Hypertension in the elderly

Hypertension is a common disease of the elderly (older than 65 years), with a prevalence of between 60% and 80%. It is more often isolated systolic hypertension with a relative fall in diastolic pressure, resulting in an increased pulse pressure. Isolated systolic hypertension is caused by age-related increases in arterial stiffness. Cardiovascular risk factors such as diabetes, hyperlipidaemia, sedentary lifestyle and obesity, are more common in the elderly. For these reasons, the elderly population with hypertension is at increased risk of cardiovascular morbidity and mortality.

Treating hypertension in the elderly is a successful intervention for reducing morbidity and mortality. The degree of benefit is related to a baseline risk factor assessment (Table I). From a systematic review,[1] treating hypertension in the elderly resulted in an overall reduction in cardiovascular morbidity and mortality from 177 to 126 events per 1 000 participants (95% CI: 31 - 73). In practical terms, for every 19 elderly individuals with primary hypertension treated (95% CI: 14 - 32), 1 cardiovascular event would be prevented.

Aetiology

The vast majority of hypertension has no known cause and is called primary hypertension. Secondary causes of hypertension include endocrine disorders (e.g. hyperthyroidism, primary aldosteronism, phaeochromocytoma and Cushing's syndrome), renal disorders (e.g. glomerulonephritis, polycystic kidney disease) and, rarely, liquorice consumption. The most common secondary cause of hypertension in the elderly is atherosclerotic renal artery stenosis, the risk of which increases with ageing.

Table I. Risk factors for cardiovascular disease

Modifiable	Non-modifiable
Sedentary lifestyle	Older age
Smoking	Male
Diabetes mellitus	Family history of cardiac risk factors
Obesity (waist circumference)	
Dyslipidaemia	

Table II. Target for blood pressure lowering

Risk	Target BP level
All	< 140/90 mmHg (in isolated systolic hypertension, avoid diastolic < 65 mmHg)
High risk (e.g. diabetes mellitus, renal disease, congestive heart failure, dyslipidaemia, smoking, obesity)	< 130/80 mmHg

Of more concern are disorders and/or medicines that may unmask or worsen primary hypertension. These include progressive renal dysfunction, untreated thyroid disorders, obstructive sleep apnoea and the use of over-the-counter and prescribed medications (e.g. non-steroidal anti-inflammatories, corticosteroids, pseudoephedrine and cyclosporine). Drug-induced or exacerbated hypertension requires thorough history taking and can be decreased with appropriate ongoing patient education.

Diagnosis

Hypertension is defined as a systolic blood pressure (BP) ≥ 140 mmHg or a diastolic BP of ≥ 90 mmHg. Isolated hypertension is defined as a systolic BP ≥ 140 mmHg and diastolic BP ≤ 90 mmHg.

The elderly should be screened at every health-care visit or at least annually for hypertension. Precise blood pressure readings can be challenging due to age-related changes in the cardiovascular system. Falsely elevated BP readings, known as pseudohypertension, occur as a result of the stiffened, calcified arteries. The diagnosis of high BP should be based on an average of two or more properly measured BP readings, in the sitting position, on two or more occasions.

Orthostatic hypotension is more common in this population, as a result of less sensitive baroreflex responses, therefore BP should be assessed both sitting and standing. BP readings performed outside of the clinical setting, may be more valuable than a single office visit reading. 'White coat hypertension', i.e. non-pathological increased blood pressure occurring during medical check ups only, is a real entity that should be taken into account.

A comprehensive diagnostic evaluation should include the proof of hypertension, exclusion of secondary causes, baseline and ongoing cardiovascular risk profile assessment and examination for end-organ involvement. For goal blood pressure, see Table II.

Approach to management of hypertension

Non-pharmacological measures

Lifestyle modification is recommended for all hypertensive individuals. Dietary changes include reducing total, saturated fat consumption, combined with increased intake of fresh fruit, vegetables, increased low-fat dairy products (rather than red meat) and high-fibre wholegrain.

Essential changes to diet must include salt restriction. Limit sodium intake to less than 2.4 g (approximately half a teaspoon) daily. Limit alcohol use to two standard drinks for men and one standard drink for women daily (standard drink contains 10 g ethanol, e.g. 25 ml spirits, 125 ml wine, 340 ml beer). Increased physical activity is part of the necessary lifestyle modification. This includes at least 30 minutes of moderate aerobic exercise preferably on every day of the week. These measures have been shown to improve BP control, allow dose reductions of the antihypertensive drugs and reduce cardiovascular risk.

Pharmacotherapy

General considerations

- Only commence drug therapy if lifestyle modifications have not been sufficient.

Table III. Compelling indications and specific pharmacotherapy

	Clinical condition	First-line drug
BP systolic > 140 - 159 mmHg	No compelling indications	Thiazide diuretic
	Cardiac failure	Thiazide diuretic
	Ischaemic heart disease	β-blocker, ACE-inhibitor and calcium-channel blocker, slow-release isosorbide dinitrate
	Diabetes mellitus	Thiazide diuretic, ACE-inhibitor, calcium-channel blocker, ARB
	Renal disease	ACE-inhibitor or ARB
	Elderly	Thiazide diuretic for most, ACE-inhibitor, ARB, calcium-channel blocker, β-blocker
BP systolic > 160 mmHg	Hypertension, no compelling indication	Thiazide diuretic PLUS ACE-inhibitor or ARB or calcium-channel blocker or β-blocker
	Hypertension with compelling indication	Thiazide diuretic PLUS ACE-inhibitor or ARB or calcium-channel blocker or β-blocker

ACE = angiotensin-converting enzyme inhibitor; ARB = angiotensin-receptor blocker.

Table IV. Comparison of antihypertensive medications

	Thiazide diuretics	β-blockers	ACE-inhibitors	Calcium-channel blockers
Efficacy	Hypertension, isolated systolic hypertension, cardiac failure	Hypertension, cardiac failure, post-myocardial infarction, arrhythmias	Hypertension, cardiac failure, post-myocardial infarction, diabetes mellitus, renal disease	Hypertension, ischaemic heart disease, Raynaud's phenomenon. Non-dihydropyridines – atrial fibrillation, supraventricular tachycardias
Safety	Electrolyte disturbances ($\downarrow K^+$), dehydration and postural hypotension, gout, drug-drug interactions with digoxin and NSAIDs, renal insufficiency	Bronchospasm, bradycardia, worse in combination with verapamil	Bilateral, renal artery stenosis, history of angioedema, pregnancy, hyperkalaemia	Hypotension, reflex tachycardia, drug-drug interactions. Nondihydropyridines – bradycardia, heart block
Regimen	Daily dosing	Once or twice daily	Twice daily	Once or twice daily

ACE = angiotensin-converting enzyme; NSAIDs = non-steroidal anti-inflammatories.

- Elderly patients are at increased risk of postural hypotension, complicated by ischaemic events in the vulnerable cerebral circulation. This as a result of declining baroreceptor and sympathetic nervous system responsiveness. The first-line antihypertensive agents should be started at low dose and increased gradually to minimise these potential adverse effects.
- Evidence supports the use of thiazide diuretics as first-line treatment.
- Second-line treatment is a choice of an angiotensin converting enzyme-inhibitor (ACE-inhibitor) or a calcium channel blocker, but this will be guided by co-morbidities and additional risk factors, also known as 'compelling indications' (Table III).

Specific drugs (Table IV)

- **Thiazide diuretics, e.g. hydrochlorothiazide.** Older patients are more prone to diuretic-induced dehydration and orthostatic hypotension. Care should be taken when commencing treatment with these agents. Clinicians should advise patients on measures to minimize their risk of falling. Thiazides may cause electrolyte disturbances: hypokalaemia, hyponatraemia, hypomagnesaemia or hypercalcaemia. Uric acid and the thiazide diuretic compete for elimination in the renal tubule resulting in increased uric acid levels, placing the patient at risk for gout. Thiazides have been associated with various metabolic derangements viz impaired glucose control and dyslipidaemia. These are more likely to occur at higher doses than those currently recommended. Thiazide diuretics should be used with caution in patients with impaired renal function, creatinine clearance < 30 ml/min, and avoided when creatinine clearance is below 10 ml/min.
- **ACE-inhibitors, e.g. enalapril.** ACE-inhibitors are used to pharmacologically inhibittherenin-angiotensin-aldosterone system. They are relatively well tolerated, but approximately 15 - 20% of patients may complain of a dry cough. A serious but rare life-threatening adverse effect is angioedema. A patient should not be re-challenged with an ACE-inhibitor if this has occurred. These agents should be used with caution in patients with pre-existing renal dysfunction. Although

ACE-inhibitors are not contraindicated in these patients, if the renal function declines by more than 30% in one week, the ACE-inhibitor should be stopped or dose reduced. ACE-inhibitors are contraindicated in patients with known bilateral renal artery stenosis or hyperkalaemia. The co-prescription of NSAIDs with ACE-inhibitors will counteract the BP-lowering effects of the ACE-inhibitors.

- **Calcium-channelblockers–dihydropyridines (e.g. amlodipine, nifedipine), non-dihydropyridines (e.g. verapamil, diltiazem).** The calcium-channel blockers are effective for managing hypertension in the elderly. They act by coronary and peripheral vasodilation. In addition, the non-dihydropyridines are negatively chronotropic and inotropic, making them a good choice for patients with atrial fibrillation, various supraventricular arrhythmias and angina pectoris. These antihypertensives should be prescribed with awareness of the potential for drug interactions. Verapamil has been associated with intractable constipation in the elderly.
- **Beta blockers, e.g. atenolol, carvedilol.** These agents are recommended additions to the antihypertensive regimens of patients with cardiac failure, ischaemic heart disease and recent myocardial infarction. β-blockers should be used with caution in patients with left ventricular (LV) dysfunction as they may precipitate cardiac failure. β-blockers should never be stopped abruptly, as they cause sympathetically mediated reflex tachycardia. Elderly patients are at increased risk of LV dysfunction, and the use of more than one negative inotrope (e.g. verapamil and atenolol) should be done with caution.

Adherence

One of the greatest barriers to effective antihypertensive therapy is patient adherence. In the elderly, there are several challenges to acceptable adherence including polypharmacy, poor memory, declining vision and reliance on carers to provide medication. In creating a positive adherence climate a patient-centred approach should be undertaken, with realistic therapeutic goal setting. Active management of adverse effects, minimising dosing times and the numbers of pills taken, may aid in improving adherence.

Reference

1. Mulrow C, Lau J, Corne J, Brand M. Pharmacotherapy for hypertension in the elderly. *Cochrane Database of Systematic Reviews 1998*. Issue 2. Art. No.: CD000028. DOI:10.1002/14651858.CD000028.

Further reading

Dickerson L, Gibson M. Management of hypertension in older persons. *Am Fam Physician* 2005; 71(3): 469-476.

Opie LH, Gersh B. *Drugs for the Heart,* 6th ed. Philadelphia: Elsevier-Saunders, 2006.

Seedat YK, Croasdale MA, Milne FJ, Opie LH, Pinkney-Atkinson VJ, Rayner BL, Veriava Y for the Joint National Hypertension Guideline Working Group 2006. South African Hypertension Guideline 2006. *S Afr Med J* 2006; 96 (4): 337-344.

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In a nutshell

- Treating hypertension in the elderly is effective in reducing morbidity and mortality.
- Isolated systolic hypertension is more common in elderly patients.
- If there is insufficient blood pressure control with lifestyle modification alone, pharmacotherapy should be initiated.
- Many elderly patients require more than one antihypertensive agent to control their BP.
- The choice of agent should be guided by the patient's clinical assessment and co-morbidities.
- Adherence to antihypertensive medication is a barrier to maintaining BP control and must be assessed at each follow-up visit.

Single suture

Sleep off the fat

A study of more than 68 000 women found that those who sleep less than 5 hours a night gain more weight over time than those who sleep 7 hours a night. So says Sanjay Patel from Case Western Reserve University, Cleveland, Ohio. Patel found that women who sleep for 5 hours a night or less gained an average of 0.7 kilograms more over 10 years than those who slept 7 hours or more. The short-sleeping group was also 32% more likely to have gained 15 kilograms or more and 15% more likely to have become obese.

Interestingly, the short-sleepers actually ate fewer calories than the longer sleepers, overturning the common idea that over-eating among those who sleep less explains the weight differences. Patel suggests that a lower metabolic rate or less fidgeting resulting from less sleep may be the reason behind the weight gain.

New Scientist, 27 May 2007.