

# Hypertension in the elderly

Hypertension remains widely prevalent and a significant determinant of cardiovascular risk in the elderly population. Several large controlled trials have shown the benefits of treating hypertension in the elderly, including octogenarians. Several drugs are available and the majority need combination therapy. Management can be challenging due to side effects, polypharmacy and orthostatic hypotension.

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Epidemiological studies show that blood pressure increases with age, especially systolic blood pressure after the sixth decade. This is mainly due to structural alteration of the arterial wall that occurs with ageing.

Hypertension was noted in 57% of older men whose mean age was 80 years with, two-thirds having isolated systolic hypertension (ISH).<sup>1</sup> A previous study, the 1998 Health Survey for England, found that 40% of the UK population, and 70% of those over 70, had a blood pressure above 140/90 mmHg.<sup>2</sup> Of the 32% of hypertensive adults who received treatment, only 9% had controlled hypertension.<sup>2</sup>

adults, concluded that systolic and diastolic blood pressure were strongly and directly related to mortality from stroke, ischemic heart disease and other vascular diseases. This was true in each decade of life, including the very elderly, and the results were similar in men and women.<sup>3</sup>

The higher the systolic or diastolic blood pressure in the elderly, the higher the cardiovascular morbidity and mortality. Increased systolic blood pressure has been found to be a stronger risk factor for cardiovascular morbidity and mortality than raised diastolic pressure. Moreover, elderly people are more likely to have

target organ damage, clinical cardiovascular disease and less likely to have their hypertension controlled by treatment than younger subjects.

## Benefits of treatment

Numerous prospective, double-blind, randomised, placebo-controlled studies have demonstrated that antihypertensive drug therapy decreases the development of new coronary events, stroke, and heart failure. Even a modest decline in blood pressure translates into major risk reduction.

In a meta-analysis of

## Hypertension as a risk factor

Hypertension is an independent risk factor for vascular disease and plays a dominant role in the development and progression of atherosclerosis. A meta-analysis of data from 61 prospective studies, involving one million healthy

### Box: Ageing and hypertension

- Sodium sensitivity increases with age
- Increased stiffness of aorta due to loss of elasticity
- ISH is more frequent than systolic-diastolic hypertension
- There is greater endothelial dysfunction with age
- Frequency of white coat effect increases
- Increased atherosclerosis with age

six randomised trials of antihypertensive treatment in patients aged 60 and over, there was a range of values used to define systolic (160 to 280 mmHg) and diastolic (90 to 120 mmHg) blood pressure.<sup>4</sup> The results showed that cardiovascular, cerebrovascular and coronary mortality decreased by 22%, 33% and 26% respectively in the active treatment group compared with the control group.<sup>4</sup> Blood pressure was lower in the intervention group by an average of 5–22 mmHg systolic blood pressure and 2–10 mmHg diastolic blood pressure. Non-cardiovascular causes of mortality were not affected.

A subsequent Cochrane review has clearly established the value of antihypertensive agents for treating patients even in their seventh and eighth decades.<sup>5</sup> Trials of blood pressure lowering in people aged over 60 years showed treatment reduced death, strokes and heart attacks, while treatment in those aged over 80 years reduced stroke but not death.<sup>5</sup>

If treated appropriately, elderly people with hypertension have a greater absolute decrease in cardiovascular events (including heart failure and renal insufficiency) and dementia than younger people.<sup>6</sup>

## ISH

Three major trials used an entry systolic blood pressure above 160 mmHg to study the effect of blood pressure lowering.<sup>7–9</sup> Average ages were 72, 70 and 67 years respectively.

A subsequent meta-analysis

included 11,825 patients and showed reductions after treatment of: 17% in all-cause mortality; 25% in cardiovascular mortality; 32% in all cardiovascular events; 37% in stroke; and 25% in coronary events.<sup>10</sup> The results show that in older patients with ISH above 160 mmHg, antihypertensive treatment is beneficial.

## Very elderly

A 1999 meta-analysis analysed data from randomised trials of antihypertensive drug treatment in patients aged 80 years or over.<sup>11</sup> The very elderly subgroup represented about 15% participants and involved 1670 subjects aged between 80 and 98 years of age. Three-quarters were women. The results suggest a significant benefit of treatment in the very old for cardiovascular events (-22%), stroke (-34%) and heart failure (-39%) but not for mortality. The authors mentioned that confirmation would be needed through a properly designed trial in very old people.

In the Hypertension in the Very Elderly Trial (HYVET), 3845 patients who were 80 years or older with systolic blood pressure above 160 mmHg were randomised to receive the diuretic indapamide SR or placebo. The angiotensin converting enzyme inhibitor (ACEI) perindopril could be added if necessary to achieve target blood pressure of 150/80 mm Hg.<sup>12</sup>

After two years, blood pressure was 15/6 mmHg lower in the active group than in the placebo group, with some 73% of actively treated patients on combination treatment. The

primary endpoints (ie, fatal or nonfatal stroke) were reduced by 30% after treatment for two years.<sup>12</sup> Moreover there was a 21% reduction in all-cause mortality. The trial showed that not only is blood pressure lowering in the elderly beneficial — with no upper age limit — but also that it is safe with very few adverse events in the treated group. However, a poor prognosis due to concomitant systemic disease may influence a decision not to treat.

The prevalence of baseline cardiovascular disease was only 12% in the HYVET study but, in another patient cohort with a mean age of 80 years, 70% had either baseline cardiovascular disease, target organ damage or diabetes.<sup>13</sup> Elderly populations with a high prevalence of cardiovascular disease can be expected to have a greater absolute reduction in cardiovascular events with treatment.<sup>5</sup>

## Treatment

As per the National Institute for Health and Clinical Excellence (NICE) guidelines<sup>14</sup> in the UK, drug treatment is indicated if blood pressure remains above 160/100 mmHg or above 140/90 mmHg in patients with target organ damage, cardiovascular disease or whose 10-year cardiovascular risk is 20% or greater. In diabetics, the diastolic threshold is lower (ie 140/80 mmHg) if accompanied by 10-year CHD risk of at least 15% or target organ damage.

NICE states that treatment should aim to reduce blood pressure to 140/90 mmHg (140/80 mmHg for diabetics).<sup>14</sup>

The British Hypertension Society (BHS) target is lower at 140/85 mmHg (<130/80 mmHg for diabetics).<sup>15</sup>

For GPs, the Quality and Outcomes Framework<sup>16</sup> sets the target at 150/90 mmHg (which is the current audit standard in BHS guidelines). Reducing blood pressure, even to these less challenging levels, can provide substantial benefits in reducing strokes, heart attacks, heart failure and all cause mortality.

### Choice of drug

The relative risk reduction with different blood pressure lowering agents has been quantified by a prospective meta-analysis of 31 trials with 190,606 participants.<sup>17</sup> The comparisons included:

1. An angiotensin converting enzyme inhibitor (ACEI) versus a diuretic or  $\beta$ -blocker
2. A calcium channel blocker (CCB) versus a diuretic or  $\beta$ -blocker; and
2. An ACEI versus a CCB.

There was no clear evidence of any difference between the effects of the drug classes on major cardiovascular events. This was true for both younger and older adults.

The ALLHAT trial showed that a diuretic (chlorthalidone, once daily) was comparable in efficacy to a CCB or ACEI in controlling blood pressure and marginally superior in preventing adverse cardiovascular outcomes.<sup>18</sup>

Thus a diuretic is a good first step for treating hypertension in the elderly, and a thiazide diuretic is usually the most suitable. Elderly patients are sensitive to diuretics and should be monitored for side effects. Diuretics should

### Key points

- Hypertension is a major cardiovascular risk factor and preventable cause of death
- ISH is common
- Secondary hypertension is uncommon
- It should be managed in the context of overall cardiovascular risk
- Drug therapy reduces cardiovascular events in elderly above 60 years and in octogenarians
- Elderly hypertensives on treatment are more susceptible to orthostatic hypotension, syncope and falls
- Diuretics are most effective in controlling hypertension in the elderly and thiazides are usually first choice
- It is important to measure blood pressure in an upright as well as a sitting position.

be avoided in subjects with gout, hyperuricaemia, diabetes or renal impairment. Alternatively a CCB can be used as a first step for patients above 55 years or of Afro-Caribbean origin (BHS guidelines).<sup>15</sup>

An ACEI may be given in preference if there are signs of heart failure or left ventricular hypertrophy. If a patient cannot tolerate an ACEI due to cough or angioneurotic oedema, then an angiotensin-II receptor blocker (ARB) should be given. Central acting drugs such as clonidine have no role in the elderly due to side effects.  $\alpha$ -Adrenergic blockers are less favoured due to postural hypotension.

Elderly patients with hypertension have a high prevalence of associated medical conditions, and the choice of drug therapy in these patients depends on associated medical conditions. For example an ACEI is indicated after a myocardial infarction, a  $\beta$ -blocker in hypertensive patients with myocardial ischaemia, rapid

ventricular rate and essential tremor. Patients with heart failure need a ACEI and a diuretic, while an ACEI or an ARB is indicated in patients with diabetes and proteinuria. If a diuretic is not the initial drug, it is usually indicated as the second drug.

Many studies have shown that the effect of antihypertensive therapy is enhanced by using a combination of agents from different classes. If one agent fails to control blood pressure, a second drug from another class is added and dosages titrated for optimum effect. If necessary a third agent, from another class, is added. Typical triple therapy includes a diuretic, a CCB and either an ACEI or an ARB. Most elderly persons with hypertension will need two or more antihypertensive drugs to control their blood pressure.

It is also important to treat other cardiovascular risk factors in elderly hypertensives to reduce cardiovascular events and mortality. This includes stopping

smoking, correcting dyslipidemia and controlling diabetes.

### **β-blockers**

These drugs have been shown to reduce cardiovascular morbidity and mortality when used in combination with a diuretic.<sup>7</sup>

However in recent years their status in treatment has been less assured after two major randomised trials showed that they have less efficacy than other antihypertensive agents in preventing stroke.<sup>19,20</sup> β-blockers do not rectify arterial stiffness and do not decrease arterial wave reflection, which is often prominent in elderly hypertensive subjects.<sup>21</sup> However they may still be used as part of therapy for arrhythmia or in secondary prevention after myocardial infarction.

## **Hypertension and diabetes**

Hypertension is three times more common in diabetics and both conditions result in enhanced cardiovascular risk. The absolute risk reduction caused by treatment of hypertension in diabetics is greater than in non-diabetics.

Blockers of the renin-angiotensin-aldosterone system have a pronounced antiproteinuric effect and should be part of the pharmacological combination in diabetics. Moreover the recommended target for blood pressure control in diabetics is under 130/80 mmHg.<sup>15</sup>

### **Lifestyle modifications**

Weight loss should be a goal in any elderly person with a BMI above

25 (which would put the patient into the overweight category). Alcohol intake represents a potent calorific source and alcohol restriction can result in impressive falls in both body weight and blood pressure. Findings from controlled studies in older subjects with hypertension have suggested the use of a low sodium diet (in the range of 60–90 mmol/day) to reduce blood pressure.

In one study, a reduction in urinary sodium excretion associated with reduced salt intake was associated with a significant fall in systolic blood pressure from 166 to 156 mmHg.

Regular aerobic exercise can produce a modest blood pressure reduction in hypertensive patients of all age groups, increase plasma HDL-cholesterol and lower overall cardiovascular risk.

## **Compliance and drug resistance**

Faulty compliance with medication is an important issue in the elderly, especially when blood pressure fails to respond to therapy. When a patient is suffering from memory loss, the degree of compliance may be difficult to determine. Close observation by carers or a dosette box may help. Polypharmacy is common and too many tablets may reduce compliance. Patients may also have difficulty swallowing tablets.

Drug-resistant hypertension is said to exist when a triple-drug regimen fails to control blood pressure, especially systolic pressure, despite good compliance. Possible reasons include volume

overload and drug interactions with, for example, NSAIDs, sympathomimetic nasal decongestants, antidepressants, some immunosuppressants (tacrolimus, cyclosporine) or steroid hormones. In some patients, investigation and treatment of underlying causes of secondary hypertension may be applicable.

## **Adverse effects**

Elderly frail people are susceptible to orthostatic hypotension, syncope and falls due to impaired baroreflex sensitivity. For orthostatic hypotension, the dose of antihypertensive drug needs to be altered or another drug given and it is important to measure blood pressure in an upright as well as a sitting position.

Reversible renal failure may occur in elderly people treated with an ACEI or an ARB who are dehydrated or salt depleted. β-blockers can precipitate heart block, asthma, depression and confusion. In the ALLHAT trial, the doxazosin arm was stopped early due to adverse events.<sup>18</sup> Centrally acting drugs are avoided due to the high incidence of sedation, depression and constipation.

## **Conclusion**

Hypertension is widely prevalent in the elderly. It is a major and modifiable risk factor for cardiovascular and cerebrovascular disease, which increases with age.

Treatment reduces the risk of stroke and cardiovascular

events even in the very elderly and chronological age should not prevent management of hypertension but benefits must be balanced against the risks in frail, housebound patients.

More evidence is becoming available to support the treatment of systolic blood pressure above 140 mmHg even for low-risk patients.

Specific drugs have benefits for patients with compelling indications but monotherapy is inadequate in most cases. A diuretic is the standard first-choice drug. The elderly are susceptible to side effects and compliance is a major issue due to polypharmacy in this population.

Despite several published guidelines the level of hypertension diagnosis, treatment and control remains low.

**Conflict of interest: none**

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