COMPARISON OF DIFFERENT STANDARD GUIDELINES WITH INDIAN GUIDELINES IN ACHIEVEMENT OF HYPERTENSION GOAL

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Abstract: Hypertension is challenging problem as its highly prevalent cardiovascular risk factor worldwide because of increasing longevity and prevalence of contributing factors such as obesity. Hypertension is contributory factor in cardiovascular diseases (CVD) such as stroke and coronary heart disease (CHD) and having risk of Kidney diseases. The purpose of the different guideline is to provide approach to the prevention and management of hypertension. Depending upon progression of systolic and diastolic blood pressure it is classified into stages of hypertension. Life style modifications helpful in initial stage but pharmacological treatment are necessary when it become difficult to control it. Pharmacological treatment for Hypertension is being selected from CCBs, β-blockers, diuretics, and renin angiotensin system inhibitors for both initial and maintenance therapy. CCBs is having higher incidence of heart failure and fatal myocardial infarction, whereas β-blockers show benefits with cardiovascular complications. Thiazide diuretics are preferred for uncomplicated hypertension. ACE-Inhibitors and ARBs are superior to other class in patients with multiple risk factors like obesity, insulin resistance or diabetes. Despite the decrease in mortality and morbidity rate, some increasing prevalence of cardiac failure and end stage renal disease remains to be explained. Guidelines in the management of arterial hypertension focus on the importance to individualized therapy, and recommend appropriate drug selection mainly based on risk stratification. They have slightly different approaches on therapy initiation, but the supporting evidence offered all converges on the same pillars of antihypertensive treatment, suggesting the use of combination therapy to target BP control and reduce cardiovascular risk.

Keywords: Diuretics, β-blockers, ACEIs, ARBs, CCBs.
INTRODUCTION

Hypertension is already a highly prevalent cardiovascular risk factor worldwide because of increasing longevity and prevalence of contributing factors such as obesity. Whereas the treatment of hypertension has been shown to prevent cardiovascular diseases and to extend life, hypertension remains inadequately managed everywhere. Hypertension affects approximately 75 million adults in the United States and is a major risk factor for stroke, myocardial infarction, vascular disease, and chronic kidney disease. Cardiovascular diseases caused 2.3 million deaths in India in the year 1990; this is projected to double by the year 2020.

Hypertension is directly responsible for 57% of all stroke deaths and 24% of all coronary heart disease deaths in India enhance life, hypertension remains inadequately managed everywhere. The prevalence of hypertension increases with advancing age and the prevalence is further increased beyond age 70.

Although hypertension is more prevalent in economically developed countries, the larger population of developing countries results in a considerably larger absolute number of individuals affected. Hypertension is a heterogeneous medical condition.

Hypertension is a major but modifiable contributory factor in cardiovascular diseases (CVD) such as stroke and coronary heart disease (CHD) and its having concomitant risk of Kidney diseases.

A number of factors increase BP, including obesity, insulin resistance, high alcohol intake, high salt intake (in salt-sensitive patients), aging and perhaps sedentary lifestyle, stress, low potassium intake, and low calcium intake.

Furthermore, many of these factors are additive, such as obesity and alcohol intake. Causes of secondary hypertension includes concurrent medical conditions or are endogenously induced (chronic kidney disease, cushing’s syndrome, coarctation of the aorta, obstructive sleep apnea, parathyroid disease, pheochromocytoma, primary aldosteronism, renovascular disease, thyroid disease). In most of these cases, renal dysfunction resulting from chronic kidney disease or renovascular disease is the most common secondary cause. If the cause of secondary hypertension can be identified, hypertension in these patients can be cured.

STANDARD WIDELY USED GUIDELINES FOR THE TREATING HYPERTENSION

Different worldwide societies recommend guidelines for the management prevention and control of hypertension which are usually update as per need and requirement. The most recent update is as follows.


6. Indian Hypertension Guideline II for Management of Hypertension


9. The 2010 Canadian Hypertension Education Program recommendations for the management of hypertension: part I—blood pressure measurement, diagnosis and assessment of risk and Part II therapy. Published by Canadian guidelines for the management of essential hypertension-Canadian Hypertension Education Program (CHEP).

The Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure (JNC 7) was published in 2003, and is still considered the gold standard. JNC 8 is currently being compiled and is expected to be published in 2011.

Two of the most widely used recommendations are those from the American Diabetes Association (ADA) and the eight report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure (JNC 7).
The aim of this assessment is to look for secondary cause of hypertension, assess progression of the disease by looking for target organ damage and finally to look for associated comorbid condition, which influences the outcome in patients with hypertension.

**ASSESSMENT FOR TARGET ORGAN DAMAGE**

Cerebrovascular disease, Transient ischemic attacks, Stroke, hemorrhage or infarct, Hypertensive retinopathy, Left ventricular dysfunction or hypertrophy, Coronary artery disease, Acute coronary syndrome, Congestive heart failure, Chronic kidney disease, Hypertensive nephropathy, Albuminuria, Peripheral artery disease.

Presence of any of the target organ damage and comorbid condition is an independent prognostic indicator for hypertension-related morbidity and mortality.

**PRINCIPLE OF ANTIHYPERTENSIVE THERAPY**

The goal of therapy is to reduce cardiovascular and renal morbidity and mortality. It has been proven beyond a doubt that blood pressure reduction is associated with reduced cardiovascular morbidity and mortality. In order to more easily achieve goal BP, antihypertensive treatment should be initiated before significant CV damage developed. Additionally guideline recommendations to lower BP less than 130/80 mmHg in patients with diabetes or a History of cardiovascular disease are also not supported by incontrovertible trial evidence.

Establishing the proper blood pressure goal for an individual patient is of obvious importance and it dependent upon co-morbidities.

**Management**

Treatment should be initiated after risk stratification.

**low- and medium-risk condition.**

Lifestyle modification is started initially and frequently reassessed.

If blood pressure target is not achieved, pharmacologic therapy is initiated.

**In high- and very high-risk conditions.**

Lifestyle modification and drug therapy are initiated simultaneously to achieve rapid control of blood pressure.

Hypertension management includes lifestyle modification and drug therapy.
Nonpharmacological Treatment (Lifestyle Modification)

- Weight reduction
- Physical exercise
- Quit smoking
- Dietary Modification
  - Low sodium diet
  - Diet rich in vegetables and fruits
  - Low fat content:

  **Weight loss and physical activity**

Overweight (body mass index, 25 kg/m²) has been seen in epidemiologic studies to be an important risk factor for higher blood pressure, and there seems to be a linear relation between body weight and blood pressure.

Increasing aerobic physical activity such as brisk walking, jogging, swimming or bicycling has been shown to lower BP.

Pharmacological Treatment

As blood pressure increases, it becomes more difficult to control it at the target level through lifestyle modifications alone and treatment with antihypertensive drugs become necessary.

**Table I. Blood pressure goals: consensus across treatment guidelines.**

<table>
<thead>
<tr>
<th>Organization</th>
<th>Patient type</th>
<th>BP goals (mmHg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>JNC 8⁴</td>
<td>Uncomplicated hypertension (60 year or older)</td>
<td>150/80</td>
</tr>
<tr>
<td></td>
<td>With diabetes mellitus, chronic kidney disease (60 year or older)</td>
<td>140/90</td>
</tr>
<tr>
<td></td>
<td>Uncomplicated hypertension (less than 60 year)</td>
<td>140/90</td>
</tr>
<tr>
<td>ESH 2007¹⁸</td>
<td>In all hypertensive patients</td>
<td>140/90</td>
</tr>
<tr>
<td></td>
<td>Diabetes and clinical conditions (stroke, MI, renal dysfunction, proteinuria)</td>
<td>130/80</td>
</tr>
<tr>
<td>WHO-ISH¹¹</td>
<td>Low risk for CVD</td>
<td>140/80</td>
</tr>
<tr>
<td></td>
<td>Presence of diabetes mellitus, target organ damage, or associated clinical conditions</td>
<td>130/80</td>
</tr>
<tr>
<td>ISHIB¹⁶</td>
<td>African Americans, low to moderate CVD risk</td>
<td>140/90</td>
</tr>
<tr>
<td></td>
<td>High-risk CVD: diabetes mellitus, chronic kidney disease</td>
<td>130/80</td>
</tr>
</tbody>
</table>
prior CVD, Stroke/TIA, target organ damage including MA proteinuria 1g/24h

<table>
<thead>
<tr>
<th>Abbreviation(s)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>NKF²³</td>
<td>Albuminuria (300 mg/d or 200 mg/g creatinine), with or without diabetes</td>
</tr>
<tr>
<td>Proteinuria (protein to creatinine ratio 500–1000 mg/g)</td>
<td>130/80, “Consider even lower than 130/80”</td>
</tr>
<tr>
<td>ADA²²</td>
<td>Diabetes</td>
</tr>
</tbody>
</table>

**Abbreviations**: JNC, Joint National Committee; EHS, European Society of Hypertension; WHO-ISH, World Health Organization-International Society on Hypertension; ISHIB, International Society on Hypertension in Blacks; NKF, National Kidney Foundation; ADA, American Diabetes Association; MI, myocardial infarction; CVD, cardiovascular disease; TIA, transient ischemic attack; MA, microalbuminuria.

**Drug combinations**

Fixed drug combinations should be avoided in the initial stages till optimal control is achieved as fine adjustment in dosage of individual components may be required. Once the patient is on a stable maintenance dose of drugs, combination therapy may be used to improve compliance.

Some drug combinations should be avoided:

Two drugs of same class, Diuretics with b-blockers: Reported to increase incidence of new onset diabetes mellitus and β-blockers with verapamil: Precipitates conduction blocks.

**Hypertension in Heart Disease**

ACE inhibitors or ARBs are the drugs of choice in chronic heart failure.

They also prevent remodeling of the ventricles along with control of blood pressure. Beta-blockers are used in hypertensives with ischemic heart disease.

Cardioselective beta-blockers like metoprolol and bisoprolol are preferred. They are contraindicated in acute heart failure. In cases with fluid overload diuretics may be used.

**Hypertension in Kidney Disease**

Patients with chronic kidney disease have elevated blood pressure and it is difficult to control. Sodium and water retention in end stage renal disease causes elevation of blood pressure.
Any decrease in blood pressure is beneficial and a blood pressure below 125/75 mm Hg is generally targeted. Dietary restriction of sodium forms an integral part of management.

ACE inhibitors and ARBs are generally initiated in initial stages of kidney disease with proteinuria but normal creatinine levels.

Thiazides, calcium channel blockers, α-blockers, clonidine have all been used in the treatment of hypertension in chronic kidney disease and most of the patients would end up in combination of two or more drugs to achieve the target blood pressure.

**Hypertension in Diabetes Mellitus**

Diabetes is the most common comorbid condition in hypertension and its incidence is increasing. The blood pressure target in diabetic individuals is less than 130/85 mm Hg, which was found to have a better cardiovascular outcome.

Lifestyle modification form important aspect in the treatment of either disease and should be stressed upon.

Use of ACE inhibitors and ARBs is preferred over other drugs in diabetic hypertensive as it also decreases proteinuria.

Combination of diuretics with β-blockers was shown to increase the incidence of new onset diabetes mellitus.

Use of β-blocker alone is also a relative contraindication because of incidence of hypoglycemic unawareness.

**Protocol of management**

![Diagram of treatment protocol](image-url)
Choice of antihypertensive drug as per guidelines

The antihypertensive drug with the greatest hypotensive effect and suited for various accompanying condition should be selected for each hypertensive patient.

Although JNC 8 recommends thiazide type diuretics as preferred initial agent in patients without compelling indications and for Stage 1 hypertension (SBP 140 to 159 mmHg, DBP 90 to 99 mmHg).

Several classes of antihypertensive drugs are available today. Among these, the drug to be used as a first line of treatment is being selected from calcium channel blockers (CCBs), angiotensin receptor blockers (ARBs), angiotensin converting enzyme (ACE) inhibitors, diuretics and beta blockers.

Table II: Indication and contraindication of Antihypertensive classes

<table>
<thead>
<tr>
<th>Class</th>
<th>Conditions favouring use</th>
<th>Compelling</th>
<th>Possible</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diuretics (thiazide/thiazide-like)</td>
<td>HF</td>
<td>Great</td>
<td>Pregnancy</td>
</tr>
<tr>
<td></td>
<td>Elderly hypertensives</td>
<td></td>
<td>β-blockers (especially atenolol)</td>
</tr>
<tr>
<td></td>
<td>ISH</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Hypertensives of African origin</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diuretics (loop)</td>
<td>Renal insufficiency</td>
<td></td>
<td>Pregnancy</td>
</tr>
<tr>
<td>Diuretics (anti-adosterone)</td>
<td>HF</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Post-myocardial infarction</td>
<td>Renal failure</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Resistant hypertension</td>
<td></td>
<td>Hyperkalaemia</td>
</tr>
<tr>
<td>CCB long-acting only (dihydropyridine)</td>
<td>Elderly patients</td>
<td></td>
<td>Tachyarrhythmias / HF</td>
</tr>
<tr>
<td></td>
<td>Angina pectoris</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Peripheral vascular disease</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Carotid atherosclerosis</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Pregnancy (nitroprusside only)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-dihydropyridine CCB (verapamil, diltiazem)</td>
<td>Angina pectoris</td>
<td>AV block (grade 2 or 3)</td>
<td>Constipation (verapamil)</td>
</tr>
<tr>
<td></td>
<td>Carotid atherosclerosis</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Supraventricular tachycardia</td>
<td></td>
<td></td>
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<tr>
<td>ACE-Ix</td>
<td>HF</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>LV dysfunction</td>
<td></td>
<td>Pregnancy</td>
</tr>
<tr>
<td></td>
<td>Post-myocardial infarction</td>
<td></td>
<td>Hyperkalaemia</td>
</tr>
<tr>
<td></td>
<td>Non-diabetic nephropathy</td>
<td></td>
<td>Bilateral renal artery stenosis</td>
</tr>
<tr>
<td></td>
<td>Type 1 diabetic nephropathy</td>
<td></td>
<td>Angiomegalyic osseous (more common in blacks than in whites)</td>
</tr>
<tr>
<td></td>
<td>Prevention of diabetic microalbuminuria</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Proteinuria</td>
<td></td>
<td></td>
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<tr>
<td>ARBs</td>
<td>Type 2 diabetic nephropathy</td>
<td></td>
<td>Pregnancy</td>
</tr>
<tr>
<td></td>
<td>Type 2 diabetic microalbuminuria</td>
<td></td>
<td>Hyperkalaemia</td>
</tr>
<tr>
<td></td>
<td>Non-diabetic nephropathy</td>
<td></td>
<td>Bilateral renal artery stenosis</td>
</tr>
<tr>
<td></td>
<td>ETV/ACE-I cough or intolerance</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Patients at high CV risk</td>
<td></td>
<td></td>
</tr>
<tr>
<td>β-blockers</td>
<td>Angina pectoris</td>
<td>Asthma</td>
<td>Peripheral vascular disease</td>
</tr>
<tr>
<td></td>
<td>Post-myocardial infarction</td>
<td>Chronic obstructive pulmonary disease</td>
<td>Bradycardia</td>
</tr>
<tr>
<td></td>
<td>HF (selected)</td>
<td>AV block (grade 2 or 3)</td>
<td>Glucose intolerance</td>
</tr>
<tr>
<td></td>
<td>Tachyarrhythmias</td>
<td>Pregnancy (atenolol)</td>
<td>Metabolic syndrome</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Athletes and physically active patients</td>
</tr>
</tbody>
</table>

* Adapted from the NCCP guidelines.
CURRENT HYPERTENSION GUIDELINES

American guidelines (JNC-8)

The goals of antihypertensive therapy is the reduction of cardiovascular and renal morbidity and mortality, with the focus on controlling the systolic BP, as most patients will achieve diastolic BP control when the systolic BP is achieved.

In patients 60 years or older who do not have diabetes or chronic kidney disease, the goal blood pressure level is now <150/90 mm Hg.

• In patients 18 to 59 years of age without major comorbidities, and in patients 60 years or older who have diabetes, chronic kidney disease (CKD), or both conditions, the new goal blood pressure level is <140/90 mm Hg.

• First-line and later-line treatments should now be limited to 4 classes of medications: thiazide-type diuretics, calcium channel blockers (CCBs), ACE inhibitors, and ARBs.

• Second- and third-line alternatives included higher doses or combinations of ACE inhibitors, ARBs, thiazide-type diuretics, and CCBs. Several medications are now designated as later-line alternatives, including the following: beta-blockers, alphablockers, alpha1/beta-blockers (eg, carvedilol), vasodilating beta-blockers (eg, nebivolol), central alpha2/adrenergic agonists (eg, clonidine), direct vasodilators (eg, hydralazine), loop diuretics (eg, furosemide), aldosterone antagonists (eg, spironolactone), and peripherally acting adrenergic antagonists (eg, reserpine).

• When initiating therapy, patients of African descent without CKD should use CCBs and thiazides instead of ACE inhibitors.

• Use of ACE inhibitors and ARBs is recommended in all patients with CKD regardless of ethnic background, either as first-line therapy or in addition to first-line therapy.

• ACE inhibitors and ARBs should not be used in the same patient simultaneously.

• CCBs and thiazide-type diuretics should be used instead of ACE inhibitors and ARBs in patients over the age of 75 years with impaired kidney function due to the risk of hyperkalemia, increased creatinine, and further renal impairment.
The change to a more lenient systolic blood pressure goal may be confusing to many patients who are accustomed to the lower goals of JNC 7, including the <140/90 mm Hg goal for most patients and <130/80 mm Hg goal for patients with hypertension and major comorbidities.

The guidelines were informed by results of 5 key trials: the Hypertension Detection and Follow-up Program (HDFP), the Hypertension-Stroke Cooperative, the Medical Research Council (MRC) trial, the Australian National Blood Pressure (ANBP) trial, and the Veterans’ Administration (VA) Cooperative. In these trials, patients between the ages of 30 and 69 years received medication to lower DBP to a level <90 mm Hg. Results showed a reduction in cerebrovascular events, heart failure, and overall mortality in patients treated to the DBP target level.

The data were so compelling that some members of the JNC 8 panel wanted to keep DBP <90 mm Hg as the only goal among younger patients, citing insufficient evidence for benefits of an SBP goal lower than 140 mm Hg in patients under the age of 60 years. However, more conservative panelists pushed to keep the target SBP goal as well as the DBP goal.

In younger patients without major comorbidities, elevated DBP is a more important cardiovascular risk factor than is elevated SBP. The JNC 8 panelists are not the first guideline authors to recognize this relationship. The JNC 7 guideline authors also acknowledged that DBP control was more important than SBP control for reducing cardiovascular risk in patients <60 years of age. However, in patients 60 years and older SBP control remains the most important factor.

Other recent evidence suggests that the SBP goal <140 mm Hg recommended by the JNC 7 guidelines for most patients may have been unnecessarily low. The JNC 8 guideline authors cite 2 trials that found no improvement in cardiovascular outcomes with an SBP target <140 mm Hg compared with a target SBP level <160 mm Hg or <150 mm Hg. Despite this finding, the new guidelines do not disallow treatment to a target SBP <140 mm Hg, but recommend caution to ensure that low SBP levels do not affect quality of life or lead to adverse events.

The shift to a DBP-based goal may mean younger patients will be prescribed fewer medications if diagnosed with hypertension; this may improve adherence and minimize adverse events associated with low SBP, such as sexual dysfunction.

Patients with Kidney Disease

Although 1 post hoc analysis showed a possible advantage in kidney outcomes with the lower target of 130/80 mm Hg recommended by JNC 7, 2 other primary analyses did not support this finding. Additionally, another 3 trials did not show an advantage with the <130/80 mm Hg goal over the <140/90 mm Hg goal level for patients with chronic kidney disease.
As a result, the new guidelines recommend that patients with chronic kidney disease receive medication sufficient to achieve the higher <140/90 mm Hg goal level. However, in an exception to this goal level, the guidelines suggest that patients with chronic kidney disease or albuminuria 70 years or older should receive treatment based on comorbidities, frailty, and other patient-specific factors.

Evidence was insufficient to support a goal blood pressure of <140/90 mm Hg in patients over the age of 70 years with CKD or albuminuria.

**Patients with Diabetes**

Adults with diabetes and hypertension have reduced mortality as well as improved cardiovascular and cerebrovascular outcomes with treatment to a goal SBP <150 mm Hg, but no randomized controlled trials support a goal <140/90 mm Hg. Despite this, the panel opted for a conservative recommendation in patients with diabetes and hypertension, opting for a goal level of <140/90 mm Hg in adult patients with diabetes and hypertension rather than the evidence-based goal of <150/90 mm Hg.

Special Therapeutic Considerations

ACE inhibitors and ARBs may not be an ideal choice in patients of African descent. Results of a subgroup analysis in the Antihypertensive and Lipid Lowering Treatment to Prevent Heart Attack Trial (ALLHAT) found that ACE inhibitors led to worse cardiovascular outcomes than thiazide-type diuretics or CCBs in patients with African ancestry. Despite the subgroup analysis of ALLHAT, results of the African American Study of Kidney Disease and Hypertension (AASK) support use of first-line or add-on ACEIs to improve kidney-related outcomes in patients of African descent with hypertension, CKD, and proteinuria. As a result, the JNC 8 panelists recommend that all patients with chronic kidney disease and hypertension, regardless of ethnic background, should receive treatment with an ACE inhibitor or ARB to protect kidney function, either as initial therapy or add-on therapy. One exception to the use of ACE inhibitors or ARBs in protection of kidney function applies to patients over the age of 75 years. The panel cited the potential for ACE inhibitors and ARBs to increase serum creatinine and produce hyperkalemia. As a result, for patients over the age of 75 years with decreased renal function, thiazide-type diuretics or CCBs are an acceptable alternative to ACEIs or ARBs. In addition, the panel expressly prohibits simultaneous use of an ACE inhibitor and an ARB in the same patient. This combination has not been shown to improve outcomes. Despite the fact that the 2 medications work at different points in the renin-angiotensin-aldosterone system, other combinations of medications are better options, and the simultaneous use of ACEIs and ARBs is not supported by evidence.
Lifestyle modifications

Weight loss (range of approximate systolic BP reduction [SBP], 5-20 mm Hg per 10 kg).

Limit alcohol intake to no more than 1 oz (30 mL) of ethanol per day for men or 0.5 oz (15 mL) of ethanol per day for women.

Reduce sodium intake to no more than 100 mmol/day (2.4 g sodium or 6 g sodium chloride; range of approximate SBP reduction, 2-8 mm Hg), Maintain adequate intake of dietary potassium (approximately 90 mmol/day), calcium and magnesium for general health.

Stop smoking and reduce intake of dietary saturated fat and cholesterol for overall cardiovascular health.

Engage in aerobic exercise at least 30 minutes daily for most days (range of approximate SBP reduction, 4-9 mm Hg).

American Diabetic association guidelines

The ADA 2011 standard of medical care states that in individuals with diabetes and mild hypertension, it may be reasonable to begin treatment with a trial of non pharmacologic therapy (diet, exercise, and other lifestyle modifications.)

Mild hypertension as defined by the ADA guideline (systolic blood pressure 130-139 mm Hg or diastolic BP 80-89 mm Hg) may be classified as prehypertension by other organization.

The ADA 2011 standards of medical care in diabetes also indicate that a majority of patients with diabetes mellitus have hypertension.

In patients with type 1 diabetes, nephropathy is often the cause of hypertension, whereas in type 2 diabetes, hypertension is one of a group of related cardiometabolic factors.

Hypertension remains one of the most common causes of congestive heart failure (CHF).

Antihypertensive therapy has been demonstrated to significantly reduce the risk of death from stroke and coronary artery disease.

Other studies have demonstrated that a reduction in BP may result in improved renal function.

Therefore, earlier detection of hypertensive nephroscerosis and aggressive therapeutic interventions (particularly with ACE inhibitor drugs) may prevent progression to end-stage renal disease.
**European guidelines**

In June 2013, the European Society of Hypertension (ESH) and the European Society of Cardiology (ESC) released new guidelines for the management of hypertension, recommending that all patients, except special populations such as patients with diabetes and the elderly, be treated to below 140 mm Hg systolic blood pressure.

In patients younger than 80 years, the systolic blood-pressure target should be 140 to 150 mm Hg, but physicians can go lower than 140 mm Hg if the patient is fit and healthy; the same advice applies to octogenarians—however, the patient's mental capacity and physical health should also be considered if targeting to less than 140 mm Hg.

Patients with diabetes should be treated to below 85 mm Hg diastolic blood pressure. Salt intake should be limited to approximately 5 to 6 g per day.

Body-mass index (BMI) should be reduced to 25 kg/m^2^ and waist circumferences should be reduced to less than 102 cm in men and less than 88 cm in women.

Ambulatory blood-pressure monitoring (ABPM) should be incorporated into the assessment of risk.

Effective combination therapies include thiazide diuretics with angiotensin-receptor blockers (ARBs), calcium-channel antagonists, or angiotensin-converting enzyme (ACE) inhibitors; or, calcium-channel antagonists with ARBs or ACE inhibitors.

Dual renin-angiotensin system blockade (ie, ARBs, ACE inhibitors, and direct renin inhibitors) is not recommended because of the risks of hyperkalemia, low blood pressure, and kidney failure.

Although additional data is needed, renal denervation is a promising therapy in the treatment of resistant hypertension.

**NICE clinical guidelines**

This NICE guideline on the management of hypertension is based on the best available evidence. A multidisciplinary Guideline Development Group carefully considered evidence of both the clinical effectiveness and cost effectiveness of treatment and care in developing these recommendations. The draft guideline was then modified in the light of two rounds of extensive consultation with the relevant stakeholder groups, including NHS organisations, healthcare professionals, patient/carer groups and manufacturers.
Lifestyle interventions

Lifestyle advice should be offered initially and then periodically to patients undergoing assessment or treatment for hypertension.

Cardiovascular risk

If raised blood pressure persists and the patient does not have established cardiovascular disease, discuss with them the need to formally assess their cardiovascular risk. Tests may help identify diabetes, evidence of hypertensive damage to the heart and kidneys, and secondary causes of hypertension such as kidney disease.

Consider the need for specialist investigation of patients with signs and symptoms suggesting a secondary cause of hypertension. Accelerated (malignant) hypertension and suspected phaeochromocytoma require immediate referral.

Figure I: Choosing drugs for patients newly diagnosed with hypertension

British hypertensive society guidelines

Guidelines for management of hypertension: report of the fourth working party of the British Hypertension Society, 2004—BHS IV

Provide advice on life-style modifications for all people with high blood pressure (BP) and those with borderline or high-normal BP. Advice on effective nonpharmacological interventions is provided (A).
Initiate antihypertensive drug therapy in people with sustained systolic BP (SBP) \( \geq 160 \text{mmHg} \) or sustained diastolic BP (DBP) \( \geq 100 \text{mmHg} \) (A).

Make treatment decisions in people with sustained SBP between 140 and 159mmHg and/or sustained DBP between 90 and 99mmHg according to the presence or absence of cardiovascular disease, other target organ damage, or an estimated cardiovascular disease (CVD) risk of \( \geq 20\% \) over 10 years, according to the Joint British Societies CVD risk assessment programme/risk chart (A).

CVD risk replaces CHD risk estimation to reflect the importance of stroke prevention as well as CHD prevention. The new CVD risk threshold of \( \geq 20\% \) is equivalent to a CHD risk of approximately \( \geq 15\% \) over 10 years.

In people with diabetes mellitus, initiate antihypertensive drug therapy if SBP is sustained \( \geq 140 \text{mmHg} \) and/or DBP is sustained \( \geq 90 \text{mmHg} \) (B).

In nondiabetic people with hypertension, the optimal BP treatment goals are: SBP \( < 140 \text{mmHg} \) and DBP \( < 85 \text{mmHg} \). The minimum acceptable level of control (Audit Standard) recommended is \( 150/90 \text{mmHg} \). Despite the best practice, these levels will be difficult to achieve in some hypertensive people (B).

In people with diabetes and high BP, optimal BP goals are: SBP \( 130 \text{mmHg} \) and DBP \( 80 \text{mmHg} \). The minimum acceptable level of control (Audit Standard) recommended is \( 140/80 \text{mmHg} \). Despite the best practice, these levels will be difficult to achieve in some people with diabetes and hypertension (B).

In some circumstances, there are compelling indications and contraindications for specific classes of antihypertensive drugs, and these are specified (A).

Most people with high BP will require at least two BP-lowering drugs to achieve the recommended BP goals. A treatment algorithm (AB/CD) is provided to advise on the sequencing of drugs and logical drug combinations (C). When there are no cost disadvantages, fixed drug combinations are recommended to reduce the number of medications, which may enhance adherence to treatment (C).

Other drugs that reduce CVD risk must also be considered, notably, low-dose aspirin and statin therapy (A).

Unless contraindicated, low-dose aspirin (75 mg/ day) is recommended for all people needing secondary prevention of ischemic CVD, and primary prevention in people with hypertension.
over the age of 50 years who have a 10-year CVD risk X20% and in whom BP is controlled to the audit standard (A).

Statin therapy is recommended for all people with high BP complicated by CVD, irrespective of baseline total cholesterol or low-density lipoprotein (LDL)-cholesterol levels. Similarly, statin therapy is also recommended for primary prevention in people with high BP who have a 10-year CVD risk X20%, estimated from the Joint British Societies CVD risk assessment programme/chart. Optimal cholesterol lowering should reduce the total cholesterol by 25% or LDL-cholesterol by 30% or achieve a total cholesterol of <4.0 mmol/l or LDL-cholesterol of <2.0 mmol/l, whichever is the greatest reduction (A).

Glycaemic control should be optimized in people with diabetes, for example, HbA1c 7% (A).

Advice is provided on the clinical management of hypertension in specific patient groups, that is, the elderly, ethnic minorities, people with diabetes mellitus, chronic renal disease, and in women (pregnancy, oral contraceptive use and hormone-replacement therapy).

Suggestions for the improved implementation and audit of these guidelines in primary care are provided.

**INDIAN HYPERTENSION GUIDELINE-II**

**Goals of therapy**

The primary goal of therapy of hypertension should be effective control of BP in order to prevent, reverse or delay the progression of complications and thus reduce the overall risk of an individual without adversely affecting the quality of life.

**Initiation of therapy**

Having assessed the patient and determined the overall risk profile, management of hypertension should proceed as follows:

**In low risk patients**, institute life style modifications and observe BP for a period of 3 months, before deciding whether to initiate drug therapy.

**In medium risk patients**, institute life style modifications and monitor BP on a monthly basis. If after a period of 2-3 months, BP remains above 140/90, then initiate drug therapy.

In high and very high-risk groups, initiate immediate drug treatment for hypertension
Management strategy

Recent evidence suggests that the level of SBP control correlates better with reduction of 31-39 mortality than the level of DBP control.

Impressive evidence has accumulated to warrant greater attention to the importance of SBP as a major risk factor for CVDs. The rise in SBP continues throughout life, in contrast to DBP, which rises until approximately 50 years old, tends to level off over the next decade, and may remain the same or fall later in life. Diastolic hypertension predominates before 50 years of age, either alone or in combination with SBP elevation. DBP is a more potent cardiovascular risk factor than SBP 2 until age 50; thereafter SBP is more important.

Non-pharmacologic therapy

Life style measures should be instituted in all patients including those who require immediate drug treatment.

Patient education: Patients need to be educated about the various aspects of the disease, adherence to life style changes on long term basis and need for regular monitoring and therapy.

Weight reduction: Weight reduction of even as little as 4.5 kg has been found to reduce blood pressure in a large proportion of overweight persons with hypertension.

Physical activity: Regular aerobic physical activity can promote weight loss, increase functional status and decrease the risk of cardiovascular disease and all cause mortality. A program of 30-45 minutes of brisk walking or swimming at least 3-4 times a week could lower SBP by 7-8 mm Hg. Isometric exercises such as weight lifting should be avoided as they lead to pressor effects.

Alcohol intake: Excess alcohol intake causes a rise in blood pressure, induces resistance to antihypertensive therapy and also increases the risk of stroke.

Salt intake: Epidemiological evidence suggests an association between dietary salt intake and elevated blood pressure. The total daily intake of salt should be restricted to 6 gm, however, in hot summer this may be relaxed. Patients should be advised to avoid added salt, processed foods, and salt-containing foods such as pickles, papads, chips, chutneys and preparations containing baking powder. In the Indian context, salt restriction is more important as Indian cooking involves a high usage of salt.

Smoking: Smoking or consumption of tobacco in any form is the single most powerful modifiable lifestyle factor for prevention of major cardiovascular and non-cardiovascular
disease in hypertensive. Cardiovascular benefits of cessation of smoking can be seen within one year in all age groups.

**Yoga & Meditation:** Yoga, meditation and biofeedback have been shown to reduce blood pressure.

**Diet:** Vegetarians have a lower blood pressure compared to meat eaters. This is due to a higher intake of fruit, vegetables, fibers coupled with a low intake of saturated fats and not due to an absence of intake of meat protein.

Intake of saturated fats is to be reduced since concomitant hyperlipidaemia is often present in hypertensive.

Regular fish consumption may enhance blood pressure reduction in obese hypertensive.

Adequate potassium intake from fresh fruits and vegetables may improve blood pressure control in hypertensive.

Caffeine intake increases blood pressure acutely but there is rapid development of tolerance to its pressor effect. Epidemiological studies have not demonstrated a direct link between caffeine intake and high blood pressure.

**Principles of diet in hypertension:**

Low calorie, Low fat, Low sodium diet with normal protein intake (0.8 gm / kg body wt) Foods with low/moderate content of sodium are recommended. Intake of foods with high potassium content is advice.

**Maintenance and follow-up of therapy**

Once therapy with particular antihypertensive drugs is instituted, patients need to be seen at frequent intervals during the period of stabilization in order to monitor changes in blood pressure and see whether non-drug measures are being strictly followed. At least once in a fortnight, blood pressure should be measured at the clinic or at home. Other CHD risk factors as well as co-existing diseases/conditions should be monitored. The overall risk category of a patient and the level of blood pressure decide the frequency of follow up visits to a large extent. The frequency can be reduced once blood pressure is stabilized and other risk factors are controlled. Tobacco avoidance must be promoted vigorously.
### After initial antihypertensive drug treatment

<table>
<thead>
<tr>
<th>Goal blood pressure achieved</th>
<th>Goal blood pressure not achieved after 3 months</th>
<th>Significant side effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>See every 3 months (high &amp; very high risk) and every 6 months (medium &amp; low risk) Monitor BP &amp; risk factors Reinforce lifestyle measures</td>
<td>If no response, substitute a drug or low dose combination from other classes If partial response, increase dose, add a drug from another class or change to low dose combination Intensify lifestyle measures</td>
<td>Substitute a drug or low dose combination from other classes Or Reduce dose and add a drug from another class</td>
</tr>
</tbody>
</table>

**When Hypertension difficult to manage**

Refer to specialist physician or clinic

### Flowchart

**Younger**

- **STEP 1**
  - A (or B*)

- **STEP 2**
  - A (or B*) + C or D

- **STEP 3**
  - A (or B*) + C + D

- **STEP 4 Resistant Hypertension**

**Older**

- **STEP 1**
  - C or D

- **STEP 2**
  - C or D

**Add:** either \(\alpha\)-blocker or spironolactone or other diuretic

**B:** \(\beta\)-blocker

**D:** Diuretic (thiazide)
COMPARISON OF GUIDELINES

Are we all reaching the same goals in blood pressure management?

International guidelines have all adopted almost the same BP target goals of therapy, based on findings on risk reduction of cardiovascular outcomes associated with blood pressure reduction and lifestyle modifications.

Blood pressure lowering reduces cardiovascular and renal morbidity and mortality. Therefore, guidelines recommend achieving a BP target of <140/90 mmHg in hypertensive patients with low to moderate risk, while for those at high and very high risk (i.e. diabetes or renal disease), BP is targeted at a lower level <130/80 mmHg.

There are minor differences in the classification of arterial hypertension in the different guidelines.

International guidelines

The guidelines on hypertension issued by the World Health Organization (WHO) and International Society of Hypertension (ISH) in 2003 are directed towards a global audience including less developed societies with limited resources that must be most effectively utilized.

In a global capacity assessment the WHO surveyed 167 countries and found that in 61% of those, no national guidelines were available, in 45% health professionals were not trained to manage hypertension and in 25% antihypertensive agents were not affordable.

When resources are limited the WHO recommends giving low-risk patients lower priority for treatment.

According to the WHO the first choice of therapy on the basis of comparative trial data, availability and cost for the majority of patients without a compelling indication for another drug class should be a low dose of a diuretic.

In most places, diuretics are the cheapest and therefore most cost-effective option.
Comparison of JNC guidelines

These guidelines are adjusted to an American population and thus include also recommendations for African Americans, who demonstrate a somewhat reduced BP response to monotherapy with beta-blockers (BBs), angiotensin converting enzyme inhibitors (ACEIs), or angiotensin receptor blockers (ARBs) compared to diuretics or calcium channel blockers (CCBs).

JNC 7 recommends that patients with systolic BP between 120-139 mmHg or diastolic BP between 80-89 mmHg should be considered pre-hypertensive and require health-promoting lifestyle modifications to prevent cardiovascular disease (CVD).

Thiazide-type diuretics should be the initial drug therapy for most patients, either alone or in combination with other drug classes, but certain high-risk conditions are compelling indications for other drug classes.

<table>
<thead>
<tr>
<th>Blood Pressure Classification</th>
<th>Systolic BP</th>
<th>Diastolic BP</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>WHO-ISH</td>
<td>ESH-ESC</td>
</tr>
<tr>
<td>Optimal</td>
<td>&lt; 120</td>
<td>&lt; 120</td>
</tr>
<tr>
<td>Normal</td>
<td>&lt; 130</td>
<td>120-129</td>
</tr>
<tr>
<td>High-Normal</td>
<td>130-139</td>
<td>130-139</td>
</tr>
<tr>
<td>Grade 1 Hypertension (mild)</td>
<td>140-159</td>
<td>140-159</td>
</tr>
<tr>
<td>Subgroup: Borderline</td>
<td>140-149</td>
<td></td>
</tr>
<tr>
<td>Grade 2 Hypertension (moderate)</td>
<td>160-179</td>
<td>160-179</td>
</tr>
<tr>
<td>Grade 3 Hypertension (severe)</td>
<td>≥ 180</td>
<td>≥ 180</td>
</tr>
<tr>
<td>Isolated Systolic Hypertension</td>
<td>≥ 140</td>
<td>≥ 140</td>
</tr>
<tr>
<td>Subgroup: Borderline</td>
<td>140-149</td>
<td></td>
</tr>
<tr>
<td>Pre-Hypertension</td>
<td></td>
<td>120-139</td>
</tr>
<tr>
<td>Stage 1</td>
<td></td>
<td>140-159</td>
</tr>
<tr>
<td>Stage 2</td>
<td></td>
<td>≥ 160</td>
</tr>
</tbody>
</table>

Comparison with Indian guidelines

The Indian guidelines differ from other major hypertension guidelines in:

Classification of hypertension

Target BP in special populations

Lifestyle changes
Dietary modifications

Initiation of pharmacotherapy

Drugs of initial choices

Use of drug combinations

HYPERTENSION DEFINITIONS

INDIA-GUIDELINES

120-129 → optimal

130-139 → high normal

USA-GUIDELINES 120-139 → pre hypertension

Special populations

Target BP goal is similar for DM in all nations, it is set at 135/85 mm hg.

Target BP for kidney disease is different in India, it is set at 125/75 mm hg, while in UK it is set at 140/80 mm hg

Lifestyle changes

Lifestyle changes are recommended at various levels of BP in various guidelines:

India– when BP> 130/80 mm of hg.

USA and WHO– when BP > 120/80 mm of hg.

Drug treatment

Pharmacotherapy recommendations also vary with nation to nation:

India– when SBP> 140

USA and WHO– when SBP> 130(along with lifestyle changes

Dietary modifications

INDIA

No guidelines on alcohol consumption.
No recommendations on potassium intake.

Daily sodium intake 2.5gm.

USA

Specific recommendations on alcohol and potassium consumption.

UK

Sodium intake limit raised to 5gm/day.

EUROPEAN GUIDELINES

These recommend the use of drug combinations right from the initial stages of hypertension

Current Challenge and Future Thought

In spite of having so many therapeutic alternatives, there is a clear need to address remaining questions regarding clinical management of hypertension. Despite use of available combination treatment, reducing SBP to, 140 mmHg may be difficult or more so if the target is a reduction to 130 mmHg in patients with diabetes, target organ damage, or associated clinical conditions. Guidelines also recommend use of antihypertensive drugs in patients with grade 1 hypertension at low or moderate cardiovascular risk (BP between 140 and 159 mmHg SBP and/or 90 and 99 mmHg DBP), but benefit of treatment is not supported by clinical trial evidence. Over the past four or five decades hypertension and cardiovascular medicine has experienced dramatic and innovative changes that have significantly reduced morbidity and mortality. But national and international guidelines dealing with the evaluation, diagnosis, and treatment of hypertension have documented the increasing prevalence of cardiac failure and end-stage renal disease, despite the continued decrease in the morbidity and mortality resulting from stroke and coronary heart disease.

Why this enigmatic occurrence takes place, despite the continued use of antihypertensive therapy, remains to be explained. A vast array of new antihypertensive compounds has been developed that are able to affect the outcomes of many pathophysiologic mechanisms in patients with hypertension. In more recent years, much new information has appeared concerning the basis genetic and biologic mechanisms involved in cardiovascular and renal diseases. In addition, innovative approaches to drug evaluation will become elucidated through individual studies into disease and drug mechanisms.
CONCLUSION

Guidelines in the management of arterial hypertension focus on the importance to individualized therapy, and recommend appropriate drug selection mainly based on risk stratification.

Lifestyle modifications can prevent or delay the onset of hypertension in normotensive, whereas concomitant therapy in hypertensive it can reduce BP and enhance antihypertensive drug efficacy. Findings of some of the previous clinical trials together with their easiness of administration, infrequent side effects and low price, diuretics still recommended as first suitable choice in the management of hypertension.

All guidelines have slightly different approaches on therapy initiation, but the supporting evidence offered all converges on the same pillars of antihypertensive treatment, suggesting the use of combination therapy to target BP control and reduce cardiovascular risk in patients at high risk.

Data on vasodilating β blockers such as carvedilol, nebivolol and celiprolol may expand the utility of β-blockers to patient populations traditionally considered not to be optimal candidates for β-blockers therapy. ACE inhibitors and ARBs are superior to other classes of agent in patients with multiple risk factors, and longterm outcome trial of aliskiren will determine its suitable place in the treatment of hypertension. Several large clinical trials and meta-analysis confirm CCBs efficacy not only in lowering blood pressure but also in reducing cardiovascular morbidity and mortality in hypertensive patients with a normal or high cardiovascular risk profile. The guidelines vary from country to country due to differences in their population, race, genetic differences and many more reasons.

Although these guidelines vary in their strategies, their basic aim remains the same, that is proper and effective control of hypertension and prevention of complications, thereby preventing morbidity and mortality arising due to hypertension.

REFERENCES


