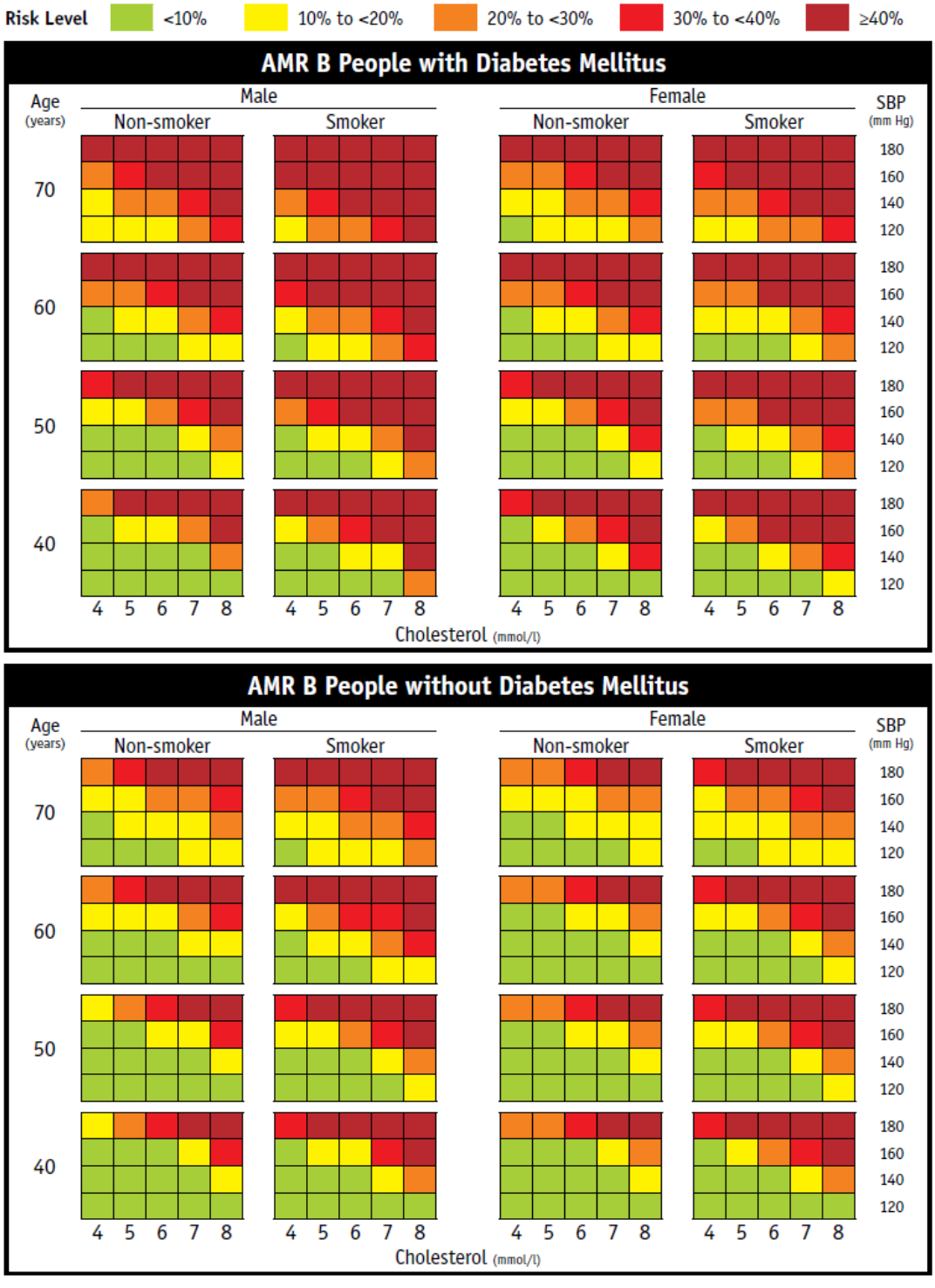
Risk levels

The colour of the cell indicates the 10-year risk of combined myocardial infarction and stroke risk (fatal and non-fatal) as shown below.

10-year combined myocardial infarction and stroke risk (fatal and non-fatal)

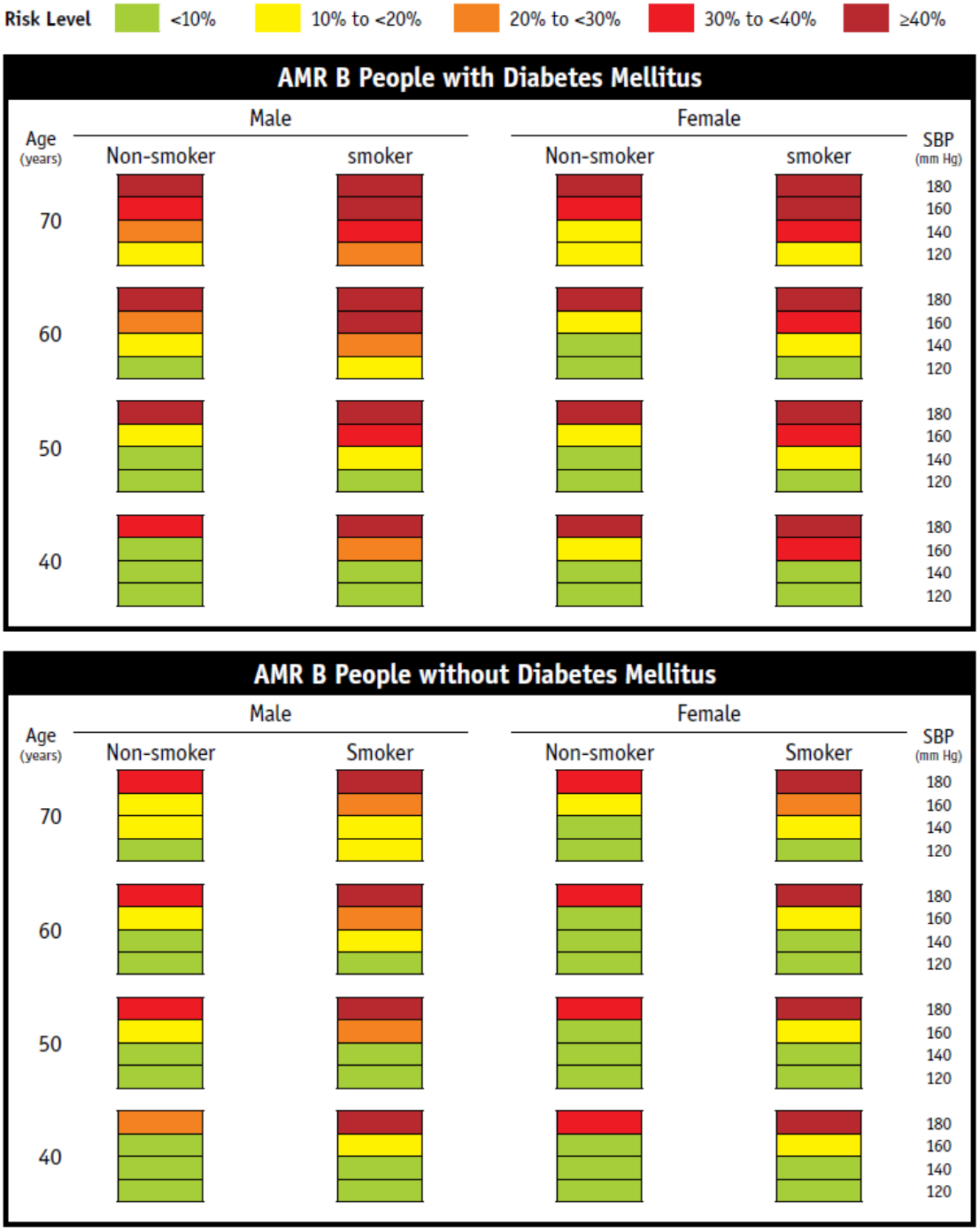
Green	<10%
Yellow	10% to <20%
Orange	20% to <30%
Red	30% to <40%
Deep Red	≥ 40%

Figure 6. WHO/ISH risk prediction chart for AMR B. 10-year risk of a fatal or non-fatal cardiovascular event by gender, age, systolic blood pressure, total blood cholesterol, smoking status and presence or absence of diabetes mellitus.



This chart can only be used for countries of the WHO Region of the Americas, sub-region B, in settings where blood cholesterol can be measured (see Table 1).

Figure 9. WHO/ISH risk prediction chart for AMR B. 10-year risk of a fatal or non-fatal cardiovascular event by gender, age, systolic blood pressure, smoking status and presence or absence of diabetes mellitus.



This chart can only be used for countries of the WHO Region of the Americas, sub-region B, in settings where blood cholesterol CANNOT be measured (see Table 1).

Appendix 2

EXERCISE GUIDE

Advice to Patients: Keep it Simple!

GO SLOW: Build up activity gradually. Warm-up exercises are important.

LISTEN TO YOUR BODY: Certain stiffness is normal at first. Stop activity if a muscle strain occurs in order to rest the muscle group... restart after a few days' rest.

OUTDOOR ACTIVITIES should be limited to early morning and evening times... wear light, loose-fitting clothing and drink a lot of water before, during and after the activity.

KEEP AT IT! Set small, short-term goals. If you become bored, try doing the activity with a friend or family member, or, switch to another activity.

MAKING OPPORTUNITIES:

- Aim for thirty (30) minutes/day of physical activity. Can be achieved all at once or at different times during the day.
- Use the stairs... up and down! Start with one flight and gradually build up to more.
- Get off the bus a few stops early.
- Avoid extra snack but if necessary, eat fruits mainly.
- Walk briskly whenever you are walking.
- Take an exercise break. Get up and stretch, walk around and give your muscles and mind a chance to relax

Appendix 3

ACTIVITIES AND CALORIES BURNED PER HOUR (Rank Order)

LIGHT ACTIVITY	**:**	Office work, cleaning house, playing golf
MODERATE ACTIVITY	**:**	Walking briskly, gardening, bicycling, dancing
STRENUOUS ACTIVITY	**:**	Jogging, swimming
VERY STRENUOUS ACTIVITY	**:**	Running, basketball, squash, tennis

Appendix 4

CALCULATING BODY MASS INDEX

Body Mass Index = (Weight in kg) ÷ (Height in Meters)^2

DIRECTIONS FOR USING NOMOGRAM

1. Locate the person's height in:
    i. Feet & inches on the left column or
    ii. Meters in the right column.
    iii. Numbers in these columns **increase** going down the scale.
2. Locate the person's weight in:
    i. Pounds in the top row
    ii. Kilograms in the bottom row.
    iii. Numbers in this row **increase** going to the left of the scale.
3. Lay a ruler or straightedge so that it touches these two points - height and weight.
4. Note where the straightedge crosses the middle line between these two columns. This is the person's Body Mass Index (BMI).

Appendix 5: NOMOGRAM FOR CALCULATING BODY MASS INDEX

Applicable for Males and Females Over the Age of 18 years

WEIGHT - LBS																															
	100	105	110	115	120	125	130	135	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240	245	250	
5"0"	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	1.52
5'1"	19	20	21	22	22	24	24	25	26	27	28	29	30	31	32	33	34	35	36	36	37	38	39	40	42	43	44	44	45	46	47	1.55
5'2"	18	19	20	21	22	23	24	24	25	26	27	28	29	30	31	32	33	33	34	35	36	37	38	39	40	41	42	43	44	45	46	1.57
5'3"	18	19	20	20	21	22	23	24	24	25	26	27	28	29	30	31	32	32	33	34	35	36	37	38	39	40	41	42	43	43	44	1.60
5'4"	17	18	19	20	20	22	22	23	24	24	25	26	27	28	29	30	31	31	32	33	34	35	36	37	38	39	40	40	41	42	43	1.63
5'5"	17	18	18	19	20	21	22	22	23	24	25	25	26	27	28	29	30	30	31	32	33	34	35	35	37	37	38	39	40	41	42	1.65
5'6"	16	17	18	19	19	20	21	22	22	23	24	25	25	26	27	28	29	29	30	31	32	33	34	34	36	36	37	38	39	40	40	1.68
5'7"	16	17	17	18	18	19	20	21	22	23	23	24	25	25	26	27	28	29	29	30	31	32	33	33	35	35	36	37	38	38	39	1.70
5'8"	15	16	16	17	18	19	20	20	21	22	23	23	24	25	25	26	27	28	28	29	30	31	32	32	33	34	35	36	37	37	38	1.73
5'9"	14	15	16	17	17	18	19	20	21	21	22	23	24	24	25	25	26	27	28	28	29	30	31	31	33	33	34	35	35	36	37	1.75
5'10"	14	15	16	16	17	18	18	19	20	21	22	22	23	23	24	25	25	26	27	28	28	29	30	30	32	32	33	34	34	35	36	1.78
5'11"	14	15	15	16	17	18	18	18	19	20	21	22	22	23	23	24	25	25	26	27	28	28	29	30	31	31	32	33	34	34	35	1.80
6'0"	13	14	15	16	16	17	18	18	19	20	20	21	22	22	23	23	24	25	25	26	27	27	28	29	30	31	31	32	33	33	34	1.83
6'1"	13	14	15	15	16	17	17	17	18	19	19	20	21	21	22	23	23	24	25	25	26	27	27	28	29	30	30	31	32	32	33	1.85
6'2'	13	14	14	15	15	16	17	17	18	18	19	20	21	21	21	22	23	23	24	25	25	26	27	27	28	29	30	30	31	31	32	1.88
6'3"	12	13	14	14	15	16	16	17	17	18	18	19	20	20	21	21	22	23	23	24	25	25	26	26	28	28	29	29	30	31	31	1.91
6'4''	12	12	13	14	14	15	15	16	17	17	18	18	19	20	20	21	22	22	23	23	24	25	25	26	27	27	28	29	29	30	30	1.93
	45	48	50	52	54	57	59	61	63	66	68	70	73	75	77	79	82	84	86	88	91	93	95	97	100	102	104	107	109	111	113	
WEIGHT - KG																																

UNDERWEIGHT	NORMAL	PREOBESE	OBESE CLASS 1	OBESE CLASS 2	OBESE CLASS 3
BMI <18.5	BMI 18.5 to 24.9	BMI 25 to 29.9	BMI 30 to 34.9	BMI 35 to 39.9	BMI 40 and above

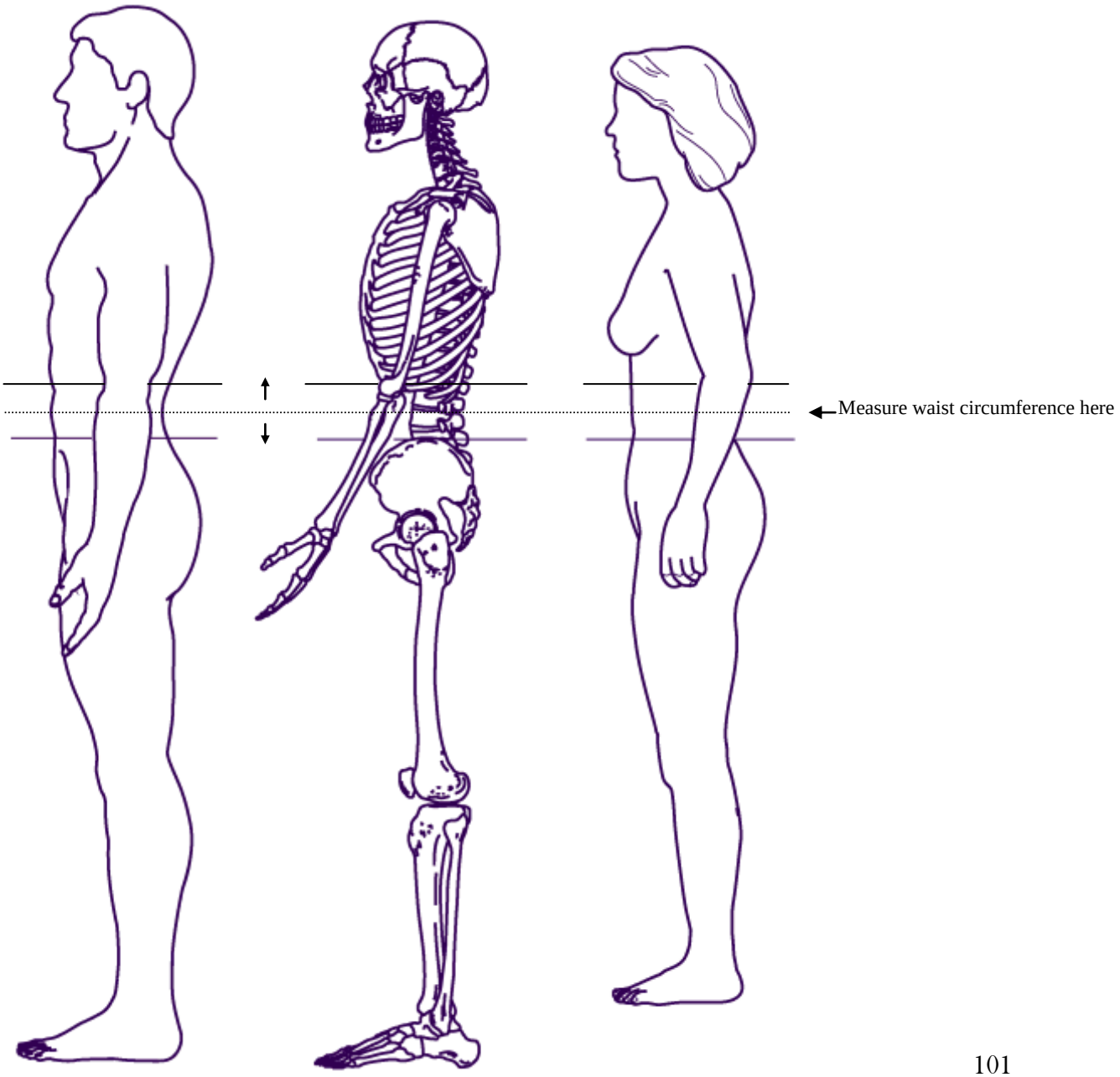
BODY MASS INDEX CLASSIFICATION

BMI	**WEIGHT (Kg)/HEIGHT^2 (m)**
Normal	20-24.9
Pre-Obese	25-29.9
Obese	
Class 1	30-34.9
Class 2	35-39.9
Class 3	$\geq$ 40

MEASURING WAIST CIRCUMFERENCE

The WC is measured at the part of the trunk located midway between the lower costal margin (bottom of lower rib) and the iliac crest (top of pelvic bone) while the person is standing, withfeet about 25-30 cm apart (10-12 in). The measurer should stand beside the individual and fit the tape snugly, without compressing any underlying soft tissues. The circumference should be measured to the nearest 0.5 cm (1/4 in), at the end of a normal expiration dctnhy

WC's >=94 cm (37 inches) in men and >= 80 cm (32 inches) in women have been shown to be associated with substantially increased risk of diseases associated with abdominal obesity.



Appendix 6

HOW MUCH WEIGHT SHOULD I LOSE?

Since the height of an adult doesn't change and you know your height and your BMI you can easily find out how much weight you should lose to get to a BMI of 20 to 25 by using the table. For example, **if you are 1.56 metres (5 feet 2 inches) tall, and your weight 73 kilograms (160-161 pounds), you need to lose approximately 14-18 kilograms (30-40 pounds) as the average for your height is** about 53.5 kilograms (118 pounds) within a range of 49-61 kilograms (108-134 pounds) as shown in the table.

A reduction of 500 calories from the daily intake of food is recommended for attaining weight loss of one pound per week.

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