EDITORIAL

Hypertension Guidelines (NICE-BIHS Guideline - 2011, ESH/ESC Guideline - 2013, JNC Guideline - 2014)

Hypertension is one of the most important preventable causes of premature morbidity and mortality. Hypertension is a major risk factor for ischemic heart disease, stroke, heart failure, chronic kidney disease, cognitive decline and premature death. The risk associated with increasing blood pressure is continuous, with each 2 mm Hg rise in systolic blood pressure there is associated with a 7% increased risk of mortality from ischemic heart disease and a 10% increased mortality from stroke. Diastolic pressure is commonly elevated in people younger than 50 years. With aging, systolic hypertension becomes a more significant problem. At least one-quarter of adults and more than half of those older than 60 have high blood pressure.

NICE GUIDELINE 2011:

This guidance updates and replaces NICE clinical guideline 34 (published in 2006).

Definition:

Stage 1 Hypertension: Clinic blood pressure is 140/90 mm Hg or higher and subsequent ambulatory blood pressure monitoring (ABPM) daytime average or home monitoring (HBPM) average blood pressure is 135/85 mm Hg or higher.

Stage 2 Hypertension: Clinic blood pressure is 160/100 mm Hg or higher and subsequent ABPM day time average HBPM average blood pressure is 150/95 mm Hg or higher.

Severe Hypertension: Clinic systolic blood pressure is 180 mm Hg or higher or clinic diastolic blood pressure is 110 mmHg or higher.

Assessing cardiovascular risk and target organ damage: For people with hypertension offer to-

a) Test for the presence of protein in urine. Send urine to measure the albumin creatinine ratio. Test for hematuria by using a reagent strip.

b) Take a blood sample to measure plasma glucose, electrolytes, creatinine, Estimate GFR, serum total cholesterol and HDL cholesterol.

c) Examine the fundi for the presence of hypertensive retinopathy.

d) Arrange for a 12 –lead electrocardiography to be performed.

Life style intervention

It should be offered initially with offer to healthy diet and regular exercise. Smokers should be encouraged to stop, alcoholic to reduce. People should reduce dietary salt, consumption of coffe, caffeine. Group working, relaxation therapy may be helpful.

Initiating antihypertensive drug treatment

a) Offer drug treatment to people under 80 years with stage 1 hypertension who have one or more of the following-

   1. Target organ damage
   2. Established cardiovascular disease
   3. Renal disease
   4. Diabetes
   5. 10 year cardiovascular risk equivalent to 20% or greater.

b) Offer antihypertensive drug treatment to people of any age with stage 2 hypertension.

c) People under 40 years of age with stage 1 hypertension and no evidence of target organ damage, cardiovascular disease, renal disease or diabetes, consider evaluation of secondary causes and more detailed assessment of potential target organ damage.

Monitoring treatment and blood pressure monitoring

Use clinic blood pressure measurement to monitor the response to antihypertensive treatment with lifestyle modifications and drugs, aim for target clinic blood

pressure below 140/90 mm Hg in people aged under 80 years with treated hypertension. Aim for target clinic blood pressure below 150/90 mmHg in people aged 80 years or over with treated hypertension. For people identified with a 'white coat effect' consider ABPM (ambulatory blood pressure monitoring) or HBPM (home blood pressure monitoring) as an adjunct to clinic blood pressure measurement to monitor the response to antihypertensive treatment with life style modification or drug. While using ABPM or HBPM to monitor response to treatment aim for a target average blood pressure during the person's usual waking hours of-

a) Below 135/85 mmHg for people aged under 80 years,

b) Below 145/85 mmHg for people aged 80 years or over.

Choosing antihypertensive drug treatment

Where possible, recommend treatment with drugs taken only once a day. Prescribe nonproprietary drugs where these are appropriate and minimize cost. Offer people with isolated systolic hypertension (systolic blood pressure 160 mmHg or more) the same treatment as people with raised systolic and diastolic blood pressure. Offer people aged 80 years and over the same antihypertensive drug treatment as people aged 55-80 years, taking into account any comorbidities. Offer antihypertensive drug treatment to women of childbearing potential in line with recommendations on management of pregnancy with chronic hypertension and breastfeeding in 'Hypertension in pregnancy'(NICE clinical guideline 107).

Step 1 treatment

a) Offer people aged under 55years step 1 antihypertensive treatment with an angiotensin-converting enzyme (ACE) inhibitor or a low-cost angiotensin-II receptor blocker (ARB). If an ACE inhibitor is prescribed and is not tolerated offer a low cost ARB. ***Do not combine an ACE inhibitor with an ARB to treat hypertension***.

b) Offer step 1 antihypertensive treatment with a calcium-channel blocker (CCB) to people aged over 55 years and to black people of African or Caribbean family origin of any age. If a CCB is not suitable, for example because of edema or intolerance or if there is evidence of heart failure or a high risk of heart failure offer a thiazide like diuretic. If thiazide treatment is to be initiated or changed ,offer a thiazide- like diuretic, such as chlorthalidone (12.5-25.0 mg once daily) or indapamide (1.5mg modified release once daily or 2.5mg once daily) in preference to a conventional diuretic such as bendroflumethiazide or hydrchlorothiazide. For people who are on bendroflumethiazide or hydrchlorothiazide and whose blood pressure is stable and well controlled, continue treatment with the bendroflumethiazide or hydrchlorothiazide.

c) Beta blocker are not a preferred initial therapy for hypertension. Howevere beta-blocker may be considered in younger people, particularly (1) those with intolerance or contraindication to ACE inhibitors and angiotensin-II receptor antagonist or (2) women of childbearing potential or (3) people with evidence of increased sympathetic drive. If therapy is initiated with a beta blocker and a second drug is required, add acalcium-channel blocker rather than a thiazide diuretic to reduce the person's risk of developing diabetes.

Step 2 treatment

If blood pressure is not controlled by step 1 treatment, offer step 2 treatment with a CCB in combination with either an ACE inhibitor or an ARB. If a CCB is not suitable for step 2 treatments, for example because of edema or intolerance, or if there is evidence of heart failure or a high risk of heart failure, offer a thiazide like diuretic. For black people of African or Caribbean family origin, consider an ARB in preference to an ACE inhibitor, in combination with a CCB.

Step 3 treatment

Before considering step 3 treatment, review medication to ensure step 2 treatment is at optimal or best tolerated doses. If treatment with three drugs is needed a combination of ARB or ACE inhibitor with CCB and a thiazide like diuretic should be used.

Step 4 treatment

Regard clinic blood pressure that remains higher than 140/90 mmHg after treatment with optimal or best tolerated doses of an ACE inhibitor or an ARB plus a CCB plus a diuretic as resistant hypertension, and consider adding a fourth antihypertensive drug and/ seeking expert advice.

For treatment of resistant hypertension at step 4

a) Consider further diuretic therapy with low dose spironolactone (25mg once daily) if blood potassium level is 4.5 mmol/L or lower. Use particular caution in people with a reduced estimated glomerular filtration rate because they have an increased risk of hyperkalemia. Consider higher dose of thiazide like diuretic if blood potassium level is higher than 4.5mmol/L.

b) When using further diuretic therapy for resistant hypertension at step 4, monitor blood sodium and potassium and renal function within 1 month and repeat as required thereafter.

c) If further diuretic therapy for resistant hypertension at step 4 is not tolerated or is contraindicated or ineffective, consider an alpha or beta-blocker.

d) If blood pressure remains uncontrolled with optimal or maximum tolerated doses of 4 drugs seek expert advice if it has not yet been obtained.

About NICE guideline

1. *How this guideline was developed*: NICE commissioned the National Clinical Guideline centre to update this guideline. The Centre established a Guideline Development Group, which reviewed the evidence and updated the recommendations.
2. *Scope of the guidance*
   a) Groups those were covered- 1. adults with hypertension (18 years or older). Particular consideration will be given to the needs of black people of African and Caribbean family origin and minority ethnic groups where these differ from the needs of the general population.2. People aged 80 years or older.
   b) Groups not covered- 1. people with diabetes, 2. Children and young people (younger than 18 years), 3. Pregnant women 4. Secondary causes of hypertension 5. Peopla with accelerated hypertension 6. People with acute hypertension or high blood pressure in emergency care.

EUROPEAN SOCIETY OF HYPERTENSION (ESH) AND EUROPEAN SOCIETY OF CARDIOLOGY (ESC) GUIDELINE FOR MANAGEMENT OF ARTERIAL HYPERTENSION

The 2013 ESH/ESC guidelines continue to adhere to some fundamental principles that inspired the 2003 and 2007 guidelines. The European members of the task force in charge of the 2013 guidelines on hypertension have been appointed by the ESH and ESC, based on their recognized expertise and absence of major conflicts of interest. Each member was assigned a specific writing task, which was reviewed by three coordinators and the by two chairs, one appointed by ESH and another by ESC. The text was finalized over approximately in 18 months, during which the task force members met collectively several times and corresponded intensively with one another between meetings. Before publication, the document was also assessed twice by 42 European reviewer half selected by ESH and half by ESC.

New aspects:

Some of the important differences of present guideline from previous ones are-

1. Strengthening of prognostic value of home blood pressure monitoring (HBPM) and of its role for diagnosis and management of hypertension, next to ambulatory blood pressure monitoring (ABPM)
2. Update the prognostic significance of night-time BP, white-coat hypertension and masked hypertension.

Purpose: Purpose of European guidelines is to be educational and not prescriptive or coercive for the management of individual patients, who may differ widely in their personal, medical and cultural characteristics, thus requiring decisions different from the average ones recommended by (many) guidelines.

Goal BP:

- Sufficient evidence to recommend that BP be lowered to < 140/90 in both low-moderate and high risk hypertensives (HTs).
- Evidence missing in the elderly (benefits of lowering SBP to < 140 mmHg never tested in randomized trials)
- Considering additional (weaker) evidence it may be prudent to recommend lowering BP within the 130-139/80-85 mmHg range in all HTs, and possibly close to lower values in this range

- More critical evidence from specific randomized trials desirable.

Questions Posed by Recent Trials

- Beneficial effects of BP reduction on systolic/ diastolic heart failure particularly if entry BP is below or only slightly above 140/80 mmHg (TRANSCEND / PROFESS / I-PRESERVE).
- Small/non-significant effects of antihypertensive treatment, even if BP lowering effect is marked, on dementia (HYVET).
- Negative findings on secondary prevention of AF by ARBs in specifically-designed trials (CAPRAF / GISSI-AF).
- Negative findings on primary prevention of AF by ARBs (TRANSCEND / PROFESS).
- Use of low dose aspirin in diabetes.

Treatment Initiation at High Normal BP (130-139/85-89 mmHg)

- If no diabetes/previous Cardiovascular (CV) events, no trial evidence of treatment benefits [except of delayed new Hypertension (HT)].
- No prospective trial evidence also in diabetes - treatment recommended if organ damage (particularly renal) is present.
- Trial evidence in patients with previous CV events controversial - further trials to be completed before firm recommendation can be given.

Initiation of Drug Treatment

- Prompt drug treatment in **grade 2/3 HT**
- Reasonable to make use of drug treatment also in **grade 1 HT**, although no trial evidence in grade I hypertensive at mild / moderate risk.
- Recommendation to start drug treatment at BP 140/ 90 mmHg in the **elderly** as well, although evidence mainly based on:
  - "Post-hoc" event data.
  - Improvement of organ damage.
  - Delayed treatment leads to irreversible organ damage / greater residual risk.

Choice of Antihypertensive Drugs (I)

- Large scale meta-analyses do not confirm the contention that major antihypertensive drug classes differ significantly for their ability to reduce BP.
- There is also no undisputable evidence that major drug classes differ in their ability to protect against overall CV risk or cause-specific CV events, e.g. stroke and myocardial infarction.
- The 2007 ESH/ESC guidelines conclusion that Diuretics / Angiotensin Converting Enzyme Inhibitor / Calcium channel blockers / Angiotensin Receptor Blocker / Betablocker can all be considered suitable for initiation / maintenance of antihypertensive treatment can thus be confirmed.

Choice of Antihypertensive Drugs (II)

- The percentage of patients responsive to any drug class is limited.
- Patients responsive to one drug are often not responsive to another drug.
- ***Thus keeping the number of drug options large increases the chance of BP control in a larger fraction of HTs***.
- This is of crucial importance because CV protection by antihypertensive treatment substantially depends on BP lowering per se, regardless of how it is obtained.

Choice of Antihypertensive Drugs (III)

- Each drug class has contraindications as well favourable effects in specific clinical settings. The choice of drugs should be made according to this evidence.
- The traditional ranking of drugs into first / second / third and subsequent choice, with an average patient as reference, has now little scientific and practical justification and ***should be avoided*** **(ESH task force document. j.hypertens 2009).**

Ranking Drugs in Order of Choice

- Any all-purpose ranking of antihypertensive drugs for general antihypertensive usage is unnecessary and probably deceiving.
- Even reasons based on costs, often used to justify ranking, have recently been weakened by the advent of generic compounds within every class of antihypertensive agents (ESH task force document.j.hypertens 2009.

2007 ESH/ESC Hypertension Guidelines First Choice Drug Treatment

- Diuretics (*not to be initially preferred in patients at high risk of developing diabetes).*
- ACE-inhibitors.
- Calcium antagonists.
- Angiotensin receptor antagonists.
- Beta-blockers (*not to be initially preferred in patients at high risk of developing diabetes).*

BP Reduction and CV Protection

- BP reduction *per se* plays a major role in CV and renal protection of hypertensive patients.
- The greater the number of available therapeutic options to lower BP the better.

Fixed-dose (or Single Tablet) Combinations

- Whenever possible, use of single tablet combinations should be preferred, because simplification of treatment carries advantages for compliance to treatment.
- Single tablet combination can be the first treatment step when high CV risk makes early BP control desirable (*This approach is now facilitated by the availability of different fixed-dose combinations of the same two drugs).*

Choice of Combinations

- Despite trial evidence of outcome reduction, the BB /diuretic combination favours development of diabetes and should thus be avoided, unless required for other reasons, in predisposed subjects.
- Use of an ACEI /ARB combination presents a dubious potentiation of benefits with a consistent increase of serious side effects (Specific benefits in nephropathic patients with proteinuria (because of a superior antiproteinuric effect) expect confirmation in event based trials for **ACEI / ARB combination).**

Choice of Combinations

- Trial evidence of outcome reduction has been obtained particularly for the combination of
  - Diuretic + ACEI
  - Diuretic + ARB
  - Diuretic + CA
  - ACEI + CA
- The ARB + CA combination also appears to be rational and effective.
- These combinations should thus be recommended for priority use.

Combination Therapy

- Evidence has continued to show that in the vast majority of HTs effective BP control can only be achieved by combination of at least two antihypertensive drugs.
- Addition of a drug from another class to the initially prescribed one should thus be regarded as a recommendable treatment strategy, unless the initial drug needs to be withdrawn because of the appearance of side effects or the absence of any BP lowering effect. The ARB/CA combination has several potential advantages (effective BP reduction / high rate of BP control / highly favourable tolerability profile / protection against organ damage).

Combinations of More than Two Drugs (Three drug combination)

- No less than 15%-20% of the patients need more than two antihypertensive drugs to achieve an effective BP reduction.
- The combination of a RAS blocker, a CA and a thiazide may be a rational three drug combination.
- Other drugs such as b-blockers or an a-blocker may be included in this multiple approach, depending on the clinical circumstances.

Sub clinical Organ damage in Total CV Risk Quantification

In HT assessment of total CV risk it is important to optimize decision about treatment initiation / intensity / goals-

- Quantification of total CV risk must include search for subclinical organ damage, which is common and has independent prognostic significance.
- Subclinical OD may not be sufficient to bring patients into the high risk category, although this may occur with multiple OD and the metabolic syndrome.
- Several measures of renal, cardiac and vascular damage can be considered for total CV risk quantification.
- Because of their simplicity, wide availability and limited cost measures based on urinary protein

excretion (including microalbuminuria), eGFR (MDRD formula), and ECG are suitable for routine use.

- Cardiac and vascular ultrasounds are more and more easily available in Europe, and their use in the evaluation of the hypertensive patient can be encouraged.
- ***Subclinical OD should be assessed both at screening and during treatment because a number of treatment-induced changes*** in OD relate to CV and renal outcomes, thereby offering information on whether the selected treatment is protecting patients.
- Several other measures of subclinical OD have been shown to have prognostic significance, but their complexity / low availability and high cost prevent their routine clinical use.
- It is likely that technological progress will make the use of some of these measurements more common in the future.
- Any measure, however, should be considered only if it adds to the overall precision of CV risk quantification.

Threshold /Target BP for Treatment in DM

- Antihypertensive treatment to be always initiated when BP e" 140/90 mmHg.
- Limited trial support for treatment initiation at high normal BP / to be recommended in the presence of organ damage (e.g. microalbuminuria).
- The < 130/80 BP goal not supported by trial evidence / very difficult to achieve.
- Realistic to pursue a sizeable BP reduction without indicating a goal which is unproven.
- Meta-analyses of available trials show that in diabetes all major antihypertensive drug classes protect against CV complications, probably because of the protective effect of BP lowering per se. They can thus all be considered for treatment.
- In diabetes combination treatment is commonly needed to effectively lower BP.
- A renin angiotensin receptor blocker should always be included because of the evidence of its superior protective effect against initiation or progression of nephropathy. In hypertensive diabetic patients tight blood glucose control (HbA1C to 6.5%) is beneficial, particularly in microvascular complications.
- Recent evidence suggests that combining effective blood glucose and BP control increases protection, particularly of the kidney.
- Tight blood glucose control should not be pursued abruptly and patients should be monitored closely because of the increased risk of severe hypoglycaemic episodes.
- Microvascular complications of diabetes in different organs are differently affected by treatment.
- Antihypertensive treatment exerts a major protective effect against renal complications, while evidence of a similar effect on eye and neural complications is less consistent.

Antihypertensive Treatment in the Elderly

- In the elderly antihypertensive treatment is highly beneficial (large meta-analyses).
- In patients aged >65 the proportional benefit is no less than in younger patients.
- Data (large meta-analyses) do not support the claim that antihypertensive drug classes significantly differ in their ability to lower BP / exert CV protection both in younger and in elderly patients.
- The choice of the drugs to employ should thus not be guided by age.
- Thiazide diuretics / ACEIs / CA / ARBs / BBs can be considered for initiation / maintenance of treatment also in the elderly.
- In the elderly outcome trials have only addressed patients with an entry SBP > 160 mmHg.
- In no trial in which a benefit was achieved SBP averaged < 140 mmHg.
- Common sense considerations suggest that also in the elderly drug treatment can be initiated when SBP > 140 mmHg with the goal of going below this value.
- Treatment should be conducted with particular attention to adverse responses, potentially more frequent in the elderly.

Treatment in Patients Aged e" 80 Years

- Evidence is now available from an outcome trial (HYVET) that antihypertensive treatment has benefits also in patients aged 80 years or more.
- BP lowering drugs should thus be continued or initiated when patients turn 80, starting with monotherapy and adding a second drug if needed.
- The decision to treat should thus be taken on an individual basis, and patients should always be carefully monitored during and beyond the treatment titration phase.

The Issue of the Poly pill

- The rationale upon which the polypill has been developed is not the reasonable one of assembling several drugs to facilitate treatment of high risk patients requiring multiple therapies.
- The rationale is that, by containing all types of agents capable of reducing CV risk, the polypill may reduce CV risk by more than 80% in all individuals, and should be given to all individuals of 55 years and olderAspirin in low risk individuals has only small CV benefits counterbalanced by excess bleeding.
- Antihypertensive agents lower BP only very moderately in NTs.
- Statins are generally well tolerated but sometimes accompanied by serious adverse events.
- The extent of the benefit of antihypertensive drugs / statins in individuals without any risk factor is unproven.
- The concept of treating "CV risk" as an entity without targeting and monitoring the individual risk factors appears unsound.

Antiplatelet Therapy

- A large meta-analysis of available trials confirms that antiplatelet treatment is highly beneficial in secondary CV prevention.
- The same meta-analysis shows that in primary prevention trials on subjects with an overall low risk antiplatelet treatment is associated with only a very tiny excess of benefit over harm.
- Although the benefit of antiplatelet treatment in diabetes (with or without hypertension) remains to be established, there is some evidence that low-dose aspirin may be beneficial (primary prevention) in HTs with a serum creatinine > 1.3 mg/dl or an eGFR < 45 ml/min.1.73m2.
- Thus low-dose aspirin should be prescribed in HT without a previous CV event if there is a reduced renal function or a high risk.
- Careful attention should be given to the possibility of bleeding, particularly gastrointestinal.

Lipid Lowering Treatment

- The recommendation to consider statin therapy in high risk HTs (ASCOT) confirmed.
- Association of statin with CA possibly more protective than with BB.
- Data from Jupiter trial support that statins can be beneficial also in subjects with moderate CV risk (15% in 10 years) and elevated CRP.

Atrial Fibrillation (AF) - Primary Prevention

- In 2007 ESH / ESC guidelines recommendation to preferentially use ARBs / ACEIs.
- Evidence mainly from post-hoc analyses.
- Also plausible pathophysiological explanation, i.e. effectiveness of RAS blocker on LVH regression and relationship of LVH regression with AF.
- No consistent support from recent trials (TRANSCEND, PROFESS, I-Preserve).
- In a meta-analysis on almost 12.000 patients with systolic HF BBs were found to reduce (-27%) AF.
- In patients with an AF history and systolic HF BBs are a specific indication.
- In a recent meta-analysis including almost 12 thousand patients with systolic heart failure, and therefore at high risk of AF, b-blockers were found to significantly reduce (-27%) the incidence of AF.
- A history of AF and systolic HF may thus be a specific indication for using b-blockers.

Protection against Recurrent AF

- In 2007 ESH/ESC guidelines preferential use of ARBs / ACEIs recommended, with stress on small number of patients / need for new studies.
- No support from two new studies - CAPRAF, GISSI-AF (85% HTs).
- Support from recent meta-analysis by Schmieder et al (?)

EIGHT JOINT NATIONAL COMMITTEE (JNC-8) GUIDELINES:

- 2014 evidence-based guideline for the management of high blood pressure in adults (report from the panel members appointed to the Eighth Joint National Committee (JNC-8).

There is strong evidence to support treating hypertensive persons aged 60 years or older to a blood pressure (BP) goal of less than 150/90 mmHg and hypertensive persons 30 through 59 years of age to a diastolic goal less than 90 mmHg; howevere, there is insufficient evidence in hypertensive persons younger than 60 years of age for a systolic goal, or in those younger than 30 years for a diastolic goal, so the panel recommends a BP of less than 140/90 mm Hg for those group based on expert opinion. The same threshold and goal are recommended for hypertensive adults with diabetes or non-diabetic chronic kidney disease (CKD) as for general hypertensive population younger than 60 years. There is moderate evidence to support initiating drug treatment with angiotensin-converting enzymes inhibior, angiotensin receptor blocker, calcium channel blocker, or thiazide type diuretic in the non-black hypertensive population, including those with diabetes. In the black (African and Caribbeans) hypertensive population, including those with diabetes, a calcium channel blocker or thiazide type of diuretic is recommended as initial therapy. There is moderate evidence to support initial or add-on antihypertensive therapy with an angiotensin converting enzyme inhibitor or angiotensin receptor blocker in persons with CKD to improve kidney outcomes.

Recommendations:

They put forward 9 recommendations. Recommendations 1 through 5 addresses questions 1 and 2 concerning threshold and goals for BP treatments. Recommendations 6, 7, 8 addresses question 3 concerning selection of antihypertensive drugs. Recommendation 9 is a summary of strategies based on expert opinion for starting and adding antihypertensive drugs.

Recommendation 1

In the general population aged > 60 years, initiate pharmacologic treatment to lower blood pressure (BP) at systolic blood pressure (SBP) > 150 mmHg or diastolic blood pressure(DBP) > 90 mmHg and treat to goal SBP <150 mmHg and goal DBP <90 mm Hg.

Corollary recommendation

In the general population aged > 60 years, if pharmacologic treatment for high BP result in lower achieved SBP (eg <140 mmHg) and a treatment goal is well tolerated and without adverse effects on health or quality of life, treatment is well tolerated and without adverse effects on health or quality of life, treatment does not need to be adjusted.

Recommendation 2

In the general population <60 years, initiate pharmacologic treatment to lower BP at DBP > 90 mm Hg and treat to a goal DBP < 90 mm Hg.

Recommendation 3

In the general population <60 years, initiate pharmacologic treatment to lower BP at SBP > 140 mm Hg and treat to goal SBP < 140 mm Hg.

Recommendation 4

In the population aged > 18 years with chronic kidney disease (CKD), initiate pharmacologic treatment to lower BP at SBP > 140 mm Hg or DBP > 90 mm Hg and treat to goal SBP < 140 mm Hg and goal DBP < 90 mm Hg.

Recommendation 5

In the population aged > 18 years with diabetes, initiate pharmacologic treatment to lower BP at SBP > 140 mm Hg or DBP > 90 mm Hg and treat to goal SBP < 140 mm Hg and goal DBP < 90 mm Hg.

Recommendation 6

In general non population, including those with diabetes, initial antihypertensive treatment should include a thiazide type diuretics, calcium channel blocker (CCB), angiotensin converting enzyme inhibitor (ACEI), or angiotensin receptor blocker(ARB).

Recommendation 7

In the general black population, including those with diabetes, initial antihypertensive treatment should include a thiazide-type diuretic or CCB.

Recommendation 8

In the population aged > 18 years with CKD, initial (or add on) antihypertensive treatment should include an ACEI or ARB to improve kidney outcomes. This apply to all CKD regardless of race or diabetes status.

Recommendation 9

The main objective of hypertension treatment is to attain and maintain goal BP. If goal BP is not reached within a month of treatment, increase the dose of the initial drug or add a second drug from one of the classes in recommendation 6 (thiazide-type diuretics, CCB, ACEI, or ARB). The clinician should continue to assess BP and adjust the treatment regimen until goal BP is reached. If goal BP cannot be reached with 2 drugs, add and titrate a third drug from the list provided. ***Do not use an ACEI and an ARB together in same patient***. If goal BP cannot be reached using only the drugs in recommendation 6 because of contraindication or the need to use more than 3 drugs to reach goal BP, antihypertensive drugs from other classes can be used. Referral to a hypertension specialist may be indicated for patient in whom goal BP cannot be attained using the above strategy or for the management of complicated patients for whom additional clinical consultation is needed.

Evidence Based Dosing for Antihypertensive Drugs

Antihypertensive drug	Initial daily dose (mg)	Target dose in RCT reviewed	Number of doses per day
ACE inhibitors			
Captopril	50	150-200	2
Enalapril	5	20	1-2
Lisinopril	10	40	1
Angotensin receptor blocker			
Eprosartan	400	600-800	1-2
Candesartan	4	12-32	1
Losartan	50	100	1-2
Valsartan	40-80	160-320	1
Irbesartan	75	300	1
Beta blocker			
Atenolol	25-50	100	1
Metoprolol	50	100-200	1-2
Calcium channel blocker			
Amlodipine	2.5	10	1
Diltizem extended release	120-180	360	1
Nitrendipine	10	20	1-2
Thiazide type diuretics			
Bendroflumethiazide	5	10	1
Chlorthalidone	12.5	12.5-25	1
Indapamide	1.25	1.25-2.5	1
Hydrochlorothiazide	12.5-25	25-100a	1-2

[a] current evidence recommended evidence-based dose that balance efficacy and safety is 25-50 mg daily comparison between JNC 7 and JNC 8.

Comparison Between JNC 7 and JNC8:

Methodology

JNC 7	JNC 8
Non systemic literature review by expert committee including a range of study design	Critical questions and review criteria defined by expert panel with input from methodology team
Recommendations based on consencious	Initial systemic review by methodologists restricted to RCT evidence Subsequent review of RCT evidence and recommendation by panel according to a standardized protocol

Definition

JNC 7	JNC 8
Defined hypertension and prehypertension	Definition Hypertension and Prehypertension not addressed Threshhold for pharmacological treatment were defined

Treatment goal

JNC 7	JNC 8
Separate treatment goal defined for uncomplicated HTN and Hypertension with subgroups with comorbidities(diabetes, kidney diseases)	Same treatment goal defined for all HTN except where evidence review support different goal for aprticular subgroup

Drug therapy

Recommended 5 classes to be considered as initial therapy	Recommended selection among 4 specific medication classes ACEI or ARB,CCB,diuretics
Recommended thiazide type diuretics as initial therapy without compelling indication for another class	Doses based on RCT evidence
Specific particular antihypertensive medication classes for patients with compelling indications i.e diabetes,CKD,heart failure myocardial infarction	Recommended specific medication classes based on evidence review for racial,CKD and diabetic subgroup Panel created a table of drugs and doses used in outcome trial

Scope of topics

JNC 7	JNC 8
Addresses multiple issues;blood pressure measurement method,patient evaluation components,secondary hypertension,adherence to regimens,resistant hypertension,hypertension in special populations	Addressd a limited number of questions. Those judges by the panel to be highest priority
Based on literature review and expert opinion	Evidence review of RCT

Review process prior to publication

JNC 7	JNC 8
Reviewed by the national high blood pressure education programme coordination committee, a coalition of 39 major professional,public and voluntary organisations and 7 federal agencies	Reviewed by expert individuals those affiliated with professional,public organizations, federal agencies

No official sponsorship by any organization should be inferred

Observations:

a) patient over 75 yrs :No evidence to support renin angiotensin system inhibitor treatment in those older than 75yrs.use of thiazide type diuretic or CCB is also an option for individuals with CKD in this age group

b) The recommendation based on RCT evidence in this guideline differ from recommendations in other currently used guidelines supported by expert concensus

c) JNC 7 and other guidelines recommended treatment to lower BP goals in patients with diabetes and CKD based on observational studies.

Guideline comparisons of Goal BP and initial drug therapy for adult with hypertension

Guidelines	Populations	Goal BP mmHg	Initial drug treatment options
JNC 8,2014 hypertension guideline	General > 60yr	<150/90	Nonblack :thiazide type diuretics,ACEI, ARB or CCB
	General < 60yr	<140/90	Black :thiazide-type diuretic or CCB
	Diabetes	<140/90	Thiazide type diuretic,ACEI,ARB,CCB
	CKD	<140/90	ACE or ARB
NICE 2011	General <80 y	<140/90	<55 yr:ACEI,ARB
	General > 80 y	<150/90	> 55 y or black:CCB
KDIGO 2012	CKD,no proteinuria	<140/90	ACEI,ARB
	CKD +proteinuria	< 130/80	

JAMA.2013;():doi:10.1001/jama.2013.284427