



A Review on Effective Detection and Management of Hypertension by Clinical Pharmacist

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ABSTRACT

Hypertension is a global public health issue and contributes to the burden of heart disease, stroke, kidney failure and premature mortality and disability. Pharmacists can be key players in controlling hypertension, given their medication knowledge and patient counseling skills, yet they remain an underutilized resource in the management of chronic disease states. Patients who are at risk of hypertension may also be identified incidentally by pharmacists during medication reviews or clinics for related chronic conditions. Such opportunities can help ensure that people with hypertension are diagnosed promptly by the general practitioner (GP), recorded on the hypertension register, and started on treatment. Pharmacists can then be involved with managing patients with hypertension by conducting patient reviews and optimizing antihypertensive medication, while also providing non-pharmacological intervention advice. This article aims to provide an update on the proven guidelines in which pharmacists contribute to provide the good management and educate the patients regarding the novel technologies including the smartphones and Bluetooth devices.

KEYWORDS

Blood pressure measure techniques; Hypertension; Management; lifestyle modifications; Self-monitoring; DASH diet plan



INTRODUCTION

HYPERTENSION:

According to World Health Organisation (WHO) Hypertension is defined as persistently raised high blood pressure (BP). The risk of cardiovascular and related diseases, including heart attacks, strokes, heart failure, and chronic kidney disease (CKD) increases due to hypertension.

Epidemiological studies have shown that, regardless of previous CVD status, reductions in BP by 10mmHg (systolic) or 5mmHg (diastolic) result in a 22% (95% confidence interval [CI] 17–27%) relative risk (RR) reduction for coronary heart disease and 41% (95% CI 33–48%) RR reduction for stroke, in patients with a baseline systolic BP of more than 110mmHg and a diastolic BP higher than 70mmHg.

While both elevated systolic and diastolic BP are positively correlated with cardiovascular endpoints and renal disease, the association with systolic BP is stronger than diastolic BP in the general population.

Approximately 31% of the American population (72 million) have high BP ($\geq 140/90$ mm Hg). Fourth National Family Health Survey reported 207 million persons (men 112 million, women 95 million) with hypertension in India. Prevalence rates are highest in non-Hispanic blacks (33.5%) followed by non-Hispanic whites (28.9%) and Mexican Americans (20.7%). BP values increase with age, and hypertension is very common in the elderly. Most patients have prehypertension before they are diagnosed with hypertension. Most diagnoses of Hypertension occurs between the third and fifth decades of life.

CLASSIFICATION:

According to the 2019 guidance for hypertension from the National Institute for Health and Care Excellence (NICE). It classifies hypertension into three stages:

- Stage one: clinic BP is $>140/90$ mmHg and daytime ambulatory BP is $>135/85$ mmHg;
- Stage two: clinic reading of $160/100$ mmHg or higher and subsequent daytime ambulator average of $150/95$ mmHg or higher;
- Stage three or severe hypertension: clinic BP of 180 mmHg (systolic) or 110 mmHg (diastolic) or more.

In the 2011 NICE guidance for the management of hypertension, clinically important sub-populations, such as people with diabetes, were given lower BP targets of $140/80$ mmHg (or $130/80$ mmHg if there was evidence of previous or existing kidney, eye or cerebrovascular



damage). However, the 2019 guidance states that the evidence for lower targets in patients with recommendations were based on two small studies in people without hypertension. The updated guidance further acknowledges that evidence from large trials, such as the ‘Action to Control Cardiovascular Risk in Diabetes (ACCORD)’ study, suggests that lower BP targets (e.g. ≤ 120 mmHg systolic) did not reduce the rate of cardiovascular events in patients with T2DM over and above the 140 mmHg systolic BP threshold. Therefore, the 2019 guidance states that patients with T2DM should have BP targets in line with patients without T2DM — an important change for patient management.

The latest European guidelines retain the previous definition of hypertension (i.e., BP $>140/90$ mm Hg) whereas the American guidelines lowered the threshold to define hypertension to $<130/80$ mm Hg. The American guidelines (proposing new definition of hypertension) are driven largely by meta-analyses of important outcome trials including SPRINT (Systolic Blood Pressure Intervention Trial). And the European guidelines are assembled largely on the basis of population attributable risk. Yet, both the sets of guidelines recommend the same therapeutic BP goal of $<130/80$ mm Hg.

Classification according to JNC 7(2003) and ACC/AHA (2017) [8, 11]:

Systolic BP mm Hg		Diastolic BP mm Hg	JNC 7(2003)	ACC/AHA(2017)
<120	and	<80	Normal	Normal
120-129	and	<80	Prehypertension	Elevated BP
130-139	or	80-89	Prehypertension	Stage 1 hypertension
140-159	or	90-99	Stage 1 hypertension	Stage 2 hypertension
≥ 160	or	≥ 100	Stage 2 hypertension	Stage 2 hypertension

[ACC-American college of cardiology, AHA- American heart association, BP- blood pressure, JNC- joint national committee on prevention,detection,evaluation,and treatment of high blood pressure]

BP Measurement Technique:

Patient should be resting for 5 minutes before blood pressure assessment.

Patient should avoid smoking, caffeine, or food for 30 minutes prior to blood pressure assessment.

Position arm (brachial artery) at heart level resting on a table or other support.



Uncover arm. Do not take blood pressure over clothes or allow rolled-up sleeve to serve as tourniquet.

Choose correct size cuff for patient.

Position cuff 1 inch above antecubital crease.

Ask patient about previous blood pressure readings.

Palpate the brachial artery and place the bell of the stethoscope over the brachial artery

Inflate cuff rapidly to approximately 20 to 30 mmHg above previous readings.

Deflate cuff slowly (approximately 2 mm/second).

Note level of pressure at which first of repetitive audible sounds appear (phase I, systolic) and when they disappear (phase V, diastolic). Then continue to slowly deflate for at least another 10 mm Hg, checking for further Korotkoff sounds.

Remember to deflate the cuff completely when done.

Wait at least 2 minutes before repeating. Repeat again if second measurement varies by more than 5 mmHg from first measurement.

On initial visit, take pressure in both arms.

If orthostatic hypotension is suspected, take measurements in sitting, standing, and supine positions.

RISK FACTORS FOR DEVELOPING HYPERTENSION:

The following are some of the risk factors [6] which can lead to the increasing risk of high blood pressure:

LIFESTYLE:

DIET eating an unhealthy diet eating too much sodium, or too little potassium

WEIGHT bring overweight or obese

ALCOHOL drinking too much alcohol

TOBACCO using tobacco

FAMILY HISTORY: If members of your family have high blood pressure, you are at a higher risk for developing it as well.

MEDICAL CONDITIONS: Chronic medical conditions such as diabetes, kidney disease, or sleep apnea can increase your risk of developing hypertension.

OTHERS:



AGE as you get older you are at a higher risk of developing high blood pressure

RACE OR ETHNICITY African Americans are at higher risk of hypertension than whites, Hispanics, or Asians.

TREATMENT TARGETS:

Hypertension is not a disease in itself, but is an important risk factor for cardiovascular mortality and morbidity. The JNC 7(2003) and WHO-ISH guidelines (2003) have defined it to be 140 mm Hg systolic and 90 mm Hg diastolic, but risk appears to be increased even at 120/80 mm Hg.

The treatment of hypertension According to the various guidelines are listed below:

According to the JNC8 [7]hypertensionguideline:

Initial drug of choice for hypertension-

- ACE inhibitors (ACEI)
- Angiotensin receptor blockers (ARB)

STRATEGY	DESCRIPTION
A	Start one drug, titrate to maximum dose, and then add a second drug.
B	Start one drug, then add a second drug before achieving max dose of first.
C	Begin 2 drugs at same time, as separate pills or combination pills. Initial combination therapy is recommended if BP is greater than 20/10 mm Hg above goal.

- Thiazide diuretics
- Calcium channel blockers(CCB)

According to JNC 7 [8] guideline:

- Treat to BP <140/90 mm Hg or BP <130/80 mm Hg in patients with diabetes or chronic kidney diseases.
- Majority of the patients will require 2 medications to reach the goal.

DIAGNOSTIC WORKUP OF HYPERTENSION:

The following are some of the diagnostic workup for finding the hypertension in the patients by the clinical pharmacists:

- Assess risk factor and comorbidities.
- Reveal identifiable causes of hypertension.
- Assess presence of target organ damage.



- Conduct history and physical examinations.
- Obtain laboratory tests:urinalysis, blood glucose, hematocrit, and lipid panel, serum potassium, creatinine, and calcium. Optional: urinary albumin/creatinine ratio.
- Obtain electrocardiogram.

Measure standing BP in adults with hypertension who have type 2 diabetes, symptoms of postural hypertension, or are aged 80 years or over.

MANAGEMENT:

Modification:	Approximate SBP reduction(range)
Weight reduction	5-20mmHg/10 kg weight loss
Adopt DASH eating plan	8-14 mmHg
Dietary sodium reduction	2-8mmHg
Physical activity	4-9mmHg
Moderation in alcohol consumption	2-4mmHg

According to AHA/ACC [11] Guideline (2017):

- BP above 140/90 mm Hg needs to be treated.
- BP above 130/80 mm Hg needs to be treated if patient had CV events or is at risk of CV events (based on age, presence of DM, CKD or calculation of atherosclerotic risk)
- Goal of treatment should be to maintain BP under 130/80 mm Hg

Self-monitoring [5, 13, 14, 15] of blood pressure can improve blood pressure control and is an increasingly common part of hypertension management. Trials of self-monitoring show improved blood pressure control, mainly in the context of additional co-interventions such as pharmacist intervention or nurse-led education.

Another option to enhance ongoing self-monitoring compliance could be BP monitoring apps. These can communicate between smartphone and BP monitor allowing the patient to control (e.g. start/stop/configure) the BP measurement procedure from the app and to download automatically the current or previous BP readings. BP estimation is computed in the device microchip using the oscillometric signal, which is sampled and filtered from device pressure sensors, during the cuff inflation or deflation. Examples of BP self-monitoring analytics subsequently available include tracking the average BP over time, alerting on concerning BP trends, e.g. high/low readings, or normal/abnormal circadian BP patterns (dipper/non-dipper trend). When an app is used to communicate with a clinician, this becomes a type of tele-monitoring.



Self-monitoring can also be combined with self-titration of medication, a process known as self-management. Trials undertaken before the current generation of mobile devices have shown that self-management can lead to improved blood pressure control through medication optimisation in both hypertensive and higher risk populations.

Artificial intelligence underpins interfaces such as Alexa and Siri which can wirelessly update medication lists and set reminders (e.g. alarm reminders to take medications to improve adherence to treatment)

Incorporation of tele-monitored [14, 15] data on blood pressure into digital healthcare programmes can now also allow combination with other physiological variables including blood glucose, heart rate and exercise allowing adaptation of management recommendations based on pre-determined variables including user demographics, indicated morbidities and comorbidities, self-identified barriers and actions recorded over the course of a programme or set by a physician. Examples of this include the ‘WellDoc Hypertension and diabetes management platform’ and ‘Omada Health’s digital program’.

Lifestyle intervention is an important element of hypertension management. Advice on lifestyle can be offered by HCAs and practice nurses initially, then followed up by GPs and pharmacists. Lifestyle modifications can help reduce BP and hence the need for medication, as well as reducing the risk of developing cardiovascular disease (CVD).

NICE recommends the following non-pharmacological interventions to manage and prevent high BP in adults:

- ascertain a patient’s diet and offer appropriate written or audiovisual advice:
- pharmacist prescribers can also consider prescribing orlistat for weight loss as part of an overall plan for managing obesity, in line with NICE Clinical Guideline 189, Obesity: identification, assessment and management
- recommend regular physical exercise
- advise reduced consumption of sodium salt
- encourage reduced intake of alcohol if they drink excessively
- discourage excessive caffeine consumption
- offer advice
- and help smokers to stop smoking



- Signpost to local initiatives to provide support and promote healthy lifestyle change.

LIFESTYLE MODIFICATIONS

Modification: Approximate SBP reduction(range)

Weight reduction 5-20mmHg/10 kg weight loss

Adopt DASH eating plan 8-14 mmHg

Dietary sodium reduction 2-8 mmHg

Physical activity 4-9 mmHg

Moderation in alcohol consumption 2-4 mmHg

Resources for guiding lifestyle interventions:

These resources help in reducing cardiovascular disease risks associated with hypertension, or in reducing blood pressure.

JNC 8 [7] guidelines:

Lifestyle changes:

- Smoking cessation
- Control blood glucose and lipids
- Diet

*Eat healthy (i.e. DASH diet)

*Moderate alcohol consumption

*Reduce sodium intake to no more than 2,400 mg/day

- Physical activity

*Moderate-to-vigorous activity 3-4 days a week averaging 40 min per session.

ACC/AHC [11] Guidelines:

- Advice to lose weight.
- Follow a DASH-pattern diet.
- Reduce sodium to less than 1500mg/day
- Increase potassium intake to 3500 mg/day through dietary intake.
- Increase physical activity to a minimum of 30 minutes of exercise three times per week.
- Limit alcohol intake to 2 drinks or less per day for men and 1 or less for women.

NHS guidelines:

- Diet



- Salt intake
- Healthy weight
- Physical activity in adults
- Alcohol consumption limits

NICE guidelines:

Clinical Guideline 43: Obesity prevention

Clinical Guideline 189: Obesity: identification, assessment and management.

Clinical Guideline 181: Cardiovascular disease: risk assessment and reduction, including lipid modification.

Public health Guideline 25: Cardiovascular disease prevention.

NICE Guideline 92: Stop smoking interventions and services.

DASH DIET GUIDELINES:

The Dietary Approaches to Stop Hypertension (DASH) diet has been shown to reduce average BP by around 8–14 mmHg. The DASH diet is rich in fruits, vegetables, and low-fat dairy, with reduced saturated fat, total fat, and sodium intake. The pharmacist should help the patient in maintaining the proper DASH diet by checking the status of the intake of the amount of the food.

The table [10, 17] shows the correct amount of the diet plan:

TYPE	AMOUNT	COMMENTS
Sodium	Standard $\leq 2,300$ mg per day	
	Lower sodium $\leq 1,500$ mg per day	The DASH diet strongly recommends reducing sodium consumptions.
Alcohol	Men ≤ 2 drinks per day	
	Women ≤ 1 drinks per day	Too much alcohol isn't healthy for blood pressure
Sweets	5 servings or less per week	The DASH diet recommends fat-free or low-fat treats and also suggests using artificial sweeteners when you're craving sweets.
Fats and oils	2-3 servings per day	Both saturated fats and trans fat are especially discouraged on the DASH diet.
Nuts, seeds, and legumes	4-5 servings per week	Because these foods are higher in calories, they're only recommended only few times a week. Yet they are also quality sources of magnesium, potassium, and protein as well as fiber and phytochemicals.



Lean meat, poultry, and fish 6 servings or less per week Meat is recommended because it provides protein, B vitamin, iron, and zinc. However, the DASH diet recommends cutting back on meat portion sizes to make way for more vegetables.

Dairy (milk, yogurt, and cheese) 2-3 servings per day Dairy products ample amounts of calcium, vitamin D, as well as protein. Low-fat versions are most highly recommended. Go light on cheeses because they tend to be higher in sodium.

Fruits 4-5 servings per day Because they provides fiber, potassium, and magnesium, fruits are considered a healthy part of any meal or snack.

Vegetables 4-5 servings per day High in potassium and magnesium along with fiber, vegetables aren't just a side dish.

Grains 6-8 servings per day With a focus on whole grains for their added fiber.

CONCLUSION

The Adherence and Intensification of Medications program more rapidly lowered SBPs among intervention patients, but usual-care patients achieved equally low SBP levels by 6 months after the intervention period. These findings show the importance of evaluating in different real-life clinical settings programs found in efficacy trials to be effective before urging their widespread adoption in all settings. Pharmacy practice has changed significantly in recent years. It will be important that pharmacists be included in the team that cares for these patients. The JNC 8 guidelines help in achieving the best evidence of reducing the cardiovascular risk and also lead to less use of the medications in the younger patients, which produce equivalent outcomes in terms of cardiovascular events with less potential for adverse events that limits adherence.



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