Evaluation and Management of Hypertension in the Elderly

AK Soyibo, EN Barton

ABSTRACT

Treatment of hypertension in the elderly is a challenge. Elevated blood pressure (> 140/80 mmHg) in the elderly (60^{+} years) can be either systolic, diastolic or combination of both. Arterial stiffness, intima hyperplasia and non-compliance of the vascular tree have been underlying factors. Prevalence of hypertension increase with advancing age and varies with the population under study, therefore screening this population should not only be limited to the at risk. Presentation is often due to complications such as stroke, cardiovascular events, and erectile dysfunction or due to presentation of an un-related disorder.

Management of hypertension in the elderly should consider the presence of co-morbidity, drug interaction and their side effects. Management of hypertension in the elderly has been shown to reduce morbidity and mortality. With the advent of several classes of antihypertensives, there is no shortage of drug options for treatment of hypertension in the elderly, but a careful and individualized approach is needed.

Short title: hypertension in the elderly

Keywords: Blood pressure, cardiovascular event, elderly, erectile dysfunction, hypertension

---

From: Department of Medicine, The University of the West Indies, Mona. Jamaica.

Correspondence: Dr AK Soyibo, Department of Medicine, The University of the West Indies, Mona, Jamaica. E-mail: adedamola.soyibo@uwimona.edu.jm , demoskey@hotmail.com , **Doi:10.7727/wimj.2012.063**

INTRODUCTION

The most commonly accepted definition of the elderly is a chronological age of 60^{+} years, but this definition is not universally accepted. Hypertension as defined by the Joint National Committee (JNC) VII as blood pressure with either systolic pressure > 140 mmHg or diastolic pressure > 90 mmHg, or a combination of both (1). The stages of hypertension are classified as; Normal: systolic BP < 120 and diastolic BP < 80, Prehypertension: SBP 120−139 or DBP 80−89, Stage 1 hypertension: SBP 140−159 or DBP 90−99, Stage 2 hypertension: SBP ≥ 160 or DBP ≥ 100. Therefore, hypertension in the elderly is systolic blood pressure >140 mmHg (systolic hypertension), or diastolic > 90 mmHg (diastolic hypertension) or elevation of both, in an individual over the age of 60^{+} years.

Hypertension in the elderly has been a treatment challenge for most primary care physicians, internists and even for cardiovascular disease management experts. The continuous rise in both systolic and diastolic blood pressure in the elderly was thought to be a natural progression of ageing of the vascular tree. The arterial stiffness, intimal hyperplasia and resultant narrowing of the vascular beds are thought to be responsible. This was an accepted phenomenon and hence no intervention was thought necessary. It is accepted currently that elevated systolic and diastolic blood pressure should be treated in this group of patients. The presence of hypertension in the elderly is a significant risk factor for the development of stroke, heart failure, heart attack and chronic kidney disease. Hypertension confers an increased risk for cardiovascular events, morbidity and mortality in the elderly.

In men, the incidence of erectile dysfunction (ED) increases with age. Hypertension is an important and recognized cause of ED in men. Therefore, proper management of hypertension can reduce its effect as a contributing factor to ED. Erectile dysfunction is no longer believed to be an unavoidable part of the ageing process especially with the advent of the phosphodiesterase inhibitors. The selection of antihypertensive agents in the elderly male should be done to avoid any additional contributor to ED.

When managing hypertension in the elderly a number of factors need to be considered in avoiding treatment peril. Elderly persons are invariably not without other co-morbid conditions that make them susceptible to medication side effects and sudden changes in the blood pressure. Also drug-to-drug interactions should be considered, as well as attention to visual acuity, mental capacity and medication effect on the central nervous systems.

Treatment of hypertension is beneficial in the elderly and therefore makes it important to screen for it in this age group.

Epidemiology

In the normal population

As a population ages, so does the prevalence of hypertension increase (1−3). With the reduction of mortality due to infectious diseases, availability of antiretroviral therapy and increasing access to quality healthcare, survival is prolonged and the percentage of the elderly in the population increases and so does the prevalence of cardiovascular disease (2). In the Jamaica Health and Lifestyle Survey II[2] (JHLSII), the prevalence of

hypertension increased with age giving a prevalence of 46.2% and 54.1% in the age range 45−64 years and 65−74 years, respectively (2). In a study of patients undergoing colonoscopy in Jamaica, 70% were older than 55 years and the prevalence of hypertension in this study group was 23.3% (4).

In the population with higher risk

The persons at high risk are those with stroke, chronic kidney disease and cardiovascular disease. The prevalence of hypertension will differ with the population being studied. The prevalence of hypertension in the stroke population and chronic kidney disease (CKD) population will differ from an unselected unbiased population. In the CKD population, the prevalence will be affected by the combined prevalence and incidence of essential hypertension causing renal failure, primary glomerular disease and progression of renal failure leading to hypertension.

Clinical presentation

Hypertension has been called the "silent killer" due to lack of specific or no symptoms during the early stages. Most persons diagnosed with hypertension are usually diagnosed after presenting with complications arising from severely elevated blood pressure such as target organ damage. The other subsets are discovered after presentation for unrelated issues or during health fair and screening programmes. Sustained elevated high blood pressure may present with headaches, nosebleeds, chest pain and dizziness. Presentation with acute left ventricular failure on the background of hypertensive heart disease is not uncommon also. In the setting of an acute stroke (ischaemic less common than

haemorrhagic) which is another possible presentation for hypertension, the blood pressure may be elevated due to sympathetic response and also as a protective mechanism of cerebral perfusion. Therefore care should be taken in the evaluation and treatment of such patients in other to avoid worsening of neurologic deficit and also reducing the possibility of haemorrhagic transformation of an ischaemic inpatient.

Erectile dysfunction can be a presentation of hypertension which may not only be a cause but a contributive factor to ED. A significant proportion of men who complain of ED, later do develop hypertension. This may suggest a vasculopathy associated in the pathogenesis of ED.

Laboratory workup

All newly diagnosed hypertensives should have baseline investigations performed before and after initiation of antihypertensive therapy. Other investigations may be necessary as dictated by further evaluation arising from the history, presence of co-morbid illness and physical examination. Routine investigation should include serum blood urea and nitrogen (BUN) level, creatinine and electrolytes. Determination of these aforesaid serum markers prior to and after initiating medication may help to determine causes of the hypertension for example low serum potassium in Conn's, elevated serum creatinine by > 30% in renovascular hypertension after commencing angiotensin converting enzyme inhibitors (ACEIs). Elevation of serum BUN post initiation of diuretic therapy could suggest underling intravascular volume contraction with hypotension that could precipitate significant renal failure. Hypernatraemia, hyponatraemia, and hyperkalaemia

are other electrolyte disturbances that can affect mortality and morbidity in the treatment of hypertension in the elderly.

Other relevant baseline investigations include Chest X-ray for aortic coarctation and electrocardiogram (ECG) for underlying ischaemic changes or accompanying dysrhythmias followed by echocardiogram, if indicated. Fundoscopic examination preferable with pupillary dilatation should be performed. Ambulatory blood pressure monitoring is highly recommended and mandated for effective treatment while avoiding hypotension.

Investigation for secondary causes should be embarked on when indicated after a thorough history and physical examination and also importantly when intervention is indicated and worthwhile. A patient's fitness to undergo surgical intervention may also determine the extent of investigations to be carried out. For example, an elderly patient with renovascular hypertension whose blood pressure is reasonably control on medical therapy may not warrant further investigation, as surgical intervention may not be necessary. Therefore, an individualized approach should be pursued especially in light of established guideline for secondary hypertension evaluation.

Drug treatment in hypertension

Hypertension management in the elderly has been shown to reduce mortality and morbidity. The treatment of isolated systolic hypertension, diastolic hypertension or both in the elderly has resulted in reduction in the prevalence of stroke, renal failure and heart attack in this population (1, 2). The pharmacologic approach to hypertension in the elderly is somewhat different in recommended guidelines. The Joint National Committee

on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure (JNC) recommends the use of diuretic or ß-blocker as first line therapy (5) while the World Health Organization (WHO)/International Society of Hypertension (ISH) did not specify the use of any particular class of agent (6, 7). Any class (diuretics, ß-blockers, calcium antagonists, angiotensin-converting enzyme (ACE) inhibitors, angiotensin II receptor blocker (ARB) and *a-1* blockers) can be considered first-line treatment in the elderly hypertensive, bearing in mind the specific indications and contraindications.

The indication for pharmacologic treatment of systolic hypertension in the elderly was borne out in the SHEP (Systolic Hypertension in the Elderly Programme) trial (8). Men and women over 60 years of age with isolated systolic hypertension of 160−219 mmHg were randomized to receive thiazide diuretic and placebo. There was significant reduction in the primary end-point of total stroke and secondary end-point of combined cardiovascular event. The active treatment group was also given a ß-blocker (atenolol) or reserpine. A similar picture in reduction of stroke and major cardiovascular event was seen in the Medical Research Council [MRC] (9) trial for both systolic hypertension (> 160−209 mmHg) and diastolic hypertension (mean < 115 mmHg) cohort. The conclusion from that trial was that hydrochlorothiazide and amiloride reduced the risk of stroke significantly more so than atenolol especially in the non-smoker group. These trials likely contributed to the widespread use of thiazide diuretic in the Caribbean as first line therapy in hypertension, particularly in the elderly.

The Swedish trial (10), [STOP-Hypertension] looked at systolic hypertension in an older population compared to the two previously mentioned trials (8, 9). The study was similar in that comparison was made between a ß-blocker and diuretic compared to

placebo. This was an older age group of men and women between 70−84 years of age. There was significant reduction in all cause mortality in this trial.

There are benefits in blood pressure treatment in the very elderly person, > 80 years, as suggested by a meta-analysis performed by Gueyffier *et al* (11). It was a meta-analysis of data in a subgroup (age > 80 years) of clinical trials involving hypertension treatment in the elderly. Overall, the result of the meta-analysis showed benefit in both primary and secondary end-point. The Hypertension in the Very Elderly Trial [HYVET] (12) looked also at an even older population of 80 years and older and showed that the use of the diuretic indapamide SR ± perindopril not only showed a reduction in stroke, heart failure and all cardiovascular events, but also there was a reduction in the risk of death from any cause. This exemplified all the benefits to be derived from blood pressure treatment in the elderly hypertensive patient.

With the advent of several classes of antihypertensives, there is no shortage of drug options for treatment of hypertension in the elderly. After several trials using diuretic and ß-blocker effectiveness, other trials (13, 14) have looked at the effectiveness of ACEI, angiotensin receptor blocker (ARB) and calcium channel blockers (CCB) and they have demonstrated similar results. A more recent study also evaluated the use of direct renin inhibition (DRI) compared to ACEI in elderly patients (> 65 years) with uncomplicated isolated systolic hypertension (15). They found better reduction in both systolic and diastolic blood pressure when compared to the ACEIs. However both treatment groups were given a combination with thiazide diuretic and CCB as step-up therapy.

With the 1999 guidelines from WHO/ISH (6), there were no trials to suggest lowering systolic blood pressure below 160 mmHg, but there are trials and observational reports that suggest similar benefit in lowering blood pressure below 160 mmHg. An example is the Hypertension Optimal Treatment (HOT) trial. Clinics and population based survey data continue to suggest that lowering blood pressure below 160 mmHg result in lower cardiovascular event rates (7).

There are several pharmacological options for blood pressure control in the elderly population. The difficulty may arise in choosing the first line agent when actual treatment is to be initiated. A useful tip will be to classify elderly patients according to the stage of hypertension along the line of JNC VII (5).

We recommend when choosing first line monotherapy for hypertension in the elderly that a diuretic be used. Thiazide diuretic, such as hydrochlorothiazide, which act by inhibition of sodium-chloride (Na^+/Cl^-) symporter in the distal convoluted tubules can be used. Another diuretic/antihypertensive which is preferred is indapamide. The mechanism of action is possibly due to a vasodilatory effect and enhancement of sodium, chloride and water excretion across nephrons (12). Stage 2 hypertension according to JNC VII will require treatment with two or more drugs. Here we recommend the combination of diuretic with another agent such ACEI/ARB, dihdropyridine CCB, BB and others (*eg* renin inhibitors). The specific indication for the other class should be borne in-mind. The use of potassium sparing diuretic or aldosterone antagonist should be considered according to the indication, for example, the presence of congestive cardiac failure, liver cirrhosis and with caution in chronic kidney disease since hyperkalaemia may occur.

Drug precautions in the elderly

The ideal aim of blood pressure control remains a challenge despite recommendations and guidelines on the target blood pressure in the general population and in the diabetics. The elderly population has many co-morbid conditions, impaired autonomic response, stiffer arterial vascular tree, impaired cerebral autoregulation and impaired hepatic metabolism of drugs and their renal excretion. These factors make the elderly more susceptible to drug side effects and more likely to suffer from irreversible effects of hypotension. The general feeling is to initiate antihypertensive therapy slowly and cautiously, starting at a low dose and titrating upwards. Arterial stiffness and other factors make the in-office blood pressure reading less likely to be reflective of the true reading and this calls for the use of ambulatory blood pressure monitoring and checking erect and supine blood pressure variability especially when symptoms are suggestive of postural hypotension.

Drug precaution with use of diuretic therapy can cause electrolyte disturbances such as hyponatraemia, hypernatraemia, hypokalaemia and contraction alkalosis. Symptoms of these metabolic derangements are usually non-specific; therefore, continued monitoring and vigilance are needed when drugs are initiated and dosing adjustment made. Drug-to-drug interaction between antihypertensive classes and potentiating effects should be reduced to the minimum tolerable effect. Drug interaction is more likely due to the presence of other co-morbidities leading to polypharmacy.

Lifestyle modification in the elderly with physical disability

Treatment of hypertension in the elderly should not be pharmacotherapy based only. Lifestyle modifications such as weight loss, increased physical activity, moderate alcohol consumption, smoking cessation, diet with increased fresh fruits and vegetables and reduced saturated fat content, salt reduction and increased dietary potassium content have all played a positive impact in lowering blood pressure and reducing the incidence of hypertension and cardiovascular events.

Balanced control of caloric intake and dietary modification without causing malnutrition should be introduced as non-pharmacotherapeutic intervention in the management of hypertension in the elderly. Increased caloric utilization in the form of exercise and physical activity can be a challenge in the elderly especially when physical or mental disability is present. Physical disability from severe osteoarthritis, chronic pain, severe muscle dystrophy, and impaired gait will affect the level of mobility and capacity to perform even the mildest form of physical activity. Mental disability usually as a result of dementia and reduced mental capacity will significantly contribute to physical inactivity.

CONCLUSION

Screening for elevated blood pressure in the elderly is recommended and can reduce the incidence of morbidity and mortality in this populace. The prevalence of hypertension increases with age with a higher incidence in the elderly > 60 years. The treatment of hypertension in the elderly and the target blood pressure is still an open question but should be individualized taking into account the presence of co-morbid disease and functional state.

REFERENCES

1. Chobanian AV, Bakris GL, Black HR, Cushman WC, Green LA, Izzo JL et al. The seventh report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure: The JNC 7 report. JAMA 2003; **289:** 2560−72.
2. Meyer J. Age: 2000. Census 2000 Brief. Washington, DC: US Department of Commerce, Economics and Statistics Administration, US Census Bureau; 2001.
3. Wilks R, Younger N, Tulloch-Reid M, McFarlane S, Francis D. Jamaica health and lifestyle survey. Technical report.
4. Fields LE, Burt VL, Cutler JA, Hughes J, Roccella EJ, Sorlie P. The burden of adult hypertension in the United States 1999 to 2000: a rising tide. Hypertension 2004; **44:** 398−404.
5. MG Lee, CD McGaw, L Chin, MAC Frankson, CA Walters. Propofol Sedation in Patients Undergoing Colonoscopy in Jamaica. West Indian Med J 2011; **60:** 284−88.
6. The seventh report of the Joint National Committee on prevention, detection, evaluation, and treatment of high blood pressure. Complete report
7. Guidelines Subcommitee. 1999 World Health Organization-International Society of Hypertension Guidelines for the Management of Hypertension. J Hypertens 1999; **17:**151−183.
8. World Health Organization (WHO)/International Society of Hypertension (ISH). 2003 Lippincott Williams & Wilkins

9. SHEP Cooperative Research Group. Prevention of stroke by antihypertensive drug treatment in older persons with isolated systolic hypertension. Final results of the Systolic Hypertension in the Elderly Program (SHEP). JAMA 1991; **265:** 3255−64.
10. MRC Working Party. Medical Research Council trial of treatment of hypertension in older adults: principal results. BMJ 1992; **304:** 405−12.
11. Dahlof B, Lindholm LH, Hansson L, Schersten B, Ekborm T, Wester PO. Morbidity and mortality in the Swedish Trial in Old Patients with Hypertension (STOP-Hypertension). Lancet1991; **338:**1281−85.
12. Gueyffier F, Bulpitt C, Boissel JP, Schron E, Ekbom T, Fagard R et al. Antihypertensive drugs in very old people: a subgroup meta-analysis of randomised controlled trials. INDANA group. Lancet 1999; **353:** 793−6.
13. Bulpitt CJ, Fletcher AE, Beckett N, Coope J, Gil-Extremera B, Forette F et al. The Hypertension in the Very Elderly Trial (HYVET). Protocol for the main trial. Drugs Aging. 2001; **18:** 151−66.
14. Tuomilehto J, Rastenyte D, Birkenhager WH, hijs L, Antikainen R, Bulpitt CJ et al. Effects of calcium-channel blockade in older patients with diabetes and systolic hypertension. Systolic Hypertension in Europe (Syst-Eur) Trial Investigators. N Engl J Med 1999; **340:** 677−84.
15. Lennart Hannson. STOP-Hypertension 2. Heart 2000; **84:**12−14.

16. Duprez D, Davis P, Botha J. The AGELESS Study: the effect of aliskiren vs ramipril alone or in combination with hydrochlorothiazide and amlodipine in patients ≥ 65 years of age with systolic hypertension. Presented at the American Heart Association Scientific Sessions 2008, 11th November 2008.