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Abstract

In patients with sporadically elevated blood pressure or white coat hypertension, a 24-h ambulatory BP monitoring is useful. This chapter will provide an update in the clinical management of hypertension in the elderly. Most of the causes of secondary hypertension in the younger adult are relatively uncommon in the elderly with the exception of renal artery stenosis. Evaluation of target organ damage begins with a physical examination. Hypertensive retinopathy together with left ventricular hypertrophy and renal impairment are considered as an indicator of target organ damage. There is positive evidence that treating hypertension in the elderly and very elderly provides clinical benefits. Several trials have indicated that lowering the systolic blood pressure (SBP) to less than 140 mmHg as recommended by the prevailing guidelines is not upheld by evidence in the elderly and does not benefit the elderly and the very elderly.

Keywords

White coat hypertension · Isolated systolic hypertension · Sodium sensitivity · Hypertensive retinopathy · Renal artery stenosis

Introduction

In the elderly, hypertension is associated with isolated systolic hypertension, “white coat effect” and sodium sensitivity [1]. An intrinsic part of management is to confirm elevated blood pressure by multiple determinations. Hypertension is diagnosed when systolic pressure is >140 mmHg or diastolic 90 mmHg or both. In the elderly, at least two seated measurements of the blood pressure must be made, remeasured 1 and 3 min after standing, measured in both arms [2]. In patients with sporadically elevated blood pressure or white coat hypertension, a 24-h ambulatory BP monitoring is useful (normal ambulatory blood

pressure but with elevated reading in the clinic) [2].

Clinical Evaluation

A focussed history, physical examination and basic laboratory investigations should be done in all patients with a blood pressure of 140/90 mmHg. Due consideration should be given to identify any additional cardiovascular risk factors [3] and overall estimate of cardiovascular risk and furthermore to ascertain target organ damage [3]. Careful history, a physical examination and a few simple laboratory tests will help in the diagnosis of secondary hypertension. The history should include past history and current symptoms of cardiovascular disease or renal disease and other significant illnesses. A drug history to include over-the-counter drugs, e.g. pseudoephedrine, and prescription drugs like non-steroidal anti-inflammatory drugs, steroids, nasal decongestants, cyclosporine, monoamine oxidase inhibitors, amphetamines and herbal remedies [4].

Basic laboratory investigations include complete blood count, blood chemistry (fasting blood sugar, electrolytes, creatinine), lipid screen (total cholesterol and high-density lipoprotein), urinalysis and an electrocardiogram. If abnormalities are found, further tests may be required. More intense laboratory testing is not cost-effective, and in the absence of clinical evidence, the yield for secondary hypertension is small. Only 5% [5] to 10% [6] of hypertension is the result of secondary causes. Most of the causes of secondary hypertension in the younger adult are relatively uncommon in the elderly with the exception of renal artery stenosis. Other causes of secondary hypertension increases with age mainly owing to the use of drugs such as NSAIDs, the presence of kidney disease, obstructive sleep apnoea and renal artery stenosis [7]. Elderly patients with higher risk of secondary hypertension include those with evidence of diffuse atherosclerosis. An abdominal bruit over one or both renal arteries with other manifestations of vascular disease suggests renal artery stenosis. Renal artery stenosis is uncommon as a cause of hypertension and may present as accelerated, refractory

hypertension, sudden unexplained pulmonary oedema or secondary to use of ACE inhibitors with worsening of renal failure.

A national consensus group, the Joint National Committee on Prevention, Detection, Evaluation and Treatment of High Blood Pressure [8], designated three stages (Stages I–III) in place of the earlier designation mild, moderate and severe. In Stage I, the systolic pressure is 140–159 and diastolic 90–99 mmHg, in Stage II the systolic pressure is 160–179 and diastolic 100–109 mmHg, and in Stage III, the systolic pressure is >180 and diastolic >110 mmHg. When systolic and diastolic pressures fall in different categories, the higher should be taken.

Evaluation of target organ damage begins with a physical examination. A thorough examination of the cardiovascular system includes a search for diminished or absent peripheral pulses, abdominal palpation for pulsatile mass and auscultation for abdominal or renal bruits and for evidence of heart failure. Fundoscopic examination may reveal systemic vascular changes. Hypertensive retinopathy together with left ventricular hypertrophy and renal impairment are considered as an indicator of target organ damage [9]. Hypertensive retinopathy develops from arteriolar changes such as tortuosity of blood vessels, arteriovenous nipping and increased light reflex of the arterioles in the initial stages followed by focal or generalised

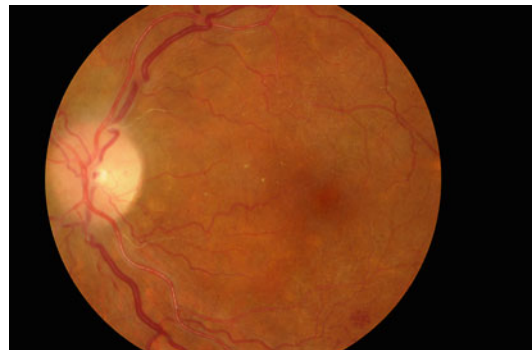


Fig. 1 Hypertensive encephalopathy. Shows few scattered haemorrhages. Silver wiring of superior and inferior temporal arteries. Multiple A/V nipping especially where the superior temporal artery crosses the vein at two points. There are multiple small arteries as ghost vessels and disc swelling showing blurring of the nasal disc margin (Reproduced, with kind permission, from Dr. P. Nithianandan)

retinal arteriolar constriction (Fig. 1). As the disease progresses, haemorrhages (flame-shaped) and small white superficial foci of retinal ischaemia (cotton wool) and later hard yellow exudates arise deep in the retina due to lipid deposition from leaking retinal vessels. The optic disc becomes congested and oedematous in severe hypertension [9]. Studies have indicated a close correlation between degree of blood pressure elevation and severity of kidney dysfunction [10]. In the elderly, elevated blood pressure and ageing give rise to nephrosclerosis resulting in increase in intrarenal vascular resistance, diminished renal blood flow, decrease in glomerular filtration rate and inability to concentrate urine. A chest X-ray and an electrocardiogram look for left ventricular hypertrophy, left atrial abnormality and arrhythmias. Urine analysis should routinely be performed.

In order to determine the overall risk profile for each patient and the need for drug therapy, the Joint National Committee [8] further recognised the need to consider other cardiovascular risk factors (Box 1), target organ damage (Box 2) and co-existing cardiovascular and other clinical conditions. The JNC 6 [8] includes a classification of blood pressure stages and a new risk stratification. It recognises three risk categories of increasing severity (A, B and C) based on the determinants, namely, the cardiovascular risk factors, target organ damage and associated clinical conditions (Table 1). Combining the risk categories with stage of hypertension provides a rational guide to the urgency of therapy.

Box 1 Cardiovascular Risk Factors

- Cigarette smoking
- Hypercholesterolaemia
- ECG evidence of left ventricular hypertrophy
- Obesity
- Diabetes
- Physical inactivity
- Family history
- Race and ethnicity
- Male gender
- Advancing years

Box 2 Target Organ Disease

- Left ventricular hypertrophy with remodelling
- Retinopathy
- Nephrosclerosis with proteinuria/renal insufficiency
- Congestive heart failure
- Stroke
- Peripheral vascular disease

Table 1 Risk categories [8]

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|--|
| Risk group A (no additional risk): no cardiovascular risk factors, no clinical cardiovascular disease or target organ damage |
| Risk group B (moderate additional risk): at least one risk factor not including diabetes, clinical cardiovascular disease or target organ damage |
| Risk group C (marked additional risk): clinical cardiovascular disease or target organ disease or diabetes with or without other risk factors |

Management of Hypertension

Elderly patients are at high risk for mortality and morbidity for hypertension-related diseases, and the studies show that treatment of hypertension (isolated systolic and systolic/diastolic) in the elderly is extremely effective [11, 12]. The general practitioner is best suited to identify, evaluate, manage and control hypertension. He or she should record the blood pressure at each patient encounter.

There have been several randomised controlled treatment trials in elderly patients with systolic/diastolic hypertension [13, 14]. Hypertension Optimal Treatment (HOT) trial reported a decline in “expected” cardiovascular events [15]. The European Working Party on High Blood Pressure in the Elderly trial randomised treatment or placebo in 840 patients over the age with both systolic and diastolic hypertension. Seventy-five percent of the patients were women. After a 12-year follow-up, there was a decrease in the total mortality rate of 27% (47% for men and 18% for women) [16]. The Hypertension in the Very Elderly Trial (HYVET) study [17] demonstrated that in the very elderly,

lowering the pressure to the level of 150/80 mmHg is beneficial.

Guidelines for the initiation of hypertensive therapy for the 80 years and older are not well defined and should follow the guidelines from the eighth report of the Joint National Committee (JNC 8) on Prevention, Detection, Evaluation and Treatment of High Blood Pressure [18]. There is positive evidence that treating hypertension in the elderly and very elderly provides clinical benefits [12]. Several trials have indicated that lowering the systolic blood pressure (SBP) to less than 140 mmHg as recommended by the prevailing guidelines is not upheld by evidence in the elderly [2, 19] and does not benefit the elderly and the very elderly [12].

There are several international guidelines, the Seventh (2003) and Eight (2013) Reports of the Joint National Committee on Prevention, Detection, Evaluation and Treatment of High Blood Pressure [18, 20], the European Society of Hypertension (ESH) and the European Society of Cardiology (ESC) [21], the Canadian Hypertension Education Program recommendations for the management of hypertension [22] as well as a consensus document issued by the American Heart Association, the American College of Cardiology and the Centers for Disease Control and Prevention (AHA/ACC/CDC) [23]. The JNC 7 advised that the elderly achieve the same targets as the general population [24]. JNC 8 however recommended that for elderly patients, there should be a less vigorous approach to begin treatment in those with systolic blood pressure at 150 mmHg or more and whose diastolic blood pressure levels are 90 mmHg or more and to treat below those levels [18]. Algorithm 1 for the patient presenting with high blood pressure.

Lifestyle Changes

Lifestyle changes to reduce blood pressure include weight reduction, dietary sodium restriction, healthy eating, increase physical activity, moderate alcohol consumption and cease smoking. Obesity is assessed by calculating the

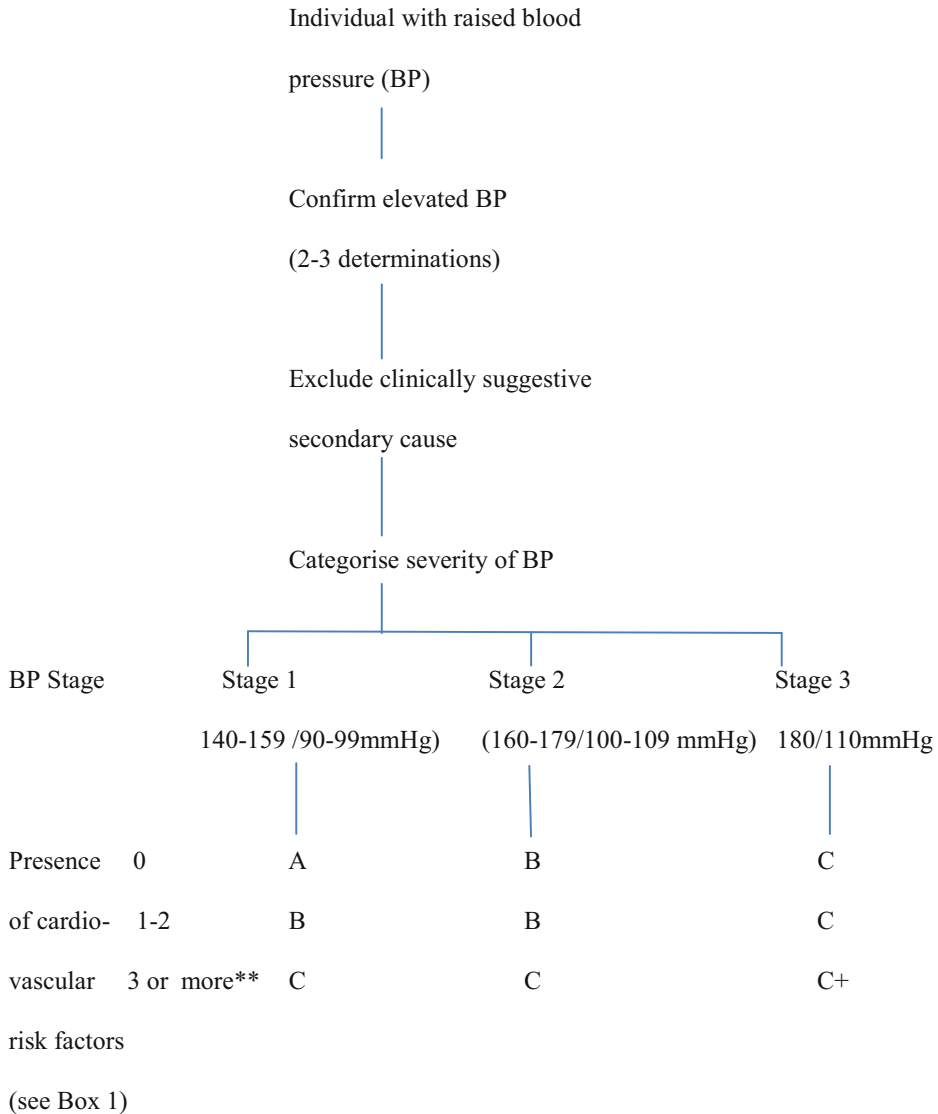
body mass index (BMI). $BMI = \text{weight (kg)} / \text{height squared (m}^2\text{)}$, and the normal range is 18.5–24.9 kg/m². BMI > 25 represents overweight and BMI > 30 obese. The waist/hip ratio which measures central obesity with upper limits for men is 0.9 and for women 0.8. Data on the effectiveness of lifestyle modification for treatment of hypertension in patients age 60 or over is scanty. Salt intake should be reduced to less than 4 g of salt per day which is approximately 1550 mg of sodium a day [25]. The JNC 7 [20] has recommended sodium intake of 2300 mg/day.

Physical activity such as brisk walking for about half an hour 5 days in the week is to be encouraged. Alcohol consumption to be restricted to two drinks for males and one for women. The diet should be rich in vegetables, fruits and low-fat dairy products.

Drug Treatment

A meta-analysis of treatment of hypertension in older persons (most of them were 60–79 years of age) demonstrated clearly that drug therapy decreased risk of stroke by an average of 32% [26]. The Hypertension in the Very Elderly Trial (HYVET) was a randomised, double-blind placebo-controlled study involving patients aged 80 or older. The results showed that lowering blood pressure of elderly patients could cut their total mortality by one-fifth and their rate of cardiovascular events by one-third [11]. Drugs from any of the main classes are suitable for initiation and maintenance of antihypertensive therapy. The choice of the drug will be dependent on:

- (i) The presence of certain conditions, e.g. diabetes with nephropathy, congestive heart failure, post-myocardial infarction, that should be given appropriate drug [3].
- (ii) The presence of co-existing conditions which may influence choice of drug. Antihypertensive medications may have unfavourable or favourable effects in co-existing conditions, for example, elderly patients with urinary incontinence diuretics may affect bladder



Algorithm 1 Patient with High Blood Pressure ** together with Target Organ Damage (see Box 2) and Associated Clinical Conditions. A = low risk; B = moderate risk;

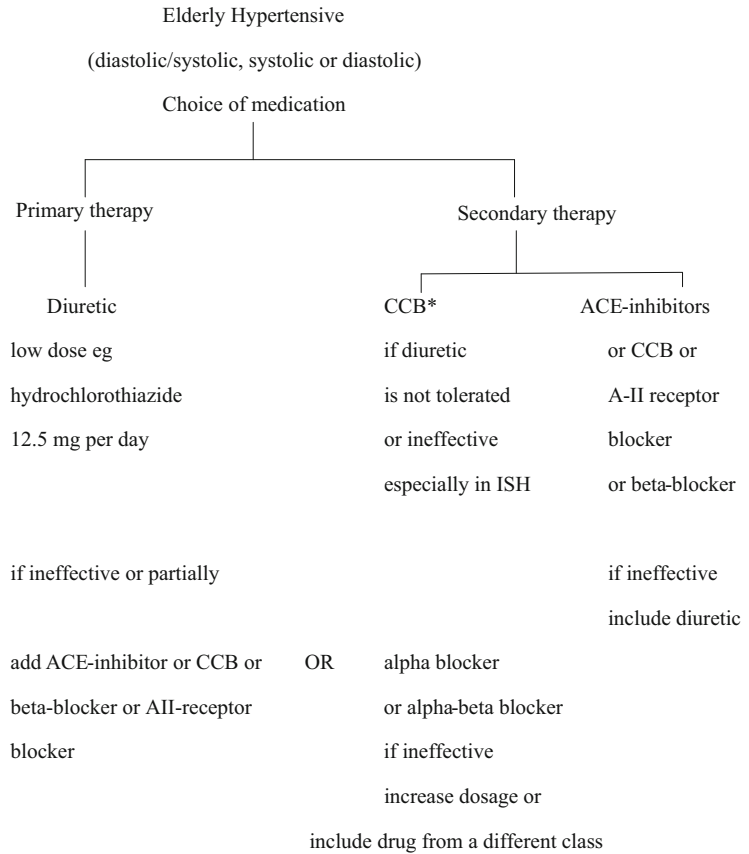
C = high risk; C + very high risk Information sources: JNC [8])

control, beta-blockers may have an unfavourable effect in patients with severe peripheral vascular disease and diuretics in gout. ACE inhibitors have a favourable effect in patients with diabetics with micro-albuminuria and in those with non-diabetic nephropathy [8].

- (iii) The patient’s cardiovascular risk profile and the presence of target organ damage.

Clinical trials have indicated that there is no age limit and appropriate antihypertensive therapy should not be withheld because of age [1]. Diuretics and beta-blockers have been suggested as primary therapy for uncomplicated hypertension and other agents for specific situations, for example, in diabetes mellitus or heart failure, ACE inhibitor or A-II receptor blocker (plus a diuretic) [18] (Fig. 2). In an MRC trial on

Fig. 2 Drug treatment of hypertension (*CCB calcium channel blocker) (Information sources: Moser [27])



old adults with hypertension, beta-blockers were poorly tolerated compared with diuretics, and many patients withdrew due to major adverse effects with beta-blockers [28]. In a meta-analysis of ten randomised trials using diuretics and or beta-blockers, two-thirds on diuretic monotherapy were well controlled compared to less than one-third on beta-blocker monotherapy [29]. Thus beta-blockers as first-line therapy of uncomplicated hypertension in the elderly remain unresolved [30]. Calcium channel blockers or ACE inhibitors and angiotensin receptor blockers are more usually used as second-line choice [1] when other agents are contraindicated. Adjunct treatment with nitric oxide (NO) and NO donors is being used because of their effect on large conduit arteries for they reduce systolic blood pressure more than diastolic blood pressure

[1, 31]. Spironolactone may reduce arterial stiffness and may be used in resistant ISH [31]. Renin inhibitors represent an alternate strategy, and they lower the blood pressure by effective blockade of the renin-angiotensin system. Aliskiren is the first renin inhibitor, and renin inhibitors can be used in combination with other hypotensives with no appreciable increase in adverse events [30].

Idiopathic systolic hypertension (ISH) is characterised by reduced arterial compliance; calcium channel blockers tends to induce arterial dilatation and hence would be more appropriate as a first-line choice [32]. Elderly patients with ISH should be treated even if they are 80 years or over. In the very elderly, lowering of the blood pressure to the level of 150/80 mmHg is beneficial as shown by the HYVET study [17]. In the elderly,

the blood pressure should be reduced by gradual titration and more so the need to “start low and go slow” and applies equally to combination therapy. Hypertension requires lifelong care and follow-up. The general practitioner should decide how often to follow up depending on the severity, variability of the blood pressure, complexity of the treatment regimes, patient compliance and need for non-pharmacological advice [32]. According to the British Hypertension Society, the follow-up of hypertension is every 3–6 months and should not exceed 6 months [33].

Regardless of lifestyle changes and drug treatment, achieving blood pressure goals often poses a difficult problem. Resistant hypertension has been characterised by the blood pressure remaining above the target levels despite adherence to three antihypertensive agents one of which is a diuretic [34]. An encouraging recourse is renal sympathetic denervation. Several renal sympathetic denervation devices are being developed. Presently it is indicated for patients who satisfy the above criteria and whose systolic blood pressure is greater or equal to 160 mmHg and in the case of type 2 diabetics whose blood pressure is more than or equal to 150 mmHg [35, 36]. The Simplicity HTN-2 trial at the end of 6 months demonstrated that the renal function remained stable, there are no significant procedure related complications and the blood pressure was reduced by 32/12 mmHg [36]. However, the investigators of the Simplicity HTN-3 trial, a blinded trial of sympathetic denervation, failed to show significant reduction of systolic blood pressure in patients with resistant hypertension after renal denervation as compared with a sham control [37].

Low-dose aspirin has been recommended for primary prevention in people over the age of 50 years and for secondary prevention of ischaemic cardiovascular disease [33]. Irrespective of the level of blood cholesterol or LDL, statins have also been recommended for all people with high blood pressure with cardiovascular disease and for primary prevention in people with high blood pressure who have a 10-year risk of cardiovascular disease of >20% [33].

Impact

Buford [38] highlighted the multifaceted risks of hypertension among older adults. Apart from the cardiovascular risks, there are a number of collateral risks in late-life hypertension, for example, dementia, physical disability, presence of postural hypotension and falls. Hypertension has been considered a “silent killer” [39, 40] for it can remain asymptomatic for years before an adverse event occurs [32]. Hypertension treatment may contribute to poor compliance with treatment [32] and impairment of quality of life [41] although the Systolic Hypertension in the Elderly Program (SHEP), Systolic Hypertension in Europe (Syst-Eur) and Study on Cognition and Prognosis in the Elderly (ScOPE) have shown that antihypertensive treatment had no negative impact on quality of life [41]. The negative effect of antihypertensive drugs has to be looked at in reference to the quality of life in the management of hypertension in the elderly, the deterioration of which may result in poor compliance [41]. Because of the high prevalence of co-morbidities in elderly hypertensive patients, clinicians should take into account the co-morbid conditions in their management of hypertension [42, 43]. In the elderly, cognitive function, physical activity, sexual function, symptomatic well-being [41], sleep and social participation are some of the domains that should be looked at in patients receiving antihypertensive therapy [44] (Box 3).

Box 3 Key Points: Hypertension

In patients with sporadically elevated blood pressure or white coat hypertension, a 24-h ambulatory BP monitoring is useful (normal ambulatory blood pressure but with elevated reading in the clinic) [2].

Due consideration should be given to identify any additional cardiovascular risk factors [3] and an overall estimate of cardiovascular risk and furthermore to ascertain target organ damage [3].

(continued)

Box 3 Key Points: Hypertension (continued)

Treatment of hypertension (isolated systolic and systolic/diastolic) in the elderly is extremely effective [11, 12]. Isolated systolic hypertension is the most common form of hypertension in the elderly.

In order to determine the overall risk profile for each patient and the need for drug therapy, the Joint National Committee [8] further recognised the need to consider other cardiovascular risk factors, target organ damage and co-existing cardiovascular and other clinical conditions.

Lifestyle changes to reduce blood pressure include weight reduction, dietary sodium restriction, healthy eating, increase physical activity, moderate alcohol consumption and cease smoking.

The JNC 7 [20] has recommended sodium intake of 2300 mg/day.

Idiopathic systolic hypertension (ISH) is characterised by reduced arterial compliance; calcium channel blockers tends to induce arterial dilatation and hence would be more appropriate as a first-line choice [32].

According to the British Hypertension Society, the follow-up of hypertension is every 3–6 months and should not exceed 6 months [33].

Multiple Choice Questions

- Each of the following regarding hypertension in the elderly is true, EXCEPT:
 - Nearly two-thirds of those above 75 years have uncontrolled hypertension.
 - Isolated systolic hypertension is the most common form of hypertension in the elderly.
 - Hypertension is not a major factor in the development of cardiac failure.
 - Elderly patients are at high risk for morbidity and mortality for hypertension-related diseases.
- Each of the following statement regarding diagnosis of hypertension in the elderly is true, EXCEPT:

- Measurement of the blood pressure in the elderly should be by correct technique.
 - Intensive laboratory investigations even in the absence of clinical evidence are cost-effective with regard to secondary hypertension even though the yield is small.
 - Elderly patients with high risk of secondary hypertension include those with evidence of diffuse atherosclerosis.
 - Renal artery stenosis may be diagnosed by ultrasound as unilateral small kidney.
- Each of the following relating to the management of hypertension in the elderly is true, EXCEPT:
 - Treatment is of no proven beneficial effect in patients above the age of 75 years.
 - The follow-up of patients with hypertension should be 3–6 months and should not exceed 6 months.
 - Salt intake should be less than 4 g of salt per day.
 - Presence of co-existing conditions may influence choice of drug that may have an unfavourable or favourable effect.

MCQ Answers

1 = C; 2 = B; 3 = A

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