

## Clinical Pathways for the Management of Hypertension in Family and Community Practice

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**Background:** Hypertension is a major risk factor for cardiovascular disease. The prevalence of hypertension in the Western Pacific Region is 37% of adults older than 24, while in the Philippines it is 25% of adults 21 years old and above. Several guidelines have been developed for the management of hypertension. All these guidelines have recommendations for assessment and treatment.

**Objectives:** The overall objective of the development and implementation of this clinical pathway is to improve outcomes of patients with hypertension seen in family and community practice.

**Methods:** The PAFP Clinical Pathways Group reviewed published medical literature to identify, summarize, and operationalize the clinical content of diagnostics, interventions and clinical indicators or outcomes to develop an evidence-based clinical pathway in family medicine practice. The group developed a time-related representation of recommendations on patient care processes, in terms of history and physical examination, laboratory tests, pharmacologic and non-pharmacologic interventions as well as social and community strategies to treat hypertension and prevent complications.

**Recommendations:** Recommendations were made based on the number of visits. During the first visit, all adult patients consulting at the clinic should be screened for hypertension with appropriate BP measurement. A thorough history focusing on symptoms, family history using genogram, smoking and other lifestyle and co-existing chronic disease and a thorough physical examination focusing on the weight/BMI, waist/hip ratio, funduscopy, neurological, cardiac, renal and peripheral arteries should be done. For the laboratory, request for 12-lead ECG, urinalysis, FBS, creatinine, serum K and lipid profile to determine co-morbidities and baseline values. If the patient is already diagnosed hypertensive, start/continue medications with either or a combination of thiazide-type diuretic, calcium channel blockers, angiotensin-converting enzyme inhibitors and angiotensin receptor blocker depending on co-morbidities or side effects. But if there is a need for further confirmation, no medication is warranted. Educate the patient about hypertension, risk factors and complications. If medications were prescribed, explain the dose, frequency, intended effect, possible side effects and importance of medication adherence. Lifestyle modifications focusing on weight control, exercise and smoking cessation should be advised. During the first visit it is expected that the patient is aware of the diagnosis of hypertension, its risks factors and complications to encourage compliance.

**Implementation:** Education, training and audit are recommended strategies to implement the clinical pathway.

## INTRODUCTION

Hypertension is a condition of persistently high systemic arterial blood pressure. It is currently defined as a systolic pressure consistently greater than 140 mm Hg or diastolic pressure is consistently 90 mm Hg or more in multiple readings.<sup>1</sup> Blood pressure measurement should be taken on two separate occasion at least one week apart.

Hypertension is a major risk factor for cardiovascular disease. Worldwide, it is estimated that almost half of deaths due to stroke and heart disease are cause by hypertension. Adequate management of hypertension may lead to a significant decrease in stroke and myocardial infarction. The prevalence of hypertension in the Western Pacific Region is 37% of adults older than 24, while in the Philippines it is 25% of adults 21 years old and above.<sup>2</sup> This is approximately 10 million adults in 2008 and the incidence is increasing.<sup>3</sup>

In 2010, hypertension is the leading single risk factor for global burden of disease.<sup>4</sup> The annual mortality per 100,000 people from hypertensive heart disease in Philippines has increased by an average of 3.9% a year since 1990. In 2013 there were 696 deaths per 100,000 among men 690 deaths per 100,000 among women. The mortality rate is highest at age 80 and above in both sexes.<sup>5</sup> The cost of treatment is usually attributed to antihypertensive drugs (42.7%), followed by hospital admission (28.4%), clinic visits (15.1%) and laboratory tests (10.6%).<sup>6</sup>

Several guidelines have been developed for the management of hypertension. All these guidelines have recommendations for assessment and treatment. Aside from pharmacologic treatment, they also recommended lifestyle interventions like smoking cessation, reduction of sodium and fat intake, aerobic exercise, maintenance of ideal body mass index and moderation of alcohol intake. For patients with co-morbidity like diabetes and dyslipidemia, pharmacologic treatment to control blood sugar and cholesterol is advised.<sup>7</sup> These guideline recommendations are published in several medical journals from Canada, USA, Europe and UK. This clinical pathway for hypertension is an attempt to implement these recommendations in family and community medicine practice in the Philippines.

The overall objective of the development and implementation of this clinical pathway is to improve outcomes of patients with hypertension seen in family and community practice. This is expected to be achieved by: 1) Improving the quality of care for patients with hypertension in individual clinic of family and community medicine practitioners, 2) Standardizing the quality of care among the members of the Philippine Academy of Family Physicians, Inc., 3) Implementing organizational and health system strategies to promote the use of this clinical pathway.

## Methods of Development and Implementation

The PAFP Clinical Pathways Group reviewed published medical literature to identify, summarize, and operationalize the clinical content of diagnostics, interventions and clinical indicators or outcomes to develop an evidence-based clinical pathway in family medicine practice. The group developed a time-related representation of recommendations on patient care processes, in terms of history and physical examination, laboratory tests, pharmacologic and non-pharmacologic interventions as well as social and community strategies to treat hypertension and prevent complications.

The group adopted several strategies in developing the recommendations. The first strategy is emphasizing on evidence-based recommendations as recommended assessments and interventions. The second strategy is recognition of potential variations between-patient and between specific practice settings. The third strategy is the recognition of “stakeholder groups” outside of family and community practice with careful attention to getting their opinion and support but without sacrificing the objectives of the project. The fourth strategy is emphasis on the commitment to establishment of the ultimate goal of improving the effectiveness, efficiency and quality of patient care in family and community practice.

The evidences for the patient care processes were reviewed and summarized as notes on the recommendations. The clinical pathway was then disseminated to the selected PAFP chapters and members and other stakeholders for

consensus development. Dissemination was publication in the Filipino Family Physician journal, conference presentations and focused group discussions.

The implementation of clinical pathways to be adopted by the PAFP will be quality improvement activities in a form of patient record reviews, audit and feedback. Audit standards will be the assessment and intervention recommendations in the clinical pathway. Implementation of clinical pathways will be at the practice and organizational levels. Practice level can be a simple count of family and community medicine practitioners using and applying the clinical pathways. Organizational outcomes can be activities of the PAFP devoted to the promotion, development, dissemination and implementation of clinical pathways.

### Grading of the Recommendations

The PAFP QA Committee met as a panel and graded the recommendations as shown in Table 1. The grading system was a mix of the strength of the reviewed published evidence and the consensus of a panel of experts. In some cases, the published evidence may not be applicable if Philippine family practice setting, so a panel grade based on the consensus of clinical experts was also used. Thus if the recommendation was based on a published evidence that is a well done randomized controlled trial and the panel of expert voted unanimously for the recommendation, it was given a grade of A-I. If the level of evidence is based on an observational study but the panel still unanimously considered the recommendation, the grade given was A-II and if the level of evidence is just an opinion but the panel still unanimously recommended it, the grade was A-III.

**Table 1.** Grading of the recommendations.

Panel Grade Level	Evidence Grade Level		
	1	2	3
A	A-I	A-II	A-III
B	B-I	B-II	B-III
C	C-I	C-II	C-III

### Panel Grade Levels

- A - All the panel members agree that the recommendation should be adopted because it is relevant, applicable and will benefit many patients.
- B - Majority of the panel members agree that the recommendation should be adopted because it is relevant, applicable in many areas and will benefit many patients.
- C - Panel members were divided that the recommendation should be adopted and is not sure if it will be applicable in many areas or will benefit many patients.

### Evidence Grade Levels

- I - The best evidence cited to support the recommendation is a well-conducted randomized controlled trial. The CONSORT standard may be used to evaluate a well-conducted randomized controlled trial.
- II - The best evidence cited to support the recommendation is a well-conducted observational study i.e. match control or before and after clinical trial, cohort studies, case control studies and cross-sectional studies. The STROBE statement may be used to evaluate a well-conducted observational study.
- III - The best evidence cited to support the recommendation is based on expert opinion or observational study that did not meet the criteria for level 2.

In the implementation of the clinical pathways, the PAFP QA committee strongly recommend compliance to guideline recommendations that are graded as either A-I, A-II or B-I. However, the committee also recommend using sound clinical judgment and patient involvement in the decision making before applying the recommendations.

Pathway Recommendations

Visit	Pathway Tasks				Patient Outcomes
	History and Physical Examination	Laboratory	Pharmacologic Intervention	Non-pharmacologic Interventions	
First Visit	<p>___ All adult patients consulting at the clinic should be screened for high blood pressure with appropriate BP measurement (A-III)</p> <p>___ Make a thorough history focusing on symptoms, family history using genogram, smoking and other lifestyle and co-existing chronic disease (A-II)</p> <p>___ Make thorough physical examination focusing on the weight/BMI, waist/hip ratio, funduscopy, neurological, cardiac, renal and peripheral arteries (A-II)</p> <p><b>Pathway decisions</b></p> <p>___ If BP is <math>\geq 140/90</math> mmHg with signs and symptoms of acute end-organ damage, consider referral to hospital (A-III)</p> <p>___ If the initial BP is <math>\geq 180/110</math> mmHg consider hypertension and start medication. (A-III)</p> <p>___ If BP is <math>\geq 140/90</math> mmHg and with previous history of high BP taken by another health professional within the month consider hypertension and start medication. (A-III)</p> <p>___ If BP is <math>\geq 140/90</math> mmHg and first time high BP confirm with home BP measurements or second visit within 4 weeks (A-III)</p>	<p><b>Diagnosed hypertension</b></p> <p>___ Request for 12-lead ECG, urinalysis, FBS, creatinine, serum K and lipid profile to determine co-morbidities and baseline values (B-II)</p> <p><b>Pathway decisions</b></p> <p>___ For patients with previously diagnosed co-morbidities, refer to specific pathway for management of co-morbidity (A-III)</p>	<p><b>Diagnosed hypertension</b></p> <p>___ Start/continue medications with either or a combination of thiazide-type diuretic, calcium channel blockers, angiotensin-converting enzyme inhibitors and angiotensin receptor blocker depending on co-morbidities or side effects (A-I)</p> <p><b>Need to confirm hypertension</b></p> <p>___ No medications are warranted (A-III)</p> <p><b>Patients for emergency referral</b></p> <p>___ Consider giving a single dose of anti-hypertensive prior to transport (A-I)</p>	<p><b>Patient interventions</b></p> <p>___ Educate the patient about hypertension, risk factors and complications (A-I)</p> <p>___ If medications were prescribed, explain the dose, frequency, intended effect, possible side effects and importance of medication adherence (A-I)</p> <p>___ Lifestyle modifications focusing on weight control, exercise and smoking cessation (A-I)</p> <p><b>Family interventions</b></p> <p>___ Inquire and recommend family members' lifestyle activities (A-I)</p> <p><b>Community interventions</b></p> <p>___ Inquire for community lifestyle activities (A-III)</p> <p><b>Continuing care</b></p> <p>___ Follow-up after 1-2 weeks (A-II)</p> <p>___ Offer family wellness package (A-III)</p>	<p>___ Aware of initial diagnosis (A-III)</p> <p>___ Aware of risk factors and complications (A-III)</p> <p>___ Aware of importance of adherence to diagnostics and interventions (A-III)</p>
Variations					

Visit	Pathway Tasks				Patient Outcomes
	History and Physical Examination	Laboratory	Pharmacologic Intervention	Non-pharmacologic Interventions	
Second Visit	<p>___ Review and note any change in history focusing on symptoms, family history using the genogram, smoking and other lifestyle and co-existing chronic disease (A-II)</p> <p>___ Repeat and note any change in physical examination focusing on the weight/BMI, waist/hip ratio, funduscopy, neurological, cardiac, renal and peripheral arteries (A-II)</p> <p>___ Review BP monitoring if available (A-II)</p> <p>___ Review laboratory results and establish the presence of other risk factors and co-morbidities (A-II)</p> <p><b>Pathway decisions</b></p> <p>___ If home BP and/or second visit BP are <math>\geq 140/90</math> mmHg diagnose as hypertension (A-II)</p> <p>___ If home BP and/or second visit BP are <math>&lt; 140/90</math> mmHg rule out hypertension but monitor after 6-12 months (A-III)</p>	<p><b>Diagnosed hypertension</b></p> <p>___ Complete request for 12-lead ECG, urinalysis, FBS, creatinine, serum K and lipid profile to determine co-morbidities and baseline values (B-II)</p> <p><b>Pathway decisions</b></p> <p>___ For patients with previously diagnosed co-morbidities, refer to specific pathway for management of co-morbidity (A-III)</p>	<p><b>Diagnosed hypertension</b></p> <p>___ Start/continue medications with either or a combination of thiazide-type diuretic, calcium channel blockers, angiotensin-converting enzyme inhibitors and angiotensin receptor blocker depending on co-morbidities or side effects (A-I)</p> <p><b>With co-morbidities</b></p> <p>___ Refer to clinical pathway of the co-morbidity (A-III)</p>	<p><b>Patient interventions</b></p> <p>___ Enhance education about hypertension, risk factors and complications (A-I)</p> <p>___ If medications were prescribed, repeat explanation about the dose, frequency, intended effect, possible side effects and importance of medication adherence (A-I)</p> <p>___ Enhance advice on lifestyle modifications focusing on weight control, exercise and smoking cessation (A-I)</p> <p><b>Family interventions</b></p> <p>___ Enhance recommendation for family members' appropriate lifestyle activities (A-I)</p> <p><b>Community interventions</b></p> <p>___ Recommend participation in appropriate community lifestyle activities (A-III)</p> <p><b>Continuing care</b></p> <p>___ Follow-up after 1 month until BP target is achieved and every 3-6 months if BP target is already achieved (A-III)</p>	<p>___ Improved BP control (Age 18 to 59: <math>&lt;140/90</math> mmHg; Age <math>&gt; 60</math>: <math>&lt;150/90</math> mmHg) (A-II)</p> <p>___ Body mass index between 18.5-24.9 kg/m<sup>2</sup> (A-II)</p> <p>___ Modification of risk factors i.e. diet, lifestyle, smoking and exercise (A-II)</p> <p>___ Absence of new complications (A-III)</p> <p>___ Adherence to diagnostics and interventions (A-II)</p> <p>___ Agreed plan for family intervention (A-III)</p> <p>___ Agreed plan for community involvement (A-III)</p>
Variations					

Visit	Pathway Tasks				Patient Outcomes
	History and Physical Examination	Laboratory	Pharmacologic Intervention	Non-pharmacologic Interventions	
Continuing Visit	<p>___ Review and note any change in history focusing on symptoms, family history using genogram, smoking and other lifestyle and co-existing chronic disease (A-II)</p> <p>___ Repeat and note any change in physical examination focusing on the weight/BMI, waist/hip ratio, funduscopy, neurological, cardiac, renal and peripheral arteries (A-II)</p> <p>___ Review laboratory results and establish the presence of other risk factors and co-morbidities (A-II)</p> <p><b>Pathway decisions</b></p> <p>___ Enhance/revise pharmacologic and non-pharmacologic interventions until BP control is achieved (Age 18 to 59: &lt;140/90 mmHg; Age &gt; 60: &lt;150/90 mmHg) (A-III)</p>	<p><b>Diagnosed hypertension</b></p> <p>___ After 6-12 months repeat for 12-lead ECG, urinalysis, FBS, creatinine, serum K and lipid profile (B-II)</p> <p><b>Pathway decisions</b></p> <p>___ For patients with previously diagnosed co-morbidities, refer to specific pathway for management of co-morbidity (A-III)</p>	<p><b>Diagnosed hypertension</b></p> <p>___ Continue/revise medications with either or a combination of thiazide-type diuretic, calcium channel blockers, angiotensin-converting enzyme inhibitors and angiotensin receptor blocker depending on co-morbidities or side effects (A-I)</p> <p><b>With co-morbidities</b></p> <p>___ Refer to clinical pathway of the co-morbidity (A-III)</p>	<p><b>Patient interventions</b></p> <p>___ Enhance education about hypertension, risk factors and complications (A-I)</p> <p>___ If medications were prescribed, repeat explanation about the dose, frequency, intended effect, possible side effects and importance of medication adherence (A-I)</p> <p>___ Enhance advice on lifestyle modifications focusing on weight control, exercise and smoking cessation (A-I)</p> <p><b>Family interventions</b></p> <p>___ Enhance recommendation for family members' appropriate lifestyle activities (A-I)</p> <p><b>Community interventions</b></p> <p>___ Recommend participation in appropriate community lifestyle activities (A-III)</p> <p><b>Continuing care</b></p> <p>___ Follow-up after 1 month until BP target is achieved then every 3-6 months if BP target is already achieved (A-III)</p>	<p>___ Improved BP control (Age 18 to 59: &lt;140/90 mmHg; Age &gt; 60: &lt;150/90 mmHg) (A-II)</p> <p>___ Body mass index between 18.5-24.9 kg/m<sup>2</sup> (A-II)</p> <p>___ Modification of risk factors i.e. diet, lifestyle, smoking and exercise (A-II)</p> <p>___ Absence of new complications (A-III)</p> <p>___ Adherence to diagnostics and interventions (A-II)</p> <p>___ Agreed plan for family intervention (A-III)</p> <p>___ Agreed plan for community involvement (A-III)</p>
Variations					

## Notes on the Recommendations

The subsequent sections discuss the clinical evidences to support the recommendations in this clinical pathway. The recommendations are packages of health care interventions designed to improve clinical outcomes of patients with hypertension. This is supposed to be implemented by family and community doctors in their outpatient clinics. The recommendations cover history and physical examination, laboratory, pharmacologic and non-pharmacologic intervention. Pharmacologic interventions include prescription of anti-hypertensive drugs. Non-pharmacologic interventions include health education, lifestyle modification, and family and community intervention. The interventions are designed to achieve patient outcomes that include blood pressure control, control of risk factors, prevention of complications and improved quality of life.

The current evidences on hypertension treatment look at the effectiveness of individual intervention. Currently, a package of interventions including: 1) healthy lifestyle counseling (smoking cessation, and salt, oil, and alcohol reduction); 2) prescription of a combination of drugs (antihypertensives, aspirin, and statin); and 3) adherence support for drug compliance and healthy lifestyle change is now being tested in a cluster randomized controlled trial. The primary outcome is the incidence of severe cardiovascular events over 24 months of follow-up. This trial will show the effectiveness of the comprehensive cardiovascular event reduction package for hypertensive patients in routine practice. This will also identify the barriers and facilitators to implementation and get informed advise on policy and practice change.<sup>8</sup>

### First Visit

#### *History and Physical Examination*

It is recommended that a blood pressure measurement should be done to all patients consulting in a family or community clinic. It is however not necessary to measure

the blood pressure of every patient at every clinic visit. The Canadian Hypertension Education Program recommended measurement only during appropriate visits that include periodic health examinations, urgent office visits for neurologic or cardiovascular-related issues, medication renewal visits, and other visits where the primary care practitioner deems it an appropriate opportunity to monitor blood pressure.<sup>9</sup>

History and physical examination should be done to all patients suspected or diagnosed with hypertension. History should include checking for family history using the genogram. Family history of hypertension, cardiovascular and cerebrovascular disease and diabetes should be actively elicited. The physical examination should focus not only on the blood pressure measurement but also with the body mass index. Organ system that may be damaged by high blood pressure should be examined like the central nervous system, retina, heart, kidneys and peripheral arteries. All these findings should be clearly written in the patient's clinical record.

#### **Checkbox for History**

- What is your highest/lowest blood pressure in the past? What is your usual blood pressure?
- When did it start? When did it happen? When were you diagnosed as hypertensive?
- Obtain following information: extent of end-organ damage (eg, heart, brain, kidneys, eyes), assessment of patients' cardiovascular risk status and exclusion of secondary causes of hypertension
- What happened during that time? What were the triggering/contributory factors? What were you doing that time?
- What symptoms did you experience? Headache, dizziness, blindness/blurring of vision, chest pain/discomfort, difficulty of breathing/shortness of breath, epigastric pain, difficulty in urination, hematuria, edema (face, upper and lower extremities), leg/foot pain?
- Aside from hypertension what other diseases/illnesses does the patient have?
- Past Medical History: If the patient is a male, ask if he took any pill/powder form for protein building? If the patient is a female, did she take any oral contraceptive pill? Intake of other maintenance drugs/vitamins/herbal medicines/supplements

- Family History: hypertension, coronary artery disease, sudden death, cerebrovascular accident, diabetes mellitus, hyperthyroidism, cancer. Draw genogram.
- Lifestyle: diet: what do you usually eat? What are you fond of? Do you have food preferences? Do you eat fish, vegetables and fruits? If yes, how many servings do you get per meal? Do you use condiments? Give a sample menu for a day. Are you taking any supplements? Any weight gain/loss? Exercise/any form of physical activity? Sports? How often?
- Substance use/abuse: smoking/tobacco alcohol illicit drugs energy drinks caffeine/coffee. If yes, ask for the amount, how often? What does he feel after?
- Occupation: time of work? What are his preparations before going to work? Is he pressured? Do you work overtime? How often? Was there any instance that you were late or absent due to high blood or any other disease? When was the last time you were on a vacation?
- Last check-up? Last blood chemistry done? What were the results? Increased total cholesterol/LDL and decreased HDL

#### Checkbox for Physical Examination

- Blood pressure measurement: both arms and if feasible in one leg
- Office reading (clinic):
- Other vital signs: cardiac rate, respiratory rate, temperature, BMI
- General: conscious, coherent, oriented to time, person and place
- Skin: color (cyanosis)
- Fundoscopic exam: floaters, arteriovenous nicking, exudates, hemorrhages, papilledema
- Examine the neck: distended veins, enlarged thyroid gland and listen for carotid bruits
- Cardiac exam: displacement of apex, sustained and enlarged apical impulse, presence of heaves, thrills, murmurs
- Abdomen: waist circumference, waist to hip ratio, organomegaly, mass, listen for renal artery bruit
- Extremity: edema, deformity, palpation of pulses (absent, weak, delayed), mid-upper arm circumference
- Neurologic exam: cranial nerves, cerebellar function, motor and sensory
- For adults, Beck's Depression Scale may be used to assess possible psychosocial stressors\*
- For the elderly please do Mini-Mental Status Examination and Geriatric Depression Scale\*

\* *These may be done in cases where compliance to medication may be affected by these findings.*

The history and physical examination must be written legibly in a clinical record. A random sample of 18 general practice in London showed that 340 (47%) of 716 patients consulting in a 10 year period had no blood pressure readings in their records. Of 84 hypertensive patients with records, 62 (74%) had no physical examination performed by the physician. Absence of data from the records may suggest deficiencies in the management of hypertension in general practice.<sup>10</sup> This should be avoided in the Philippine family and community medicine practice.

Assessment of absolute cardiovascular risk is a rational method of managing hypertension. Determination of the presence or absence of these factors must be the focus of history taking. The CONTROLRISK study was designed to determine how the cardiovascular risk profile of the hypertensive patients were being conducted at primary care and specialist setting in Spain. In this study, target organ damage and associated clinical conditions were more frequently obtained in specialist setting. The most common risk factor was age. The most frequently reported target organ damage was left ventricular hypertrophy. Ischemic heart disease was the most common associated clinical condition. In this study, physicians tend to underestimate the cardiovascular risk in daily clinical practice.<sup>11</sup> A similar study in UK also showed that risk was correctly estimated in 21% of patients, underestimated in 63% of patients, and overestimated in 16% of patients. It is therefore recommended that family and community medicine practitioners use cardiovascular risk charts or tables in the management of hypertensive patients.<sup>12</sup>

Office BP measurement (OBPM) should be performed using an electronic oscillometric device. Measurement by aneroid sphygmomanometers has not been found to be accurate. Maintenance of the quality of aneroid sphygmomanometers has also been low. A study to check the instruments against British Hypertension Society guidelines, only 38.8% of anaeroid instruments were accurate at all test pressure levels. The defects noted could have an impact on diagnosis and monitoring of hypertension.<sup>13</sup> If a patient has elevated blood pressure reading readings in the office ( $\geq 140/90$ ), a series of standardized out-of-office blood

pressure measurements should be performed in order to rule out white-coat hypertension.<sup>14</sup>

### Laboratory Tests

Most studies on hypertension profiling include not only history and physical examination but also laboratory evaluation. In one study, medical examination included weight, height, blood pressure and laboratory analyses including fasting blood glucose, serum cholesterol, serum triglycerides, electrocardiogram and simple spirometry.<sup>15</sup> Caution must be raised against over requesting for laboratory tests. In clinics where office chemistry machine is available, the test requests increased but the level of blood pressure control was the same.<sup>16</sup> Since most outpatient treatment is out-of-pocket, it is better to save some money for drugs.

### Pharmacologic Interventions

There is enough evidence that pharmacologic treatment of hypertension prevents stroke, congestive heart failure, and other blood pressure-related complications. Even among the elderly, the Systolic Hypertension in the Elderly Program (SHEP) also showed a reduction in myocardial infarction and other coronary

events in older patients. Similar findings of cardiovascular mortality reduction was also seen in the Swedish STOP-Hypertension Trial and the British MRC Trial in Older Patients. These studies have in common the use of diuretics and/or beta blockers.<sup>17</sup>

In general, the initial antihypertensive treatment should include one or a combination of thiazide-type diuretic, calcium channel blocker, angiotensin-converting enzyme inhibitor, or angiotensin receptor blocker. But angiotensin-converting enzyme inhibitor and angiotensin receptor blocker cannot be combined.<sup>18</sup> The choice of drug class will depend on the co-morbid condition, cost and patient preference after these have been explained.

After deciding on what drug class to prescribe, the next is to choose the specific drug. The choice of individual drugs depend on efficacy, safety, suitability, and cost. There are number of options within each class. It may be good for the family and community doctor to narrow their choice to only 1-2 preferred options for a particular patient based on the above factors. This may be included into a personal formulary or essential drug list. This will allow the physician to have more experience and become more familiar with the expected drug effect, adverse effects, and interactions. A new drug also needs to be evaluated before it is added to the personal formulary.<sup>19</sup>

**Table 1.** Antihypertensive Drugs for Maintenance

Drugs	Dose	Indication	Adverse Reaction	Remarks
<b>ACE Inhibitors (ACEIs)</b>				
Captopril*	25 mg tab 25-50 mg per day BID	Heart failure, left ventricular (LV) dysfunction, diabetic, myocardial infarction (MI)	Cough, hyperkalemia	Contraindicated in pregnancy and lactation
Enalapril*	5, 10 and 20 mg tab 5-40 mg per day BID		Headache, dizziness, fatigue, nausea, diarrhea, decreased hgb/hct, cough, hyperkalemia	

Drugs	Dose	Indication	Adverse Reaction	Remarks
<b>Angiotensin II Receptor Antagonists (ARBs)</b>				
Candesartan*	8 and 16 mg tab 8 – 16 mg per day OD	Heart failure and impaired LV systolic function	Angioedema, hyperkalemia, hypoglycemia, acute renal failure, hepatic dysfunction, agranulocytosis, rhabdomyolysis, interstitial pneumonia	Contraindicated in pregnancy and lactation
Irbesartan*	150 and 300 mg tab 150 – 300 mg per day OD	Diabetics and mild renal disease	Fatigue, edema, nausea, vomiting, dizziness, headache	Contraindicated in moderate to severe renal impairment, pregnancy and lactation
Losartan*+	50 and 100 mg tab 50 – 100 mg per day OD	LVH and for renal protection in Type 2 diabetic patients	Diarrhea, abdominal pain, nausea, headache, dizziness, hyperkalemia, hypotension, URI symptoms, angioedema, anemia, liver function abnormalities, vomiting, myalgia, arthralgia, photosensitivity	Contraindicated in pregnancy and co-administration with aliskiren in diabetic patients
Olmesartan	10, 20 and 40 mg tab 10 – 40 mg per day OD		Dizziness	Contraindicated in pregnancy (2nd & 3rd trimester) and lactation
Telmisartan*	40 and 80 mg tab 40 – 80 mg per day OD	Prevention of cardiovascular morbidity and mortality in patients ≥ 55 y/o with high CV risk	Diarrhea, abdominal pain, nausea, headache, dizziness, fatigue, light-headedness, hypotension, URI symptoms, hyperkalemia, intermittent claudication and skin ulcer	Contraindicated in cholestasis, biliary tract disorder, severe hepatic impairment, pregnancy and lactation Food decrease bioavailability
Valsartan*	80, 160 and 320 mg tab 80 – 320 mg per day OD for maintenance BID for HF and MI °40 mg per day for children <35 kg	Heart failure, post-MI, delay of diabetes progression in hypertensives at CV risk and children 6 – 18 y/o	Dizziness, postural dizziness, hypotension, renal failure and impairment	Contraindicated in pregnancy
<b>Cardioselective Beta-blockers (BBs)</b>				
Atenolol*	25, 50 and 100 mg tablet 25 – 100 mg per day OD	Angina, MI or heart failure	Bradycardia, decreased libido	Contraindicated in sinus bradycardia, cardiogenic shock, acute unstable HF
Metoprolol*	50 and 100 mg tablet 100 – 400 mg per day BID	Angina, MI or heart failure	Fatigue, weakness, orthostatic hypotension, impotence, drowsiness, bradycardia, pulmonary edema, CHF	Contraindicated in sinus bradycardia, cardiogenic shock, acute unstable HF

Drugs	Dose	Indication	Adverse Reaction	Remarks
Propranolol	10 and 40 mg tab 160-320 mg per day BID	Angina, anxiety, migraine, post-MI, arrhythmia	Fatigue, weakness, orthostatic hypotension, impotence, drowsiness, bradycardia, pulmonary edema, CHF	Take before meals Contraindicated in patients with history of bronchial asthma or bronchospasm, cardiogenic shock, tachycardia, 2nd and 3rd degree block
Calcium Channel Blockers (CCBs)				
Nifedipine	5, 30 mg cap 5-30 mg per day		Headache, vomiting	5 mg preparation is short-acting 30 mg preparation is extended- release
Amlodipine*+	5 and 10 mg tab 5-10 mg per day OD		Peripheral edema, headache, sleep, urinary, visual and taste disturbance, abdominal pain, nausea, palpitations, flushing	Contraindicated for unstable angina, uncompensated heart failure, acute MI, pregnancy
Felodipine*	2.5, 5 and 10 mg tab 2.5 – 10 mg per day OD		Peripheral edema, headache, flushing, palpitations	Contraindicated for unstable angina, uncompensated heart failure, acute MI, pregnancy
Combined Alpha & Beta Blocker				
Carvedilol*	6.25 and 25 mg tab 6.25 – 50 mg per day OD - BID	Angina and mild to moderate heart failure	Diarrhea, nausea, dizziness, abnormal or blurred vision	Contraindicated in unstable heart failure, 2nd or 3rd degree AV block, severe bradycardia or hypotension, history of COPD or bronchospasm
Thiazide Diuretics				
Hydrochlorothiazide	12.5 and 25 mg tab 12.5 - 100 mg per day OD	Edema and nephrogenic diabetes insipidus	Dry mouth, thirst, weakness, lethargy, muscle pain, cramps, hypotension	Contraindicated in renal impairment, can cause hyperglycemia
Combination drugs				
Hydrochlorothiazide- losartan	Hydrochlorothiazide (50-100mg)-losartan (12.5-25mg)		Dry mouth, thirst, weakness, lethargy, muscle pain, cramps, hypotension diarrhea, abdominal pain, nausea, headache, dizziness, URI symptoms, cough	Contraindicated in renal impairment, can cause hyperglycemia, pregnancy

\* Drugs included in PNF 2008

+ Available at local health centers under the DOH program for noncommunicable diseases

CSAP – Chronic Stable Angina Pectoris

DM – Diabetes Mellitus

HCTZ – Hydrochlorothiazide

HF – Heart Failure

MI – Myocardial Infarction

### *Non-pharmacologic Interventions*

Knowledge about patient-related determinants of adherence to interventions (pharmacologic and non-pharmacologic) is needed to improve the management and outcomes of hypertensive patients. One study tried to measure the association between patient-related determinants (medication self-efficacy, beliefs about medication and hypertension, social support, and satisfaction with care) and treatment adherence. Medication self-efficacy and fewer concerns about medication use were associated with improved pharmacologic and non-pharmacologic intervention adherence. Family and community doctors should support medication adherence by paying attention to patients' medication self-efficacy, the concerns they may have about medication use and patients' perceptions on hypertension.<sup>20</sup> This can be achieved by patiently explaining hypertension as a health problem and the risks associated with it. The medication dose, effect, potential side effect and cost should also be explained. This will eventually lead to adherence to interventions.

A cross sectional study in family practice clinics showed that two-thirds of patients described hypertension based on biomedical definition. Half of them believed that stress was a cause of their high blood pressure; two-thirds were aware that stroke and heart attack respectively are possible consequences of hypertension. As a result, three-quarters were fully adherent to their medications in the preceding month.<sup>21</sup> This study showed that appropriate awareness of hypertension and its consequences resulted to an improved adherence to interventions.

Despite the absence of strong evidence, most family physicians should still offer non-pharmacological management at the first consultation before prescribing medication. However, few offered detailed and structured interventions. Dietary therapy, restriction of alcohol consumption and exercise were suggested by most. Restriction of sodium intake and behavioural therapy were less popular non-pharmacological interventions. These non-pharmacologic advices were consistent with current guidelines on the treatment of hypertension.<sup>22</sup> In order to

accommodate cultural variations, it is advised that family and community medicine practitioners should develop a structured non-pharmacologic intervention program. Use of flyers, audio visual presentation at the waiting room and face-to-face health education may be used.

The purpose of patient information leaflets is to inform patients about the administration, precautions and potential side effects of their prescribed medication. However, this must be prepared carefully. One study showed that current description of potential risk information caused feelings of fear and anxiety to the patients. Flyers need to convey potential risk information in a language that is less frightening while retaining the necessary information.<sup>23</sup>

Dietary fat plays a major role in the development of cardiovascular disease. Modification of fat intake could have a preventive potential. The guideline of the German Nutrition Society recommended to reduce total and saturated fat intake. It also recommended increased intake of polyunsaturated fatty acids. A high fat intake increases the risk of obesity with probable evidence when total energy intake is not controlled for. When energy intake is controlled for, there is probable evidence for no association between fat intake and risk of obesity.<sup>24</sup> There should be a balance between calorie source from fats and carbohydrates.

There are few randomized controlled trial studies on the effectiveness of dietary intervention for hypertensive patients in family practice. But family and community practice is an ideal setting for the provision of lifestyle interventions for patients with hypertension. There is currently an ongoing randomized controlled trial that may release its results soon. The trial will test a behaviourally-based, matched prescriptive physical activity and diet change program. The primary goal is to increase physical activity and improve dietary intake. The results will provide scientific rationale for the implementation of this lifestyle intervention in primary care.<sup>25</sup>

With regards to advice on exercise, the results of a systematic review suggested that physical activity of moderate intensity involving rhythmic movements with the lower limbs for 50-60 minutes, 3 or 4 times per week, reduces blood pressure and appears to be more effective

than vigorous exercise. With this type of exercise, harm is uncommon and is generally restricted to musculoskeletal strain. Injury occurs more often with jogging than with walking, cycling or swimming. People with mild hypertension should engage in 50-60 minutes of brisk walking or cycling, 3 or 4 times per week to reduce blood pressure. Exercise should be prescribed as an adjunctive intervention to pharmacologic therapy for hypertension. People who do not have hypertension should also participate in regular exercise as it reduce the risk of coronary artery disease.<sup>26</sup>

A systematic review of randomized clinical trials was conducted to evaluate the acceptability and usefulness of computerized patient education interventions. Most interventions used instructional programs for educational intervention. Others used information support networks and computer systems for health assessment and history-taking. Most studies reported positive results for interactive educational intervention. Computerized educational interventions can lead to improved health status in several major areas of care and serve as a valuable supplement to face-to-face education with physicians.<sup>27</sup>

**Table 2.** Patient-directed Non-pharmacologic Interventions.

Goals	Recommendations: EDUCATE patients on the following
Health Education	Lifetime risk of hypertension hypertension increases with advancing age The higher the BP, the greater the chance of heart attack, HF, stroke, and kidney diseases
BP control BP goal	For those >50 years of age, will reach the DBP goal once the SBP goal is achieved, the primary focus should be on attaining the SBP goal In patients with hypertension and diabetes or renal disease, the BP goal is <130/80 mmHg Treating SBP and DBP to targets that are <140/90 mmHg is associated with a decrease in CVD complications Goal blood pressure targets should be reached within a month of starting treatment either by increasing the dose of an initial drug or by using a combination of medications*
BP monitoring	Clinicians should provide to patients, verbally and in writing, their specific BP numbers and the BP goal of their treatment
Compliance	Emphasize that antihypertensive therapy has been associated with reductions in (1) stroke incidence, (2) myocardial infarction (MI), and (3) Heart Failure (HF), hence importance of compliance
Target weight	Maintain normal body weight (body mass index 18,5-24.9 kg/m <sup>2</sup> ) Weight loss of as little as 10 lbs (4.5 kg) reduces BP and/or prevents hypertension in a large proportion of overweight persons
Diet	Adoption of the Dietary Approaches to Stop Hypertension (DASH) eating plan Consume a diet rich in fruits, vegetables, and low fat dairy products with a reduced content of saturated and total fat Dietary sodium should be reduced to no more than 100 mmol per day (2.4 g of sodium or 6 g sodium chloride) Decrease portion sizes for meals and snacks Decrease frequency and consumption of –containing beverages
Fitness	(when able) Engage in regular aerobic physical activity such as brisk walking at least 30 minutes per day most days of the week or moderate to vigorous activity 3–4 days a week averaging 40 min per session* Increase physical activity such as walking, biking, aerobic dancing basketball and other sports Decrease time in sedentary activities such as watching television, playing videogames or on line
Moderation of alcohol intake and smoking cessation	Alcohol intake should be limited to no more than 1 oz (30 mL) of ethanol, the equivalent of two drinks per day in most men and no more than 0.5 oz of ethanol (one drink) per day in women and lighter weight persons Patients should be strongly counseled to quit smoking
Others	Control blood glucose and lipids*
Follow up	most patients should return for follow up and adjustment of medications at monthly intervals or until the BP goal is reached

**Table 3.** Family-directed Non-pharmacologic Interventions.

Goals	Recommendations
Lifestyle Family Diet	Encourage family meals adhering to DASH eating plan, wherein food served should be HIGH in: Fruits and vegetables (4-5 servings each per day; fiber (7-8 servings per day); low fat dairy products (2-3 servings per day); lean meat (2 servings per day); calcium; magnesium; potassium LOW in saturated fat, cholesterol, salt such as unsalted nuts, almonds, peanuts, chocolate, cocoa butter, coconut Increase intake of polyunsaturated fatty acids such as *Foods and oils including walnuts, sunflower seeds, fish such as salmon, mackerel, corn oil, soybean oil
Fitness	Encourage family members engaging in physical activities Family members should have physical activity of moderate intensity involving rhythmic movements with the lower limbs for 50-60 minutes, 3 or 4 times per week Family members with mild hypertension should engage in 50-60 minutes of brisk walking or cycling, 3 or 4 times per week Family members who do not have hypertension should also participate in regular exercise as it reduce the risk of coronary artery disease.

**Table 4.** Community-directed Non-pharmacologic Interventions

Goals	Recommendations
Lifestyle Family Diet	Inquire if patient and family aware of existing community lifestyle activities
Community Programs	Inquire if patient and family aware and willing to participate in existing local health center and programs on hypertension in the community

### *Patient Outcomes*

Awareness by the patient on the diagnosis of hypertension and its consequences is an important patient outcome during the first visit. A study looked at the association between patient-related determinants (medication self-efficacy, beliefs about medication and hypertension, social support, and satisfaction with care) and treatment adherence. After follow-up medication self-efficacy and fewer concerns about medication use were associated with improved medication adherence. Self-efficacy was also associated with adherence to lifestyle recommendations at baseline.<sup>20</sup> Thus an initial and continuing adequate knowledge about the disease and the purpose of the interventions lead to better adherence and eventually control of hypertension.

### **Second Visit**

#### *History and Physical Examination and Laboratory Tests*

The family doctors should review and complete the needed information based on the checklist. The needed laboratory and its results should be completed and reviewed.

#### *Pharmacologic Interventions*

Based on the initial response to medications, the physician may use the stepped care approach to control the blood pressure.

## Non-pharmacologic Interventions

During the second and continuing visits, repeated delivery of educational intervention should be done. During the first and second visits face-to-face, paper-based or digital method of health education should be done. But when opportunity arise, behavioral intervention such as counselling may be done later. The use of patient diaries may be helpful to monitor adherence.

With regards to exercise, once the patient is used to rhythmic lower limb exercise, the patient may move up to moderate to vigorous aerobic (endurance) activity up to 5 days/week. Resistance training (strength) on 2 or more non-consecutive days/week. Vigorous exercise training is generally safe and well tolerated by most people, including those with hypertension, although some special considerations are required for safety.<sup>28</sup>

The effectiveness of educational and organizational strategies used to improve control of blood pressure was examined in a systematic review of randomized controlled trials. The following interventions were evaluated: self-monitoring and educational interventions directed to the patient. The results showed that a system of regular review and self-monitoring of antihypertensive drug therapy was shown to reduce blood pressure and all-cause mortality at 5 years follow-up. Antihypertensive drug therapy should be monitored closely and adopt a stepped care approach when patients do not reach target blood pressure levels.<sup>29</sup>

## Patient Outcomes

During the second visit, the patient should have increased awareness about the diagnosis and potential risks associated with hypertension. As a result of this awareness, adherence to interventions should be achieved. Adherence can be achieved by repeating/enhancing the interventions done during the earlier visits.

Adherence to intervention may be a surrogate outcome leading to successful management of hypertension. One study evaluated the effect of adherence on cardiovascular disease mortality, cerebral hemorrhage and cerebral infarction. Adherence were classified into good (cumulative medication adherence,  $\geq 80\%$ ), intermediate (cumulative medication adherence, 50%-80%), and poor (cumulative medication adherence,  $< 50\%$ ) adherence groups. The results showed that patients with poor medication adherence had worse mortality from ischemic heart disease (hazard ratio, 1.64; 95% confidence interval, 1.16-2.31; P for trend=0.005), cerebral hemorrhage (hazard ratio, 2.19; 95% confidence interval, 1.28-3.77; P for trend=0.004), and cerebral infarction (hazard ratio, 1.92; 95% confidence interval, 1.25-2.96; P for trend=0.003) than those with good adherence. Similar findings were also noted with hazard ratio for hospitalization.<sup>30</sup>

For those already prescribed with medications, the goal should be a blood pressure lower than the baseline. Based on guideline recommendations the goal differ among patients above or below 60 years old. For patients less than

**Table 5.** Reinforcement of Goals.

Patient	Family	Community
Reinforce BP goals, self-monitoring and recording	Encourage family members to adhere to healthy lifestyle	Encourage family members to join programs on hypertension in the community
Reinforce compliance to antihypertensives	Compliance to healthy family meals	Enrolment in existing community lifestyle activities
Reinforce adherence to lifestyle modification (targeted weight, diet and fitness)	Adherence to family fitness activities	Actively participating in hypertension support groups in the community

60 years old, it is less than 140/90 mmHg and for 60 and above, the goal is less than 150/90 mmHg towards a normal of 120/80 mmHg. This goal is also implemented by several outpatient Kaiser Permanente clinics in the US.<sup>31</sup>

This goal is similar for all other specialties taking care of hypertensive patients. In one study, there was no difference in patient outcomes achieved in 2-year or 4-year outcomes for patients with hypertension whether they were being treated by endocrinologists, cardiologists or internal medicine specialists. These findings must be viewed in light of the historically higher costs of fee-for-service in subspecialty physician practice.<sup>32</sup>

## **Continuing Visit**

### *History and Physical Examination*

During the continuing visit blood pressure monitoring and continuing review of history and physical examination should be done. Changes must be noted. Among those with co-morbidity, adequate treatment of co-morbid condition using the applicable clinical pathway should be done.

### *Pharmacologic Interventions*

Pharmacologic treatment of hypertension reduces risks of stroke, congestive heart failure, renal failure and mortality. However there is a question of once blood pressure is already controlled, can pharmacologic treatment be discontinued? A survey of a random sample of practicing physicians indicated that 79% tried to withdraw treatment. Studies of antihypertensive medication withdrawal also showed success rates of 40.3 percent after 1 year of follow-up and 27.7 percent after 2 years of follow-up were achieved. Similar findings were noted among elderly patients where an average success rate of 26.2 percent was obtained for periods of 2 or more years.<sup>33</sup> It is therefore recommended that after 1-2 years of follow-up and the blood pressure is controlled with no symptoms attributed to hypertension or to a target organ damage, the physician may try step down or withdrawal treatment.

### *Non-pharmacologic Interventions*

During first few visits, the physician is advised to continue repeating and reinforcing health education and non-pharmacologic intervention. During the continuing visit, there may be a shift to peer-led or family treatment partner interventions to improve self-management. In one randomized controlled trial peer-led interventions were found to have similar effect as physician-led intervention. However, this may lower the cost of treatment.<sup>34</sup>

Health coaching by medical assistants can also be an alternative to physician-led health education. In one study, in-clinic health coaching by medical assistants improves control of cardiovascular and metabolic risk factors when compared with usual care. Patients who were given health coaching were more likely to achieve the treatment goals. Many coached patients achieved the hemoglobin A1c goal, the LDL cholesterol goal and the systolic blood pressure goal.<sup>35</sup>

### *Patient Outcomes*

The Eighth Joint National Committee (JNC 8) guidelines for blood pressure management recommend a blood pressure goal of less than 140/90 mm Hg for all adults except those 60 years or older. For those who are  $\geq 60$  years a systolic blood pressure goal of less than 150 mm Hg is recommended.<sup>36</sup>

The assessment of the risk of a cardiovascular event is the most reliable and accurate way to measure the benefits of anti-hypertensive therapy. Most studies that have examined control of hypertension have relied solely on the blood pressure level attained after treatment. Aside from blood pressure, it is also recommended to control the other risk factors. This is due to a finding in one study where 40.9% of the hypertensive still had an absolute risk exceeding 20% of having a cardiovascular event. The factors independently associated with uncontrolled hypertension were age, sex, past history of stroke, ischemic heart disease and transient ischemic attack, a body mass index greater than 30, diabetes, and current smoking.<sup>37</sup> While age, sex

and past history are non-modifiable, body mass index, blood sugar and smoking can be modified.

## Recommendations for Implementation

### *Clinic Level*

Education, training and audit has been used to improve the quality of physician's practice. In one randomized controlled trial, an educational intervention designed to improve the management of hypertension in the elderly was tested in family practice. Educational visits, discussion of barriers to implementing change in practice were done. At the end of the educational visits, there was a significant difference in the stated threshold for treating systolic hypertension between intervention and control groups. There was also a statistically significant difference between the two groups, in their willingness to treat a 70-year-old male with mild hypertension. The effectiveness of an educational intervention is significantly improved by addressing the barriers preventing practitioners from implementing the recommendations.<sup>38</sup>

Self-audit of medical records may also be an effective way of implementing the clinical pathways. In this activity, a family or community doctor randomly select medical records of 10 hypertensive patients. Then he/she evaluates the record if there is evidence that the recommendations in the clinical pathway were followed. This method has been shown to be a reliable way of identifying patients with optimal or suboptimal management of blood pressure.<sup>39</sup>

After self-audits, a full quality improvement activity may be done. In quality improvement, the family or community medicine practitioner performs self-audit at baseline. Then based on the self-audit he/she identifies suboptimal performance based on the clinical pathway recommendations. Self-initiated change in clinical practice is then implemented to address the suboptimal performance. This is followed by a repeat self-audit after a period of time. This two-stage quality improvement approach has been shown to be effective in achieving blood pressure control among hypertensive patients.<sup>40</sup>

### *Health System Level*

The effectiveness of educational and organizational strategies at the health system level to improve control of blood pressure was examined in a systematic review of randomized controlled trials. The following interventions were evaluated: (1) educational interventions directed to the health professional, (4) health professional (nurse or pharmacist) led care, (5) organizational interventions that aimed to improve the delivery of care, (6) appointment reminder systems. The results showed that an organized system of regular review allied to vigorous antihypertensive drug therapy was shown to reduce blood pressure and all-cause mortality at 5 years follow-up. These findings have important implications for recommendations concerning implementation of structured delivery of care in hypertension guidelines.<sup>41</sup>

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