Primary Health Care Initiatives (PHCI) Project
Contract No. 278-C-00-99-00059-00
Abt. Associates Inc.

HYPERTENSION

LEARNING OBJECTIVES:

- Describe the risks of hypertension and the value of blood pressure control
- Diagnose hypertension correctly
- Develop an effective treatment plan for hypertension
- Communicate to the patient and family necessary steps and messages in the understanding, prevention and control of hypertension

TEACHING STRATEGIES:

- Review technique of measuring blood pressure with practice by trainees on each other. Confirm that blood pressure measurement for each trainee is within 4 mm of trainers measurement
- Use lecture or informal presentation for didactic material, small group discussion for prevention, counseling, and patient education issues.
- Assign groups of 4-6 trainees to review web-based PowerPoint presentation, follow with small group discussion of teaching points presented

MATERIALS AND EQUIPMENT NEEDED:

- Blood pressure cuffs, one for every two participants – confirm proper operation and calibration before use
- Computer for PowerPoint presentation
- White board or flip chart and markers for summarizing major points

LEARNING POINTS:

Significance of hypertension in cardiovascular disease

- Effect on stroke
- Effect on coronary artery disease
- Effect on heart failure and renal disease

Effect of hypertension with other cardiovascular risk factors.

The morbidity and mortality of hypertension is significantly worse with the following risk factors:

- Age > 50
- Diabetes
- Smoking
- Hyperlipidemia
- Alcohol abuse
- Obesity

Effectiveness of proper treatment of hypertension on morbidity and mortality

Correct measurement of blood pressure

- Blood pressure should be measured, with the patient in a sitting position using mercury sphygmomanometer.
- When measuring blood pressure particular care should be taken to:-
  - Allow the patient to sit for several minutes in a quiet room before beginning blood pressure measurement.
  - Use a standard cuff with a bladder that is 12-13 cm x 35 cm, with a larger bladder for fat arms and a smaller bladder for children.
  - Use phase 5 Korotkoff sounds (disappearance) to measure the diastolic pressure
  - Measure the blood pressure in both arms first visit if there is evidence of peripheral vascular disease.
  - Measure blood pressure in standing position in elderly subjects, diabetic patients and in other conditions in which orthostatic hypotension is common.
  - Place the sphygmomanometer cuff at heart level, whatever the position of the patient.

Diagnosis of hypertension

Table 1. Definitions and Classification of Blood Pressure Levels

Category	**Systolic**	**Diastolic**
Optimal	<120	<80
Normal	<130	<85
High-Normal	130-139	85-89
Grade 1 Hypertension (“mild”)	140-159	90-99
Subgroup: borderline	140-149	90-94
Grade2 (“hypertension moderate”)	160-179	100-109
Grade 3 (“ severe”)	180	110
Isolated systolic Hypertension	140	<90
Subgroup borderline	140-149	<90

(When a patient’s systolic and diastolic blood pressures fall into different categories, the higher should apply.)

Clinical evaluation in initial diagnosis of hypertension

Initial Evaluation of the Hypertensive Patients

A comprehensive clinical history is essential and should include:-

- Family history of hypertension, diabetes, dyslipidaemia, chronic heart disease, stroke, or renal disease.
- Duration and pervious levels of high blood pressure, and results and side effects of previous antihypertensive therapy.
- Past history or current symptoms of chronic heart disease and heart failure, cerebrovascular disease, peripheral vascular disease, diabetes, gout, dyslipidaemia, bronchospasm, sexual dysfunction, renal disease, other significant illnesses, and information on the drugs used to treat those conditions
- Symptoms suggestive of secondary causes of hypertension

- Careful assessment of lifestyle and factors including dietary intake of fat, sodium and alcohol, quantitation of smoking and physical activity, and enquiry of weight gain since early adult life as a useful index of excess body fat
- Detailed enquiry of intake of drugs or substances that can raise blood pressure, including oral contraceptives, non-steroidal anti-flammatory drugs, cocaine and amphetamines. Attention should be paid to the use of erythropoietin, cyclosporins or steroids for concomitant disorders
- Personal, psychological and environmental factors that could influence the course and outcome of antihypertensive care including family situation, work environment and educational background.

Physical examination

- A full physical examination is essential and will include careful measurement of blood pressure as described below. Other important elements of the physical examination include:
  - Measurement of height and weight, and calculation of Body Mass Index (weight of kilograms divided by height in meters, squared)
  - Examination of the cardiovascular system particularly for heart size, for evidence of heart failure, for evidence of arterial disease in the carotid, renal and peripheral arteries, and for coarcatations of the aorta.
  - Examination of the lungs for rales and bronchospasm and of the abdomen for bruits, enlarged kidneys, and other masses
  - Examination of the optic fundi for evidence of cerebrovascular damage. (Consider referral)

Laboratory investigations

The laboratory investigation should include at the minimum:

- Urinalysis for blood, protein and glucose and microscopic examination of urine
- Potassium
- Creatinine
- Fasting glucose
- Total cholesterol
- Electrocardiogram

Risk Stratification

All patients should be classified regarding the relative risks of their hypertension, as follows, and as outlined in the attached graph:

- *Low risk group*

  The low risk group includes men below 55 and women below 65 years of age with Grade 1 hypertension and no other risk factors. Among individuals in this category, the risk of a major cardiovascular event in the next ten years is typically less than 15%. The risk will be particularly low in patients with borderline hypertension.

- *Medium risk group*

  This group includes patients with a wide range of blood pressures and risk factors for cardiovascular diseases. Some have lower blood pressures and multiple risk factors, whereas others have higher blood pressure and no or few other risk factors. This is the patient for which the clinical judgment of the responsible doctor will be paramount in determining the need for drug treatment and the time interval before it should be instituted. Among subject in this group, the risk of a

major cardiovascular event over the next ten years is typically about 15-20%. The risk will be closer to 15% in those patients with Grade 1 (mild) hypertension and only one additional risk factor.

- *High-risk group*
  This group includes patients with Grade 1 or Grade 2 hypertension who have three or more risk factors listed in **Table 2,** diabetes or target organ damage and patients with Grade 3 (severe) hypertension without other risk factors. Among these patients the risk of a major cardiovascular event in the following ten years is typically about 20-30%.

- *Very high risk group*
  Patients with Grade 3 hypertension and one or more risk factors and all patients with clinical cardiovascular disease or renal disease (as defined in **Table 2**) carry the highest risk of cardiovascular events, of the order of 30% or more over ten years, and thus qualify fro the most intensive and rapidly instituted therapeutic regimes.

Table 2

Risk Factors for Cardiovascular Diseases
I. Used for risk stratification
• Levels of systolic and diastolic blood pressure (Grades 1-3)
• Men >55 years
• Women > 65 years
• Smoking
• Total cholesterol > 6.5 mmo/1 (250 mg/dl)
• Diabetes
• Family history of premature cardiovascular disease
II. Other factors adversely influencing prognosis
• Reduced HDL cholesterol
• Raised LDL cholesterol
• Microalbuminuria in diabetes
• Impaired glucose tolerance
• Obesity
• Sedentary lifestyle
• Raised fibrinogen
• High risk ethnic group
• High risk geographic region

Management Strategy of Hypertension

Having assessed the patient and determined the overall risk profile, including the level of blood pressure elevation, the responsible physician should determine whether the

patient is at low, medium, high or very high risk of cardiovascular disease events. This will help the physician, in consultation with the patient, to determine whether to:

- Institute immediate drug treatment for the hypertension and the other risk factors or conditions present (high and very high risk groups).
- Monitor blood pressure and other risk factors for several weeks and obtain further information before deciding whether to institute drug treatment (medium risk group).
- Observe the patient over a significant period of time before deciding whether to institute drug treatment (low risk).
- In situations where resources are limited it becomes imperative to direct drug treatment to individuals in the high and very high-risk groups before considering their use in lower risk patients.
- Having decided on the broad strategy for management, the physician should then determine the specific therapeutic goals for the individual patient, and draw up a comprehensive therapeutic plan to lower the blood pressure and reduce the overall cardiovascular risk in order to attain these goals. This plan will include consideration of:
    - Monitoring of blood pressure and other risk factors.
    - Lifestyle measure- to lower the blood pressure and control the other risk factors.
    - Drug treatment- to lower the blood pressure and to control the other risk factors and clinical conditions available.
    - Lifestyle measures should be instituted wherever appropriate in all patients including those who require drug treatment.

Principles of Drug Treatment

- Begin with the lowest available dose of the particular agent, in an effort to reduce adverse effects. If there is a good response to a low dose of a single drug 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.
- Use appropriate drug combinations to maximize hypotensive efficacy while minimizing side effects. It is often preferable to add a small dose of a second drug rather than increasing the dose of the original drug. This allows both the first and second drugs to be used in the low dose range that is more likely to be free of side effects. The use of the fixed low dose combinations that are increasingly available in Jordan may be advantageous.
- Change 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 or adding a second drug.
- The use 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. This may provide greater protection against the risk of major cardiovascular events and the development of target organ damage.

Initiation of Drug Treatment

- High and very high risk groups – begin drug treatment as soon as repeated measurements have confirmed the patient's blood pressure.

- Medium and low risk groups – begin with the following measures:
  - Consultation with the patient on preferred strategies
  - Changes in life style measures for 3 – 12 months, depending on level of risk. These include
    - Daily exercise for 20 – 30 minutes (pulse rate 100 – 120)
    - Weight loss if BMI > 28
    - Mild sodium restriction if intake is excessive
    - Smoking cessation
    - Decreased coffee, tea, and colas (caffeine containing drinks)
    - Discussion of life stressors, and interventions to decrease stress
  - Control other risk factors
    - Low fat diet to control LDL and cholesterol
    - Strict glucose control in diabetics
  - Follow Figures 1 and 2 for steps in initiation and monitoring of treatment

Choice of Anti-Hypertensive Drugs

- In absence of other risk factors or problems, begin with one of the following:
  - Diuretic (hydrochlorothiazide)
  - B Blocker (propranolol, atenolol)
- If no response to initial drug and dose, increase dose to next level
- If no further response to full dose of one drug, add a second drug
- Management of special hypertensive populations. Use Table 2 for selection of preferred drug if the following are present:
  - Diabetes
  - Elderly
  - Renal disease
  - Pregnancy
  - Coexisting heart or vascular disease

CLINICAL PROTOCOL

- (see attachments)

PREVENTION ISSUES AND HEALTH EDUCATION MESSAGES

- Screening for hypertension
  - Age > 20; at every visit to Health Center
  - Positive family history
  - Presence of other cardiovascular risk factors (high cholesterol, smoking, inactivity, alcohol abuse)
  - African descent
- Community participation in hypertension screening
- Salt intake if intake excessive
- Smoking cessation

Patient or Family Counseling

- Hypertension requires permanent, life-long treatment
- Hypertension is usually asymptomatic; symptoms such as headache are rare)
- Stress can contribute to hypertension, but is not the most common cause; a genetic predisposition is the most common factor

- Lifestyle modification to reduce the risk of developing hypertension:
    - Smoking cessation
    - Mild salt restriction
    - Weight loss
    - Limit alcohol intake
    - Increase physical activity

CRITICAL ELEMENTS FOR REFERRAL

- Severe hypertension (Blood pressure persistently >220/130)
- Transient ischemic attack with any degree of hypertension
- Mental confusion or disorientation
- No response of blood pressure to normal doses of at least 2 medications over 1-2 months
- Pregnancy and hypertension

CASE STUDY

Name of Patient	Abdullah
Sex	Male
Date of Birth	10 October, 1947
Date of Visit	4 May, 1999
Vital Signs	Pulse: 84 Resp.: 16 Blood Pressure: 190/114 Weight: 82 kg.
Medical History	Last week the patient lifted a heavy sack which resulted in severe back pain. It is moderately improved at this visit, but still somewhat painful to flex forward and sideways. There is no radiation of the pain into the posterior thigh, no numbness or weakness in the legs or feet, and no change in the pain with cough or straining. This same pain has occurred several times in the past, and usually resolved spontaneously within a few weeks. Upon questioning, the patient admits being previously told that he has high blood pressure, and has taken medicine for this for up to 2 months in the past. When asked why he stopped the medicine, he said that it was because he felt better. He has not noticed any chest pain, shortness of breath, swelling of the ankles, or change in appetite. He does have several brothers who have been diagnosed as being diabetic.
Physical Examination	The patient walks somewhat stiffly. The throat is pink and clear, the neck shows no adenopathy and carotid pulsations are equal bilaterally. The chest is clear to auscultation, and the heart has no murmers, but the second heart sound is accentuated. There is no peripheral edema.

Topics of discussion regarding case study:

1. What are the major medical problems identified in this patient?
2. What important additional elements of the history should be asked?
3. What additional elements of the physical exam should be done?
4. What is an appropriate plan of management for this patient at this point?
5. What counseling issues would be most appropriate for this patient at this point?

CRITICAL ELEMENTS FOR EVALUATION OF COMPETENCE

- Correct measurement and recording of blood pressure (physicians and nurses)
- Proper diagnosis and classification of degree of hypertension (physician)
- Appropriate non-pharmacologic and pharmacologic management of hypertension (physician)
- Consideration of additive risks in treatment of hypertension (physician)
- Appropriate patient education regarding hypertension, management plan, and life-style modifications (physician and nurse)
- Knowledge of need for referral (physician and nurse)

Measurement of Blood Pressure

Monitoring Protocol

Name of Trainee _____ Date _____

Name of Trainer _____

Step	Action	Did Trainee Correctly Perform?	
		YES √	NO √
1	Client sitting and comfortable Arm resting at level of heart, supported by a table Sleeve removed completely for blood pressure cuff		
2	Position the sphygmomanometer so that it can be easily seen with the mercury level at your eye level		
3	Place the cuff on the arm at least 2 cm. above the elbow crease Cuff bladder should be centered over the brachial artery Make sure the cuff is proper size for the arm		
4	Be sure that the mercury level is at 0		
5	Stethoscope earpieces should be angled forward in the ears		
6	Place the stethoscope diaphragm over the brachial artery		
7	Close the valve on the bulb, and rapidly inflate to approximately 200, or until radial pulse disappears		
8	Open the valve, let the air slowly escape at approximately 4 mm per heartbeat		
9	Note the reading at which the first pulse beat is heard		
10	Continue letting the air escape, and note the reading at which the pulse beat disappears		
11	Allow all air to escape, with the mercury returning to "0"		
12	Remove the blood pressure cuff, and stethoscope. Clean stethoscope head		
13	Was blood pressure reading within 4 mm. of trainer's reading on both systolic and diastolic?		

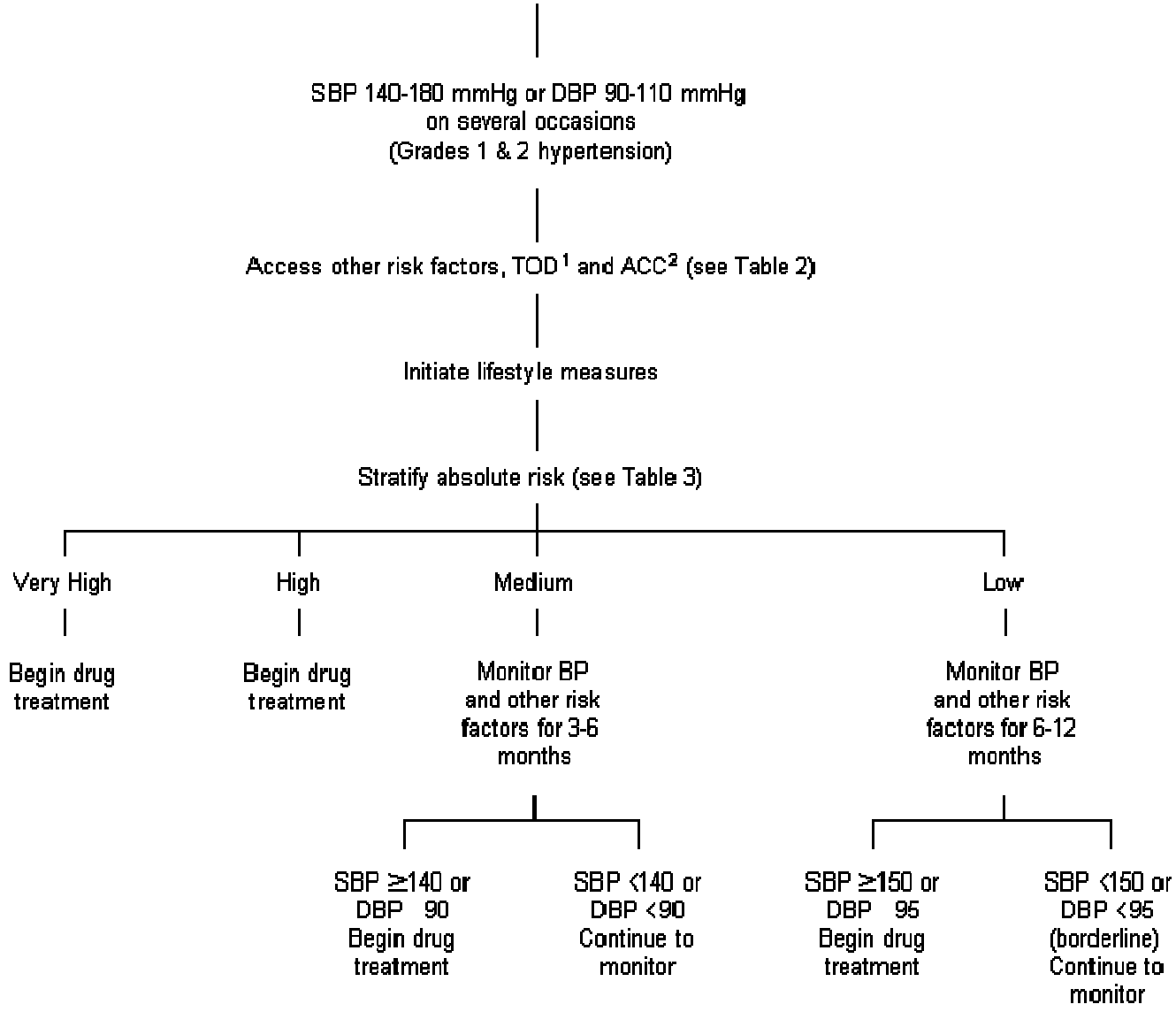
Table 1. Stratification of Risk to Quantify Prognosis

	BLOOD PRESSURE (mmHg)		
Other Risk Factors & Disease History	**Grade 1** (mild hypertension) SBP 140-159 or DBP 90-99	**Grade 2** (moderate hypertension) SBP 160-179 or DBP 100-109	**Grade 3** (severe hypertension) SBP ≥ 180 or DBP ≥ 110
I.. no other risk factors	LOW RISK	MED RISK	HIGH RISK
II. 1-2 risk factors	MED RISK	MED RISK	V HIGH RISK
III. 3 or more risk factors or TOD[1] or diabetes	HIGH RISK	HIGH RISK	V HIGH RISK
IV. ACC[2]	V HIGH RISK	V HIGH RISK	V HIGH RISK

Risk strata (typical 10 year risk of stroke or myocardial infarction): Low risk = less than 15%; medium risk = about 15-20% risk; high risk = about 20-30%; very high risk = 30% or more

1. TOD – Target Organ Damage (Table 2)
2. ACC – Associated Clinical Conditions, including clinical cardiovascular disease or renal disease (Table 2)

Figure 1 Initiation of Treatment



1. TOD - Target Organ Damage (previous WHO Stage 2 hypertension)

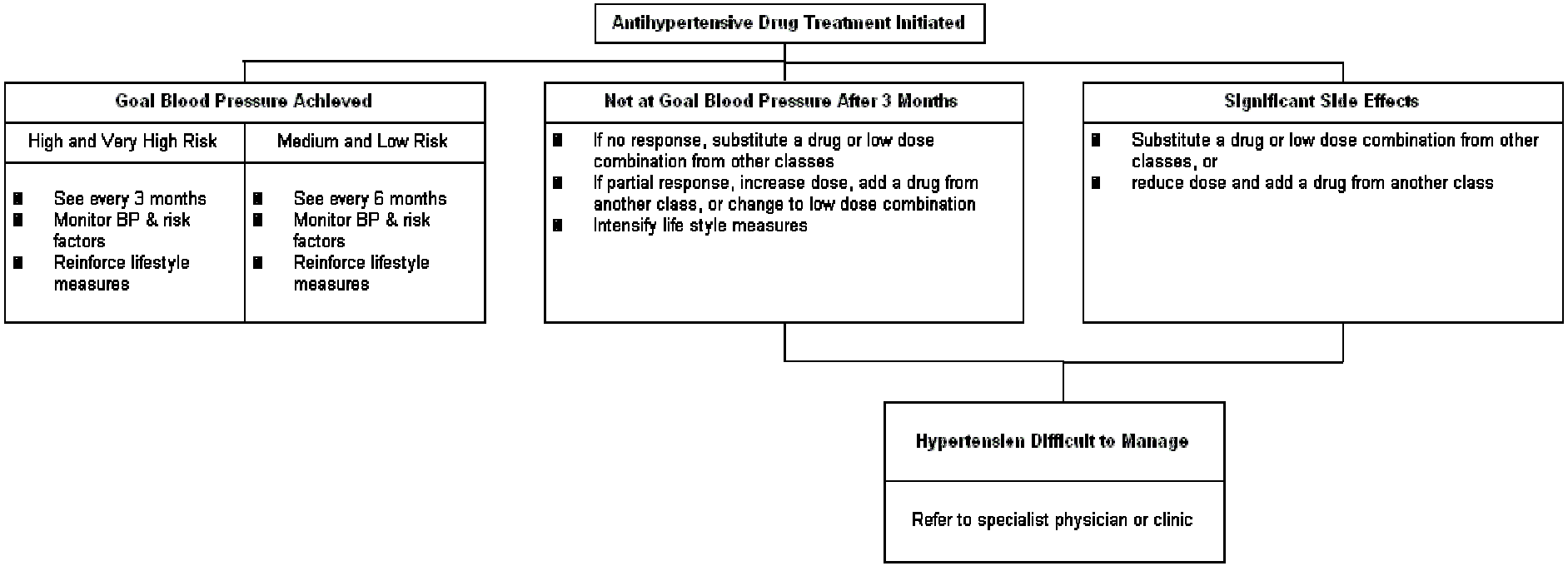
2. ACC - Associated Clinical Conditions including clinical cardiovascular disease and renal disease (previous WHO Stage 3 hypertension)

Table 2: Guidelines for Selecting Drug Treatment of Hypertension

Class of Drug	Compelling Indications	Possible Indications	Compelling Contraindications	Possible Contraindications
Diuretics	Heart failure Elderly patients Systolic hypertension	Diabetes	Gout	Dyslipidaemia Sexually active males
Beta-Blockers	Angina After myocardial infarct Tachyarrhythmias	Heart failure Pregnancy Diabetes	Asthma and chronic obstructive pulmonary disease Heart block[a]	Dyslipidaemia Athletes and physically active patients Peripheral vascular disease
ACE Inhibitors	Heart failure Left ventricular dysfunction After myocardial infarct Diabetic nephropathy		Pregnancy Hyperkalaemia	Bilateral renal artery stenosis
Calcium Antagonists	Angina Elderly patients Systolic hypertension	Peripheral vascular disease	Heart block[b]	Congestive heart failure[c]
Alpha-Blockers	Prostatic hypertrophy	Glucose intolerance Dyslipidaemia		Orthostatic hypotension
Angiotensin II Antagonists	ACE Inhibitor cough	Heart failure	Pregnancy Bilateral renal artery stenosis Hyperkalaemia	

a Grade 2 or 3 atrioventricular block
b Grade 2 or 3 atrioventricular block with verapamil or diltiazem
c Verapamil or diltiazem

Figure 2 Stabilisation, Maintenance and Follow-Up After Initiation of Drug Therapy



HYPERTENSION

_____ □ Male □ Female _____ _____

Name of Patient Date of Birth Date Diagnosis Hypertension

Standard/Date												
Blood Pressure												
Weight												
Cardiac Exam												
Pulmonary Exam												
Edema?												
Ophthalmoscopic Exam (nl/abnl)												
Med./dose												
Med./dose												
Med./dose												
Medication Side Effects?												
Ed √ Diet												
Exercise												
Med Use												
Smoking												
Referral to:												
Followup												

ECG Date_____ Creatinine_____ Date_____ Urea Nitrogen_____ Date_____