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Education-Family Physician Corner

Hypertension in Clinical Practice

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The global incidence of hypertension is growing. In 2001, an estimated 7.6 million premature deaths worldwide were attributed to high blood pressure (BP)[1]. The relationship between hypertension and increased risk of cardiovascular (CV) disease is well established. The use of goal BP as a treatment target to reduce CV risk is supported by current European guidelines for hypertension treatment[1], it is recommended that BP should be reduced to below 140/90 mmHg, and even to lower values, if tolerated, in all hypertensive patients. However, the achieved level of BP target remains to be poor, especially in our region[2].

Despite this, clinical trials have demonstrated without doubts that early initiation of antihypertensive treatment is associated with significant reductions in major CV events, including stroke, heart failure and myocardial infarction[1].

Hypertension in Bahrain

The prevalence of hypertension in Bahrainis, in 2007, was 38.2%, 42.9% in males and 33.7% in females[3]. In 1995, in Bahrain, the prevalence of hypertension was 21.1%[4]. The prevalence of common risk factors of hypertension in the Bahraini population include smoking, lifestyle trends and nutritional factors, see table 1[5]. Cardiovascular events, which is an end-point of hypertension, caused the major number of mortalities in 2008[6], see figure 1 and 2.

Table 1: Classification and Management of Blood Pressure in Adults[7]

BP Classification	SBP* mmHg	DBP* mmHg	Lifestyle Modification	Initial Drug Therapy	
				Without Compelling Indication	With Compelling Indication
Normal	<120	and <80	Encourage		
Pre-hypertension	120–139	or 80–89	Yes	No antihypertensive drug indicated	Drug(s) for compelling indications‡
Stage 1 Hypertension	140–159	or 90–99	Yes	Thiazide-type diuretics for most. May consider ACEI, ARB, BB, CCB, or combination	Drug(s) for the compelling indications‡
Stage 2 Hypertension	≥160	or ≥100	Yes	Two-drug combination for most† (usually thiazide-type diuretic and ACEI or ARB or BB or CCB)	Other antihypertensive drugs (diuretics, ACEI, ARB, BB, CCB) as needed

DBP-diastolic blood pressure; SBP-systolic blood pressure; Drug abbreviations: ACEI- angiotensin converting enzyme inhibitor; ARB-angiotensin receptor blocker; BB- beta-blocker; CCB-calcium channel blocker; * Treatment determined by highest BP category; † Initial combined therapy should be used cautiously in those at risk for orthostatic hypotension
‡ Treat patients with chronic kidney disease or diabetes to BP goal of <130/80 mmHg

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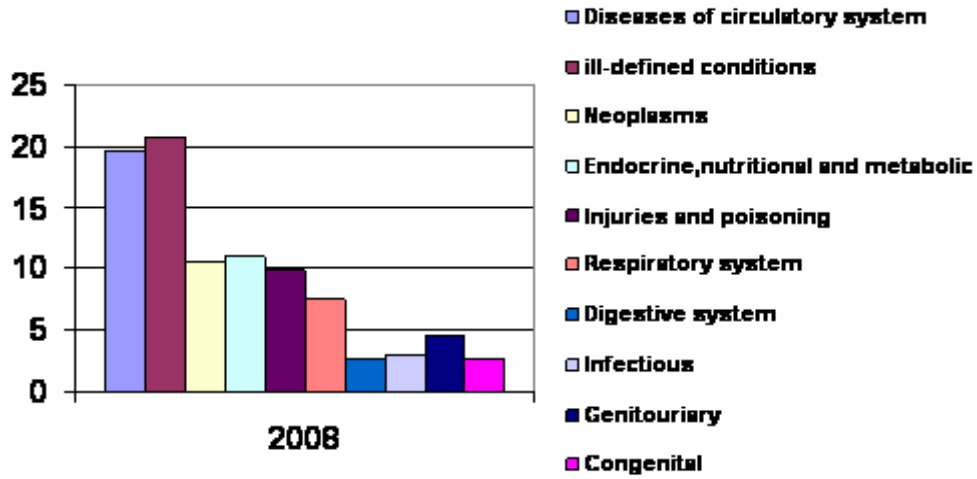


Figure 1: Leading Cause of Death in the Kingdom of Bahrain[6]

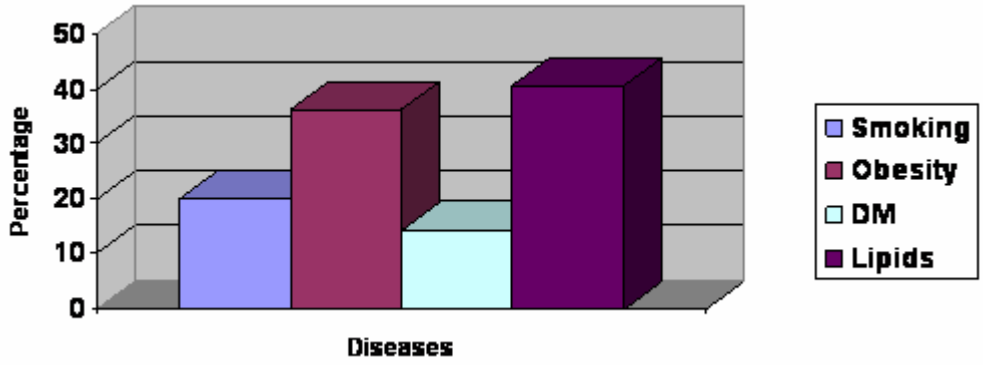


Figure 2: Leading Risk Factors for Hypertension in Bahrain[4]

Case Study

The following patient is an example of everyday practice in family medicine. Middle-aged people are presenting asymptomatically to screen for possible chronic diseases. This patient was chosen to highlight the importance of the following:

- Confirming the diagnosis of hypertension before initiating therapy
- Risk factor screen and lifestyle modification in the treatment of hypertension
- Proper evidence-based selection of antihypertensives in the medical management of hypertension

A forty-eight year-old business administrator attended the clinic for recheck of his blood pressure (BP) because he had previous BP readings of 160/88 mmHg and 165/90 mmHg; the readings were confirmed with home device monitoring.

The patient currently takes Simvastatin 20 mg daily for long standing hypercholesterolemia. His father suffered a non-fatal heart attack at the age of 53 and his mother is under treatment for hypertension. There is no family history of diabetes or any major medical illnesses. He is a non-smoker. His body mass index (BMI) was 27 kg/m^2.

Over the past four months, he goes for evening walks. Two months ago, his total cholesterol was 4.1 mmol/L, high-density lipoprotein–cholesterol 0.6 mmol/L and low-density lipoprotein–cholesterol 2.8 mmol/L. Electrolytes, renal function, liver function, full blood count and glucose tests were normal.

On examination, his BP was 172/92 mmHg. Physical examination was unremarkable. Other potential causes of secondary hypertension have been excluded. A decision was made to start treating the patient's hypertension.

There is still much uncertainty about the pathophysiology of hypertension. A small percentage of patients (between 2% and 5%) have a clear underlying secondary cause of hypertension like renal or adrenal disease that may attribute to their raised blood pressure. In most patients, however, no clear single identifiable cause is found and their condition is labeled "essential hypertension"[7], see figure 3.

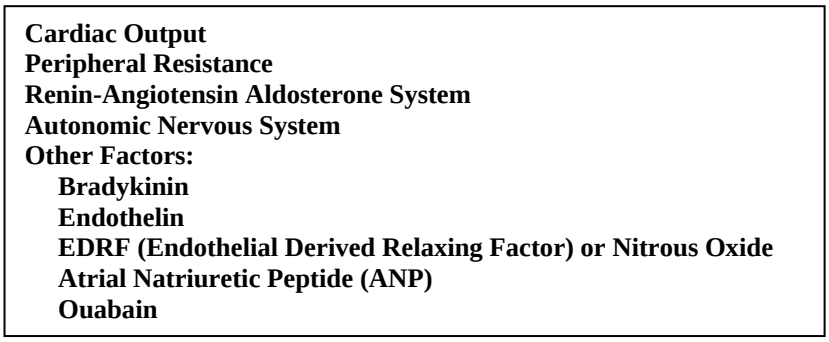


Figure 3: Physiological Mechanisms Involved in the Development of Essential Hypertension[7]

Many interrelated factors probably contribute to the development of hypertension. These factors contribute to the development of hypertension differently in different individuals. Among the factors that have been thoroughly evaluated are salt intake, obesity and insulin resistance, renin angiotensin system and the sympathetic nervous system. In the past few years, other factors have been evaluated, including genetics, endothelial dysfunction (as manifested by changes in endothelin and nitric oxide), low birth weight and neurovascular anomalies[8].

The recommendation is to assess the patient absolute cardiovascular risk before starting antihypertensive medication, but his level of blood pressure necessitates prompt consideration of medication initiation.

Tables 1 outlines the classification and management of blood pressure in adults. Our patient falls in stage 2; therefore, initiation of drug therapy is a must at this stage along with lifestyle modification[8].

Based on the National Cholesterol Education Program (NCEP) risk calculator, our patient is at high risk (25%) of a cardiovascular event in the next 10 years. Reducing his blood pressure to a target level of < 130/85 mmHg will reduce this risk by 15%[9].

In randomized clinical trials, antihypertensive therapy has been associated with reductions in stroke incidence of 35–40 percent, myocardial infarction 20–25 percent and heart failure of more than 50 percent[9].

The current antihypertensive medications works on different areas of blood pressure control. They are targeting the possible pathophysiological derangement in blood pressure control. The different sites of antihypertensives actions are depicted in figure 4[8].

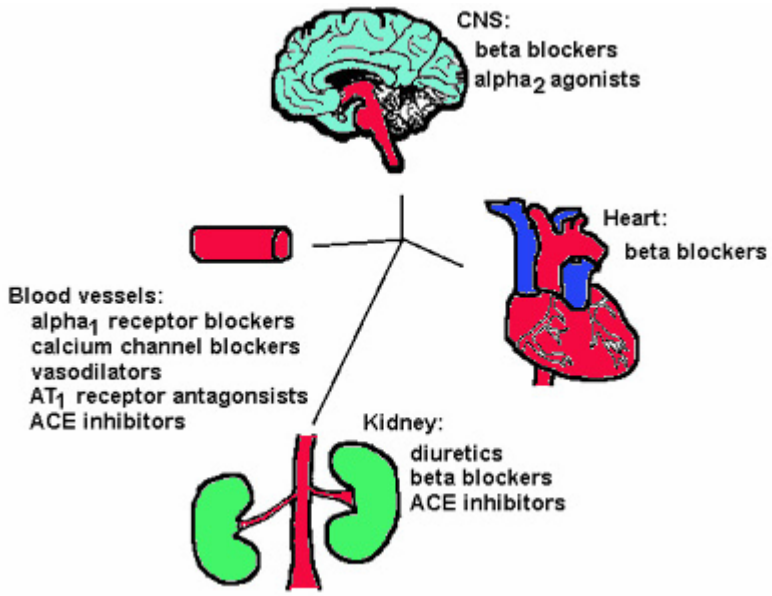


Figure 4: Potential Sites of Action for Antihypertensive Drugs[10]

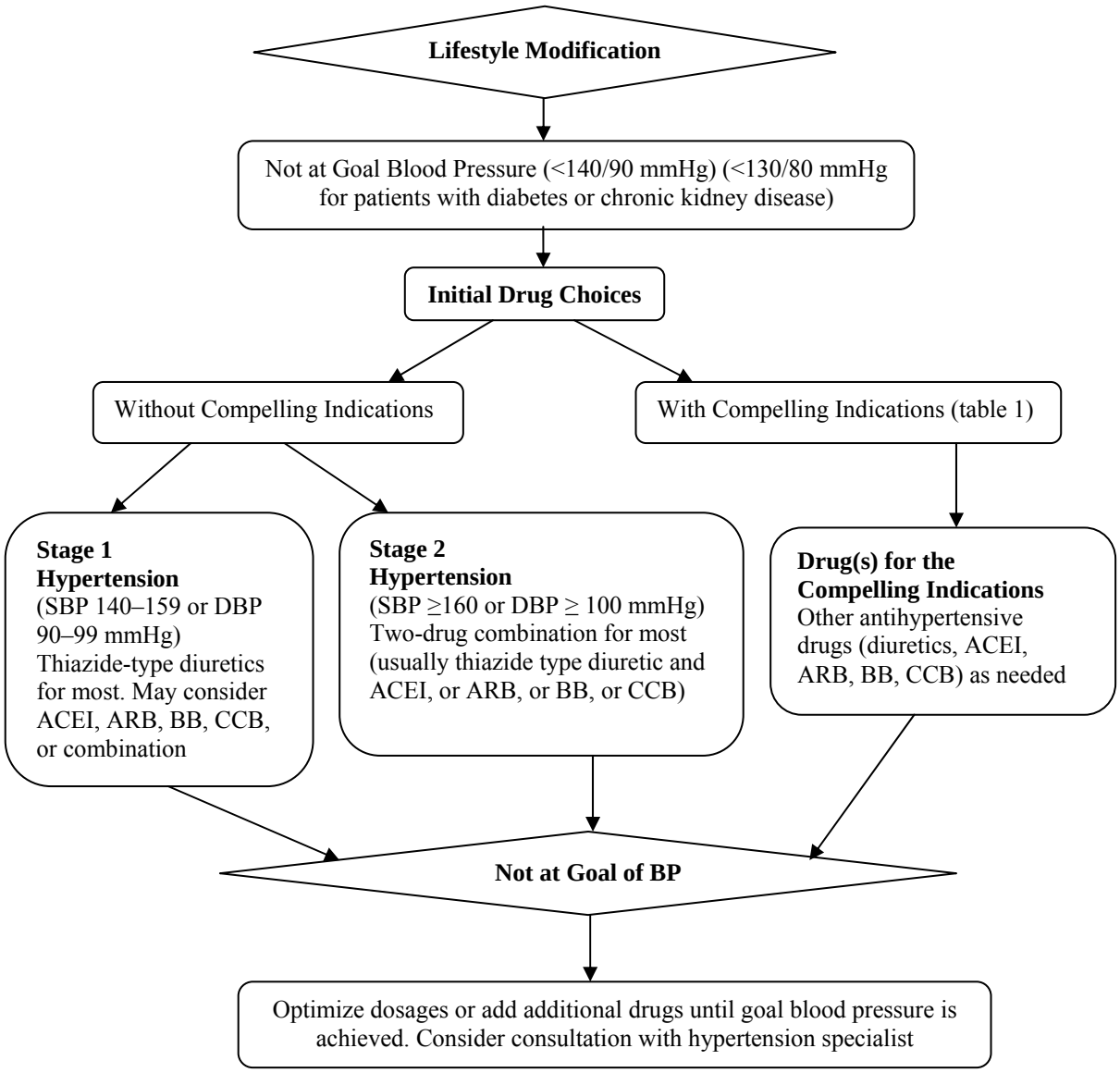
When choosing antihypertensive drug the following should be considered[9]:

- The patient's cardiovascular risk profile
- Presence of co-morbid disease, which influences the decision about the use of a particular class
- Potential interactions with other prescribed medications
- Potential adverse effects

The current recommendation for starting antihypertensive therapy is Thiazide-type diuretics for the majority of patients with uncomplicated hypertension, either alone or combined with drugs from other classes, see table 1. If the patient has specific indications, the initial use of other antihypertensive drug classes (angiotensin converting enzyme inhibitors, angiotensin receptor blockers, Beta-blockers, calcium channel blockers) may be warranted[9].

The five major classes of antihypertensive drugs (low-dose thiazides, beta blockers, ACE inhibitors, angiotensin II-receptor antagonists and calcium-channel blockers) reduce blood pressure to a similar extent, and this is their key contribution to preventing cardiovascular events[10], see figure 5.

The role of beta blockers, particularly Atenolol, in treating hypertension has been challenged after recent meta-analyses that which suggested that less protection from stroke is attained with B-blockers compared to other antihypertensive drug classes. However, protection against myocardial infarction or mortality was comparable. Beta blockers are indicated due to their favorable effect on myocardial infarction and heart failure[11].



*DBP- diastolic blood pressure; SBP-systolic blood pressure. Drug abbreviations: ACEI- angiotensin converting enzyme inhibitor; ARB- angiotensin receptor blocker; BB-beta-blocker; CCB-calcium channel blocker

Figure 5: Algorithms for Hypertension Treatment[10]

Worsening lipid control was cited as a common reason for not considering thiazide diuretics. At the current recommended low doses, adverse effects on plasma lipids attributed to thiazide diuretics, are minimal[12].

In the case of our patient, a combination of thiazide diuretic and ACE inhibitor was chosen. Lifestyle modification was recommended.

It is better to start with lifestyle modification, then combined lifestyle modification and drug therapy, see figure 5[7]. The second stage of therapy gives the caregiver a chance to choose from the different spectrum of antihypertensives considering patients condition and preference. If these maneuvers fail, further investigations is needed based on the advice of a hypertension specialist[9].

The patient was advised to exercise 20 minutes three times a week, further to be increased to 90 minutes daily. The exercise had to be at least of moderate intensity to be beneficial.

The patient was advised to use 'The DASH' (Dietary Approaches to Stop Hypertension). The diet includes three servings of low-fat dairy foods and eight to 10 servings of fruits and vegetables, which was shown to help lower blood pressure and may have another lifesaving benefit--protection against heart disease[13,14].

The patient was advised about alcohol intake; the advice ranged from total abstinence to two or less standard drinks per day with two alcohol-free days per week. The importance of reducing the salt in the patient diet was emphasized[13].

Self-management support is currently identified as a very crucial factor in managing patients with chronic conditions. Because it is relatively new discipline, especially in our region, self-management support is deficient and it is not stressed among the clinicians and other care providers[14].

Self-management program should include: collaborative paradigm, putting agenda, closing the loop, setting action plans, problem-solving, interim visits, and medication education (reconciliation, understanding, and adherence). Further, these techniques, tools and maneuvers are applicable to a wide range of other common chronic condition such as diabetes, hypertension, asthma, and depression[14].

Self-management goals for patients with hypertension usually center on the following primary prevention activities[15]:

- Smoking cessation (our patient was not a smoker)
- Weight loss, our patient BMI was 27. Weight reduction would be an advisable and achievable goal
- Restriction of sodium intake to no more than 2,400 mg/day or lower
- Limitation of alcohol to no more than 1-2 drinks per day if applicable. Our patient does not drink
- At least 30-45 minutes of aerobic exercise 3-5 days a week
- Maintain adequate potassium intake
- Maintain adequate intakes of calcium and magnesium
- Encourage adherence to prescribed treatment regimens
- Blood pressure < 140/90 mmHg or < 130/85 mmHg if heart failure, renal insufficiency or diabetes

The goals of self management plan should be patient-centered and oriented towards patients need but supervised and approved by the treating physician. They should be simple, specific, achievable and realistic. Both partners should understand and share the concept of concentrating on only 1-2 goals at a time. In each and every step, evidence of patient participation and sharing of thoughts should be documented in his action plan. For each chosen goal, an action plan should be developed. There are usually six components of an action plan. The action plan itself should be oriented towards remodeling patient behaviors in a way to achieve his proposed goal. Therefore, the patient should see it as his priority and work accordingly. To develop an action plan should not take more than 3-5 minutes of collaborative work between the patient and the physician[16].

Before discussing the action plan, the following data of Bahraini lifestyle were shared with our patient. Tables 2 and 3 demonstrate Bahrainis' lifestyle. Fruits and vegetables constitute a reasonable proportion of their diet. On the other hand, their level of activity is below the standard for healthy lifestyle. The sodium and potassium intake in their diet are above the average[4].

Table 2: Average Consumption of Fruits and Vegetables in Bahraini Population Based[3]

Average Consumption of	Fruits	Vegetables
Daily	49.6%	62.9%
Less than daily	44.5%	32.5%
Never	5.5%	5%

Table 3: Type of Activity in Bahraini Population[3]

Type of activity	Percentage
Leisure time	42.9%
Every day activity	36%
During working hours	27.6%

The Action Plan[15]

- Something the patient is WILLING to do and the caregiver agrees upon
- The details of the goal as how, what, when, where, frequency of the activities that entail the goal
- Recognition of obstacles in carrying out the plan
- Ways to overcome these obstacles
- Rating his confidence in performing the task from (1-10). Rates 7 and higher are desirable
- Follow-up plan within 1-2 weeks. This may be done by phone or e-mail

It is the role of the multidisciplinary team (physician, nurse, dietitian, physiotherapist and pharmacist) to guide the patient through constructive decision making and informative choice to the most suitable plan of action that suits his lifestyle and attain the highest possible level of compliance[16]. Our patient was advised to return to clinic at interim visits in order to review the adherence to the action plan and reconsideration of any goals that need to be revised and evaluated according to patient's preference.

Three years later, our patient returned. He had an ST-segment-elevation myocardial infarction several months ago but has had no chest pain since. His current medications are Aspirin 100 mg once daily, Rosuvastatin 20 mg once at night, Ramipril 5 mg once daily and Verapamil (modified release) 240 mg once daily. He reported no problems with any of

his medications. Recent blood test results, including lipids, were within the normal range. His current BP is 130/80 mmHg.

Our patient had moved from primary to secondary stage of his disease with the occurrence of a myocardial infarction (MI) which is one of the morbid results of hypertension. He is now established in his secondary disease and requires aggressive pharmaceutical and non-pharmaceutical therapy.

The pharmaceutical therapy as noticed above comprises mainly of an antiplatelet agent, a beta blocker, an ACE inhibitor, and Statin. This management is based on evidence as shown in table 4 which suggests post MI addition of beta blocker and ACE inhibitor as a mean to lessen the recurrence of MI and to lessen the occurrence of other cardiovascular events like stroke. Using Statin therapy is crucial to achieve the above goals as well[10].

Table 4: Clinical Trial and Guideline Basis for Compelling Indications for Individual Drug Classes[9]

Compelling Indication*	Recommended Drugs†						Clinical Trial Basis
	Diuretics	BB	AECI	ARB	CCB	ALDoANT	
Heart Failure	•	•	•	•		•	ACC/AHA Heart Failure Guideline, MERIT-HF, COPERNICUS, CIBIS, SOLVD, AIRE, TRACE, ValHEFT, RALES
Post MI			•			•	ACC/AHA Post-MI Guideline, BHAT, SAVE, Capricorn, EPHESUS
High coronary disease risk	•		•		•		ALLHAT, HOPE, ANBP2, LIFE, CONVINCE
Diabetes	•		•	•	•		NKF-ADA Guideline, UKPDS, ALLHAT
Chronic kidney disease			•	•			NFK Guideline, Captopril Trial, RENAAL, IDNT, REIN, AASK
Recurrent stroke prevention	•		•				PROGRESS

* Compelling indications for antihypertensive drugs are based on benefits from outcome studies or existing clinical guidelines; the compelling indication is managed in parallel with the BP
† Drug abbreviations: ACEI, angiotensin converting enzyme inhibitor; ARB, angiotensin receptor blocker; Aldo ANT, aldosterone antagonist; BB, beta-blocker; CCB, calcium channel blocker
‡ Conditions for which clinical trials demonstrate benefit of specific classes of antihypertensive drugs

Non-pharmaceutical therapy enhances lifestyle modification through empowering self management in the general areas delineated before.

Our patient's blood pressure goal remains <130/80 mmHg. If this goal is not attained after replacing the non-dihydropyridine calcium-channel blocker with a beta blocker, it is reasonable to adjust the dose of his ACE inhibitor to achieve this.

The Statin dose of our patient's should be maintained, as his lipids are shown to be 'within the normal range'. His readings are as follows LDL level is ≥ 2.0 mmol/L, HDL ≤ 1.0 mmol/L, and his triglycerides ≥ 1.5 mmol/L. These readings are acceptable. Maintenance of such readings is encouraged to achieve lower risk of cardiovascular mortality and morbidity.

Barriers to Hypertension Management

The following points are challenges faced by the working multidisciplinary team in dealing with hypertensive patients[17].

1. **Inadequate Primary Prevention:** The general trend of unhealthy diet and increasingly lack of exercise are contributing to the epidemic of hypertension.
2. **Insufficient Awareness of the Risk of Hypertension:** Many physicians do not recognize the risk of higher than the 'goal blood pressure' and overestimate the risk of multiple therapies to the patient.
3. **The Need for Simplicity**: If multiple tasks are addressed to the patient at the same time, the patient gets confused. Complicated treatment regimens may reduce hypertensive patient adherence.
4. **Therapeutic Follow Ups:** Chances for effective and evidence-based monitoring of patient and medication titration are often not comprehended by the patient.
5. **Lack of Patient Awareness:** Patients fail to implement the recommended lifestyle changes whilst also adhering poorly to treatment.
6. **Healthcare Structures and Policy**: Hypertension interventions are time consuming and most healthcare systems especially in our region do not provide sufficient and efficient resources or incentives to control blood pressure effectively.

CONCLUSION

1. **Increase Awareness of Hypertension in the Society: Keeping the public informed about the risk factors for hypertension and lifestyle awareness may reduce the number of people presenting with hypertension.**
2. **Patient's Education: Adherence to treatment and healthy living should be encouraged in patients with hypertension.**
3. **The Utilization of Multidisciplinary Teams: Nurses as members of the team could promote lifestyle changes to the entire family and pharmacists could perform treatment reviews and BP monitoring.**
4. **Encourage Patient Accountability and Empowerment: Self-monitoring of BP and other elements of self care may motivate patients to adhere to medication and lifestyle changes and encourage them to take part in their own management.**
5. **Simplify Treatment: Current fixed-dose combination treatments provide rapid and powerful BP reductions and help to overcome adherence issues.**
6. **Take a Leadership Role: Physicians as decision maker need to augment their role for improved policies and structures and initiate campaigns for public education.**

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