“Hypotension” is, perhaps, best regarded as a relative term because a low blood pressure can give rise to significant symptoms in one person, whereas another person with the same blood pressure can be perfectly healthy and asymptomatic. However, hypotension has been defined as a blood pressure below 90/60mmHg.

Fluctuations in blood pressure are a product of normal homeostatic mechanisms and we all experience periods when our blood pressure is lower than what is normal for us as individuals and that which is consistent with the term “normotensive” (typically 120/80mmHg). In many cases these periods of relative hypotension give rise to no signs and symptoms and have no long-term consequences. Nonetheless, for some patients falls in blood pressure can give rise to troublesome symptoms that can affect quality of life and, in severe cases, can be life threatening.

In essence, hypotension becomes problematic when it results in hypoperfusion of vital organs, with the consequent reduction in delivery of oxygen and nutrients. For example, a systolic blood pressure of less than 70mmHg can lead to permanent brain or renal damage.

There has been discussion as to whether hypotension is a disease or a normal physiological state. Some of this originated from observations that British clinicians were less likely to make a diagnosis of hypotension than colleagues on the continent. The reality is that it can be classed as either, depending on the circumstances.

Mechanisms
With blood pressure controlled by a combination of cardiac output and vascular resistance, failure of mechanisms that regulate either or both of these two variables can give rise to hypotension. For example, if the circulating blood volume is depleted due to dehydration or haemorrhage, vasoconstriction or increased cardiac output, or both, will usually compensate and maintain a normal blood pressure; however if these reflexes are impeded then hypotension can result.

Failure of these compensatory mechanisms may be due to:

• Primary dysfunction of the heart or vasculature
• Secondary dysfunction of the heart or vasculature (eg, due to diseases affecting the autonomic nervous system)

REFLECT
1. How is hypotension defined?
2. Which antihypertensive drugs are most likely to cause orthostatic hypotension and what can pharmacists do to support patients?
3. How is hypotension managed?

Before reading on, think about how this article may help you to do your job better.
Orthostatic hypotension

Orthostatic hypotension is one of the most common causes of chronic hypotension. Sufferers fail to produce the level of endogenous steroids required to regulate blood pressure after standing, in addition to the routine sitting position.

Types of hypotension

Hypotension exists in a number of forms, reflecting its diverse range of underlying causes. It can be described as acute, chronic, orthostatic and post-prandial.

Acute hypotension

Acute hypotension is usually associated with shock, which may be hypovolaemic (e.g., due to fluid loss in severe haemorrhage, burns or diarrhoea and vomiting) septic, cardiogenic (e.g., following myocardial infarction), neurogenic or anaphylactic. It can also occur in patients receiving epidural or spinal anaesthesia (as a result of agents, such as bupivacaine, blocking sympathetic nerves that maintain vascular tone) and in those undergoing haemodialysis.

Chronic hypotension

Addison’s disease is one of the most common causes of chronic hypotension. Sufferers fail to produce the level of endogenous steroids required to regulate sodium and water retention.

Orthostatic hypotension

Orthostatic or postural hypotension is one of the most common forms of hypotension and is defined as a reduction in blood pressure of >20/10mmHg within three minutes of standing. In some cases orthostatic hypotension can result from disease states that involve dysfunction of the autonomic nervous system and these are summarised in Panel 1.

Information from the Malmo Preventative Project suggests that orthostatic hypotension can be found in around 6 per cent of middle aged individuals. Meanwhile rates among people with Parkinson’s disease have been reported to be as high as 20 per cent and the prevalence of orthostatic hypotension among elderly people living in residential-nursing care facilities appears particularly high, with some sources reporting rates of up to 68 per cent.

Recognising the prevalence of orthostatic hypotension among the elderly and those with diabetes, British Hypertension Society guidelines specifically recommend that blood pressure should be measured in these groups after standing, in addition to the routine sitting measurement. However, based on the high prevalence in those with Parkinson’s disease or other autonomic disorders, it would appear logical to extend this recommendation to these additional groups.

Younger patients can also experience problematic orthostatic hypotension. It can give rise to symptoms after prolonged periods of crouching or bending, and is particularly common in pregnancy.

No mention of orthostatic hypotension can ignore the huge role that drug therapy plays in the condition and this is further discussed in Panel 2.

Post-prandial hypotension

Post-prandial hypotension is common in the elderly, especially after consumption of meals high in carbohydrates. It has been defined as a fall in blood pressure of 20mmHg within two hours of eating, but in many cases the onset of hypotensive episodes can be much sooner.

The mechanisms underlying this form of hypotension are similar to those in orthostatic hypotension, namely a failure of normal reflex responses to compensate, in this case for the increase in blood supply to the gastrointestinal tract after eating.

Symptoms and diagnosis

Symptoms of hypotension occur as a result of hypoperfusion of essential organs and this can be clearly linked to activities or behaviours that rise to hypotension include that between the time of eating, but in many cases the onset of hypotensive episodes can be much sooner.

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Fainting (syncope) is a sudden and brief loss of consciousness due to reduced blood flow to the brain and can be a manifestation of hypotension. It may also occur as a result of venous pooling for example after long periods of standing (especially in a warm environment), or due to pain, exhaustion, hunger or stress.

Fainting often results in a fall to the floor. Assuming no head injuries have been sustained, and there is no reason to suspect a stroke or heart condition, the person should be laid flat, legs raised and airway, breathing and pulse checked. The person’s pulse will be slow and he or she may have pale, cold skin and be sweating. Any restrictive clothing around the neck and waist should be loosened and windows can be opened to ensure access to fresh air.

People who have vomited should be placed in the recovery position. A person who has fainted should recover within two minutes. Reassurance is important, especially if an injury has been sustained. If the person does not regain consciousness or there are concerns about an injury from the fall, an ambulance should be called immediately.

People who feel they may be about to faint can be managed with many of the same approaches: lying down, loosening tight clothing and reassurance.

*Adapted from “First aid manual” (Dorling Kindersley Ltd), Patient.co.uk and “First aid handbook/Australian Red Cross” before there are indications of the reduction in blood pressure, for example, swelling of the lips and face, and respiratory distress in anaphylaxis.

Where there is a significant underlying disease process to which hypotension is secondary, for example, Addison’s or Parkinson’s disease, symptoms typical of the condition will initially be more apparent than those due to hypotension.

Management

With elevated blood pressure widely recognised as a major cause of morbidity and mortality and lower blood pressure targets considered appropriate for patients at high cardiovascular risk, it may be all too easy to dismiss non-acute hypotension as little more than a nuisance. This may, however, be inappropriate because there is evidence that the relationship between mortality and blood pressure is described by a J-shaped curve, with mortality rising not only with elevated blood pressure but also with low blood pressure, albeit to a lesser extent. This is most apparent for patients with established coronary artery disease in whom a blood pressure of <110–120/<60–70mmHg increases the risk of future cardiovascular events. In addition, there is now evidence that orthostatic hypotension is a predictive factor for all-cause mortality in middle-aged people generally.1

Management of hypotension is, to a large extent, guided by the underlying cause and will also depend on whether it is acute, intermittent or chronic.

Acute hypotension is a medical emergency and, depending on the cause, treatment can involve the administration of intravenous fluids, blood transfusion, oxygen, vasopressors and postural changes (eg, lying down flat with legs above waist height in hypovolaemic or septic shock).

In most cases of chronic and intermittent hypotension, treatment is generally only required when there is a negative impact on quality of life. A balance needs to be struck between reducing the troublesome symptoms of hypotension and the potential of increasing periods when the patient may be at risk of hypertension, for example when those with orthostatic hypotension are supine.

With post-prandial hypotension, management aims to modify the eating patterns of patients to try to reduce symptomatic hypotensive episodes. Eating smaller, low carbohydrate meals more often is generally recommended and patients may be advised to lie down after eating. For those with hypertension complicated by post-prandial hypotension, another approach is to change the timing of antihypertensive drugs doses, to try to avoid their peak hypotensive effects coinciding with post-prandial periods. Clearly such modifications of dosing regimens need to be individualised, based on the drug(s) involved and the circumstances of the patient.

A number of strategies may be employed in the management of orthostatic hypotension. Irrespective of the approach adopted, the overall goal of management is to improve quality of life and prevent injury, rather than to achieve a target blood pressure value. A review of current drug therapy to identify opportunities to modify medication that may be implicated should invariably be a first step. Next comes a range of lifestyle interventions that have an important role and these are generally advocated before considering antihypotensive drug therapy. Lifestyle interventions for orthostatic hypotension are summarised in Panel 4. In addition to these recommendations, patients should be advised to avoid activities and exercise that involve straining, because these tend to lead to venous pooling and reduce cardiac output.

Drug therapy

When lifestyle interventions are not effective, there are two main options for anti-hypotensive drug therapy; namely, fludrocortisone or a vasoconstrictor.

The mineralocorticoid fludrocortisone is used in patients with Addison’s related hypotension (alongside cortisone or hydrocortisone for glucocorticoid effects) and in orthostatic hypotension. Doses typically in the range of 50 to 300μg daily. Because the drug increases blood pressure through promotion of renal sodium reabsorption and expansion of plasma volume, patients need to have a high salt and adequate fluid intake for treatment to be optimally effective. Potential problems that may be associated with fludrocortisone are generally predictable and include hypokalaemia, ankle oedema, supine hypertension and, rarely, cardiac failure.

In patients with orthostatic hypotension but without Addison’s disease, there is no indication for a glucocorticoid.

A range of vasoconstrictors have been used in the management of orthostatic hypotension. These include ephedrine, pseudoephedrine and mideboxine, all of which exert their effects as alpha-1 adrenoreceptor agonists. Although these all work to increase blood pressure, they may actually decrease the perfusion of vital organs such as the kidney. Pharmacists will be familiar with pseudoephedrine and ephedrine from their widespread use as decongestants. Nonetheless, the regular and chronic dosing required in orthostatic hypotension (typically 30–60mg tds for pseudoephedrine and 15–45mg tds for ephedrine) increases the probability of problematic adverse effects such as tachycardia and anxiety.

Midodrine is likely to be less familiar. This is a pro-drug that is converted to the active metabolite desglymidodrine and it may be used as monotherapy or in combination with fludrocortisone if necessary. Potential adverse effects of midodrine include supine hypertension (in around one in four patients), piloerection, pruritis, paraesthesa, urinary

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Counselling on the drug. Pharmacists may find useful to support verbal exposition. Some specialist centres have produced protocols that may be useful as an aid for clinicians. It is important that patients have regular blood pressure monitoring and advising on lifestyle and self-help measures, to counselling patients. The role of the pharmacist is to identify any supine hypertension. Treatment with oral vasoconstrictors is initiated at low dose and titrated according to response. Some guidance advises that the first dose of vasoconstrictor should be taken around 30 to 60 minutes before getting out of bed, which is consistent with the suggested bedtime dose of 2 mg. This being to counter the tendency for symptoms to be more severe early in the day. The final daily dose of these drugs should not be increased four hours before going to bed, in order to limit the potential for supine hypertension. The person should use physical counter movements, such as crossing of the legs, squatting or lying on the side, and postural changes should be made gradually to allow autonomic adaptation. The person can increase intake of sodium (up to 10 g per day) with fluids (up to 2.5 L per day). This increases central blood volume/litres per day. Rapid ingestion of water (eg, 500 mL over three minutes) will stimulate a pressor response (possibly mediated by activation of sympathetic nervous system), which has an onset after about five minutes and typically lasts up to an hour. This approach (eg, drinking water before getting out of bed in the morning) has been used to good effect to reduce orthostatic symptoms in some patients.

**Panel 4: Lifestyle Interventions**

- Postural changes should be made gradually to allow autonomic adaptation.
- The person should use physical counter movements, such as crossing of the legs, squatting or stretching leg muscles to reduce peripheral blood pooling, increasing venous return to the heart and cardiac output. The person should take part in physical activity and isotonic exercise (preferably recumbent or seated). Isotonic exercises are those where contracting muscles shorten against a fixed resistance and there is movement (eg, lifting a weight). This helps to avoid the decline in muscle strength that exacerbates orthostatic hypotension.
- Compression stockings can be worn to reduce peripheral blood pooling.
- Meal sizes, especially carbohydrate content, can be reduced to decrease tendency towards postprandial hypotension.
- The head of the bed can be raised by 10–20° to decrease the pressure diuresis during the night that contributes to hypovolaemia, and therefore hypotension on rising in the morning.
- The person can increase intake of sodium (up to 10 g per day) with fluids (up to 2.5 L per day). This increases central blood volume/litres per day.
- The role of the pharmacist is potentially broad, ranging from identifying any supine hypertension. Irrespective of treatment used, it is essential that patients have regular blood pressure monitoring (sitting and standing), to confirm a therapeutic response and to check that this has not been excessive, in particular to identify any supine hypertension. Although midodrine is the only one of these drugs that is not licensed in the UK, the other drugs referred to are being used “off label” in the management of orthostatic hypotension and this needs to be considered by those prescribing, dispensing and administering such treatments.

**Summary**

Hypotension is relatively common and those affected can experience symptoms that impact significantly on their quality of life and increase the risk of falls. The role of the pharmacist is potentially broad, ranging from blood pressure monitoring and advising on lifestyle and self-help measures, to counselling on medicines that may be contributing to the condition, especially in the elderly.

**References**


**PRACTICE POINTS**

Reading is only one way to undertake CPD and the regulator will expect to see various approaches in a pharmacist’s CPD portfolio.

1. Discuss with your team what strategies can be used to counter hypotension — and which patients need counselling.
2. When carrying out medicines use reviews with patients taking medicines that can cause hypotension, ask about signs and symptoms — some patients consider symptoms of hypotension to be part of normal ageing.

Consider making this activity one of your nine CPD entries this year.