Pre-operative measurement of adult blood pressure and management of hypertension

Association of Anaesthetists of Great Britain and Ireland
British Hypertension Society


¹ Association of Anaesthetists of Great Britain and Ireland
² British Hypertension Society

All AAGBI guidelines are reviewed to ensure relevance/accuracy and are updated or archived when necessary. Date of review: 2020.

This is a consensus document produced by expert members of a Joint Working Party of the Association of Anaesthetists of Great Britain and Ireland, and the British Hypertension Society. It has been seen and approved by the elected Board and Executive Committee of both organisations.
Summary
The diagnosis of hypertension is made in primary care. The measurement of blood pressure before planned surgery to determine the absence or presence of hypertension occurs in primary care. Hospitals should aim not to measure blood pressure before planned surgery. Primary care should provide blood pressure readings and document any appropriate action in non-urgent surgical referrals. The decision by a patient to accept or decline treatment for hypertensive readings should be documented by primary care. Anaesthetists cannot insist that a patient receives treatment for high blood pressure if the patient does not want treatment.
• **What other guideline statements are available on this topic?**

There is detailed evidence-based guidance on the diagnosis and treatment of hypertension in the community from, for example, the National Institute for Health and Care Excellence [1]. There is little guidance on a ‘safe’ blood pressure for planned anaesthesia and surgery.

• **Why was this guideline developed?**

There is no national guideline for the measurement, diagnosis or management of raised blood pressure before planned surgery. There is little evidence that raised preoperative blood pressure affects postoperative outcome. Local guidelines vary from area to area. Hypertension is a common reason to cancel or postpone surgery. In our sprint audit, 1-3% of elective patients had further investigations precipitated by blood pressure measurement, of whom half had their surgery postponed. Across the UK this would equate to ~100 concerned and inconvenienced patients each day, with associated costs to the NHS and the national economy [2, 3].

This guideline is the first collaboration between the AAGBI and the British Hypertension Society (BHS). These two organisations have very different perspectives. Members of the BHS are concerned with the long-term reduction in rates of cardiovascular disease, particularly strokes. Anaesthetists are more focussed on immediate complications, in the peri-operative period. This guideline aims to prevent the diagnosis of hypertension being the reason that planned surgery is cancelled or delayed. As such it should also be of interest to hospital managers and commissioners of hospital care.

• **How does this statement differ from existing guidelines?**

This guideline serves, therefore, not to advise on treatment of hypertension, but rather to produce a common terminology in diagnosis and referral, explaining the impact of anaesthesia on blood pressure and vice versa to the wider, non-anaesthetic community. At the same time it will review current best practice on the measurement, diagnosis and treatment of hypertension.

• **Why does this statement differ from existing guidelines?**

Pre-operative blood pressure management involves many specialties and professions: primary care, general medicine, cardiology, endocrinology, pre-operative assessment clinic and, of course, both anaesthetists and surgeons. This list is not exhaustive. This guideline should be a useful summary for all those clinicians and for patients.

The guidance takes into account not just the best clinical evidence, but the particular pattern of referral for treatment within the NHS in all four countries of the UK.

**Reference**


Recommendations (and suggestions for care)

1. A blood pressure measurement taken within the preceding twelve months should be detailed in the referral letter from primary care.
2. Only in cases where a blood pressure taken in primary care within the last twelve months is not available should the blood pressure be taken in a hospital outpatient department.
3. A patient with a blood pressure greater than or equal to 180/110 should not proceed to non-urgent surgery.
4. A reduction in blood pressure to less than 160/100 mmHg should precede non-urgent surgical referral.
5. The decision by a patient to accept or decline treatment for hypertensive readings should be documented by primary care.
Introduction

The National Institute for Health and Care Excellence (NICE) has described hypertension as "one of the most important preventable causes of premature morbidity and mortality in the UK" [4]. The Association of Anaesthetists of Great Britain and Ireland together with the British Hypertension Society felt there was a need for a nationally agreed policy statement on how to deal with raised blood pressure in the pre-operative period. We have based this statement on a consensus view with the backing of graded evidence, where such evidence is available.

Hypertension is almost always asymptomatic and it is diagnosed following general practice screening. Managing hypertension pre-operatively is a complex matter of balancing the risks of anaesthesia, treatment and delay for the individual patient. Most cases of hypertension are primary i.e. with no other medical cause. For the remainder the cause for hypertension may be associated with the reason for the proposed operation.

Cancellations of planned surgical procedures have been a major and long-standing problem for healthcare worldwide. The quantifiable loss of resource is pitted against unquantifiable and significant psychological, social and financial implications of cancellations for patients and their families. Although guidelines exist for the treatment of elevated blood pressure, there remains a paucity of literature and accepted guidelines for the peri-operative evaluation and care of the patient with hypertension who undergoes non-cardiac surgery [4]. Of particular importance is defining the patients most vulnerable to complications and the indications for immediate and rapid antihypertensive treatment and/or cancellation of surgery to reduce these risks pre-operatively, intra-operatively, and postoperatively. Peri-operative hypertension often occurs in conjunction with sympathetic nociceptive stimulation during the induction of anaesthesia, during surgery and with acute pain in the early postoperative period. Hypertension may also accompany hypothermia, hypoxia, or intravascular volume overload from excessive intraoperative fluid therapy, particularly in the ensuing 24 to 48 hours as fluid is mobilised from the extravascular space [5-7].

There are no nationally agreed guidelines for the diagnosis or management of raised blood pressure prior to elective surgery. The evidence regarding the effect of raised pre-operative blood pressure is very limited. Local guidelines do exist but vary from area to area. Both the Association of Anaesthetists of Great Britain and Ireland and the British Hypertension Society recognised the need for a national guideline and consensus statement to address the various issues of concern. We have limited our deliberations to a specific scope. Only the period prior to planned surgery is covered. Blood pressures which may cause an immediate risk to health are specified rather than those which may cause risk over the long term. The best method of taking accurate blood pressure measurement is examined. We considered how long blood pressure should be controlled before surgery is undertaken. Communication between different hospital departments, primary care and the patient are of importance. We hope that by providing national guidance the chances of a patient receiving conflicting advice will be minimised.

References


Scope

This guideline is aimed at adults presenting for planned surgery. The following groups are specifically excluded, although many of the general points covered in the guideline may apply.

- **Emergency/urgent surgery.** By definition these groups have no or very limited time for investigation, treatment or postponement. Such surgery must almost always proceed, but all those involved, including the patient must be aware of any associated increased risk.

- **Obstetrics.** Most cases of hypertension in pregnancy will be directly-related to the pregnancy (although with an ageing obstetric population with higher rates of obesity this may be less so). The monitoring and treatment of blood pressure is a specific and integral part of obstetric care, regardless of the need for surgery and there is also very limited opportunity for delay.

- **Paediatrics.** Childhood hypertension is relatively uncommon, and its epidemiology and natural history is relatively unclear and there are no definitive trials on screening. Thus the diagnosis and management, including pre-operatively is a specialist area beyond the scope of the general guidance in this publication.

- **Cardiac surgery.** Peri-operative hypertension commonly complicates surgery for congenital and acquired cardiac disease. Management will be affected by many other factors including the planned procedure, the use or not of cardiac bypass and the other indications for vaso- and cardio-active medication. We have thus considered it to be a specialist area beyond the scope of the general guidance in this publication.
Method

We formed a working party, four members from each society, of academics and clinicians with varied interests including vascular anaesthesia, cardiology, elderly care medicine and general practice. We agreed on the scope of the guideline and then we carried out a systematic review with the quality of evidence described using the Grading of Recommendations Assessment, Development, and Evaluation (GRADE) approach [8, 9]. The GRADE approach considers the quality of a body of evidence as high, moderate, low, or very low (Table 1). A consultation guideline was then made available to members of both societies for comment. The Council and Executive of the respective societies were given the task of final approval.

Reference


<table>
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<tr>
<th>Grade of recommendation and quality of evidence</th>
<th>Clarity of balance between desirable and undesirable effects</th>
<th>Methodological risks of bias</th>
<th>Implications</th>
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<td>Strong recommendation, high-quality evidence, Grade 1a</td>
<td>Desirable effects clearly outweigh undesirable effects, or vice versa</td>
<td>Consistent evidence from well-performed RCTs or exceptionally strong evidence from unbiased observational studies</td>
<td>Recommendation can apply to most patients in most circumstances. Further research is unlikely to change our confidence in the estimate of effect</td>
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<td>Evidence from RCTs with important limitations (inconsistent results, methodological flaws, indirect, or imprecise) or exceptionally strong evidence from unbiased observational studies</td>
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<td>Strong recommendation, low-quality evidence, Grade 1c</td>
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<td>Evidence for at least one critical outcome from observational studies, RCTs with serious flaws or indirect evidence</td>
<td>Recommendation may change when higher quality evidence becomes available. Further research (if performed) is likely to have an important impact on our confidence in the estimate of effect and is likely to change the estimate.</td>
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<td>Desirable effects closely balanced with undesirable effects</td>
<td>Consistent evidence from well-performed RCTs or exceptionally strong evidence from unbiased observational studies</td>
<td>The best action may differ depending on circumstances or patients or societal values. Further research is unlikely to change our confidence in the estimate of effect.</td>
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<td>Evidence from RCTs with important limitations (inconsistent results, methodological flaws, indirect, or imprecise) or exceptionally strong evidence from unbiased observational studies</td>
<td>Alternative approaches likely to be better for some patients under some circumstances. Further research (if performed) is likely to have an important impact on our confidence in the estimate of effect and may change the estimate.</td>
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<td>Uncertainty in the estimates of Desirable effects, harms, and burden; Desirable effects, harms, and burden may be closely balanced</td>
<td>Evidence for at least one critical outcome from observational studies, from RCTs with serious flaws or indirect evidence</td>
<td>Other alternatives may be equally reasonable. Further research is very likely to have an important impact on our confidence in the estimate of effect and is likely to change the estimate.</td>
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Blood pressure, hypertension and anaesthesia

The anaesthetist has two broad considerations in the hypertensive patient who presents for surgery. One is to be cognisant of the effect of chronic hypertension on the individual’s perioperative and long term cardiovascular risk. The other is to consider whether the blood pressure measured in primary care setting is associated with adverse perioperative events and to decide whether this should be reduced before surgery.

The association between hypertension and surgery was first reported in the 1950s [10, 11]. Systolic blood pressures in excess of 170 mmHg and diastolic blood pressures in excess of 110 mmHg were associated with complications such as myocardial ischaemia [12]. Hypertension was the second-most common factor associated with postoperative morbidity [13]. Higher blood pressures, for instance a diastolic blood pressure of 120 mmHg, were not associated with even greater rate of cardiovascular complications [14]. In 2003 Weksler et al. published a “quasi”-randomised controlled study of 989 treated hypertensive patients who had diastolic blood pressures between 110 and 130 mmHg measured in the anaesthetic room [15]. In one group surgery proceeded after intranasal nifedipine and in the other group surgery was delayed whilst further antihypertensive treatment was pursued in hospital. During the first three postoperative days the rates of neurological and cardiovascular complications were similar. One might conclude that there was no difference in an infrequent outcome or that the study had insufficient power to detect a small difference (see “Treatment for hypertension: extension of evidence from the community to the perioperative period”).

The association of hypertension with cardiovascular disease is established, but there is no clear evidence that patients with stage 1 or 2 hypertension without evidence of target organ damage have increased perioperative cardiovascular risk [16]. Patients with stage 3 or 4 hypertension, who are more likely to have target organ damage, have not been subjected to rigorous randomised controlled trials of interventions for perioperative blood pressure. There is evidence that hypertension with target organ damage is associated with a small increased incidence of perioperative major adverse cardiovascular events [17]. It is not known whether or not reducing blood pressure in these patients during a postponement of planned surgery would reduce this rate of events: there is sparse evidence to guide a decision. Any decision should take into account factors other than blood pressure; namely, age, co-morbidity, functional reserve and the urgency and indication for surgery (see “The treatment of cardiovascular risk, not hypertension”). The latest guidelines published by NICE in conjunction with the BHS recognise the importance of target organ damage in the management of hypertension by targeting a lower threshold for further medical intervention [1]. Whether or not these thresholds and targets should be rigorously applied in the perioperative setting is not clear.

Patients with hypertension (controlled or uncontrolled) demonstrate a more labile haemodynamic profile than their non-hypertensive counterparts [18]. The induction of anaesthesia and airway instrumentation can lead to a pronounced increase in sympathetic activation, which may lead to a significant increase in blood pressure and heart rate. A reduction in systemic vascular resistance soon after the induction of anaesthesia commonly leads to varying degrees of hypotension. Reduction in vascular resistance is multifactorial and may be secondary to loss of the baroreceptor reflex control, central neuraxial blockade and direct effects of anaesthetic agents. The effect on vascular tone will be exaggerated by “deep” or excessive anaesthesia and in patients who are fluid-depleted during surgery. This and the often exaggerated haemodynamic response to noxious stimuli, such as surgical stimuli, pain and emergence from anaesthesia have also been described as being more common in the hypertensive population [19]. Some researchers have demonstrated an association between hypertension and relatively minor “cardiovascular events” such as hypotension,
hypertension and arrhythmia but not one study has conclusively demonstrated that these fluctuations in haemodynamic parameters are associated with clinically significant harm [20]. Larger studies to investigate differences between untreated, treated and “non-responders” to medical treatment have failed to demonstrate significantly increased cardiovascular risk in the perioperative period. However many of the studies on this topic come from studies conducted in the late 1970s and these findings may not be as applicable in modern surgical or anaesthetic practice [21].

This appreciation of labile hemodynamics in hypertensive patients has led to a number of anaesthetic techniques designed to achieve a more stable haemodynamic profile in the intraoperative period. Such techniques include the practice of co-induction, greater use of invasive arterial monitoring with titrated or prophylactic vasopressor therapy, depth of anaesthesia monitoring, beta-blockers and the optimisation of stroke volume with intravascular fluid therapy. The omission of antihypertensive drugs such as angiotensin converting enzyme inhibitors and receptor blockers combined with the careful re-introduction of these drugs after surgery is common place and appears to be associated with fewer significant fluctuations in haemodynamic parameters in the perioperative period [22]. The practice of rapidly correcting preoperative hypertension with drugs such as beta-blockers appears to be associated with a higher mortality secondary to hypotension and stroke, albeit with less cardiac injury, as demonstrated in the POISE study [23]. The anaesthetist should be aware that sudden withdrawal of certain antihypertensive agents such as clonidine, alpha-methyldopa and beta-blockers can be associated with adverse events. Withdrawal of beta blockers may also be associated with myocardial ischaemia that is often silent in the perioperative period and easily missed without continuous ECG monitoring and serial serum troponin measurements.

References


**Best practice: the measurement of blood pressure [1]**

Primary care should measure blood pressure before non-urgent surgical referral. Surgical outpatients and preoperative assessment clinics should arrange for primary care to measure the blood pressure of patients who have not had a measurement in the last twelve months.

- The setting should be relaxed and temperate in a standardised environment with current calibrated equipment.
- The seated patient should have their supported arm outstretched for at least one minute before the initial reading.
- The pulse rate and rhythm should be recorded before the blood pressure is measured by a validated device.
- Automated sphygmomanometers ([www.bhsoc.org/bp-monitors](http://www.bhsoc.org/bp-monitors)) are inaccurate when the pulse is irregular, when the blood pressure should be measured by auscultation over the brachial artery during manual deflation of an arm cuff.
- Blood pressure should be measured in both arms. If the difference between arms in systolic pressure is greater than 20 mmHg, repeat the measurements. Subsequently measure from the arm with the higher blood pressure.
- The patient is normotensive if the blood pressure measurement is less than 140/90 mmHg.
- If the first measurement is equal to or higher than 140/90 the blood pressure should be measured twice more, with each reading at least one minute apart. The lower of the last two readings is recorded as the blood pressure: if it is less than 140/90 mmHg the patient is normotensive.
- If the reading is between 140/90 and 179/109 the patient may have stage 1 or 2 hypertension and would be offered ambulatory (ABPM) or home blood pressure monitoring (HBPM) to establish their true blood pressure (GRADE 1B).
- If the reading is equal to or higher than 180/110 the patient may have severe hypertension and would be considered for immediate treatment.
- In elderly patients, especially those aged 80 or more and patients with long standing diabetes postural hypotension would be considered: a further blood pressure reading is taken with the patient standing for at least one minute. A drop in systolic blood pressure of 20mmHg is significant.
Best practice: the diagnosis of hypertension

General practitioners should establish whether blood pressure has been measured and managed in all adults before non-urgent surgical referrals. A blood pressure measurement taken within the preceding twelve months should be detailed in the referral letter.

The diagnosis of hypertension in patients referred for investigation of surgical disease that are not treated for hypertension and who have not had a blood pressure measurement in the preceding twelve months follows the same process as any other primary care patient. We recommend that the practice instigate ambulatory or home blood pressure measurement before non-urgent referrals if the standard blood pressure is equal to or greater than 160/100 mmHg. If the patient’s ABPM/HBPM blood pressure is equal to or greater than 150/95 (or equal to or greater than 135/85 with target organ damage), the patient is diagnosed as having hypertension: treatment should be discussed and commenced using the NICE/BHS CG127 algorithm [18]. These procedures can take place at the same time as urgent surgical referrals, but a reduction in blood pressure to less than 160/100 mmHg should precede non-urgent surgical referral. The referral letter should document that an informed discussion has taken place with patients who decline treatment, or detail that all appropriate attempts have been made to reduce blood pressure for patients with persistent hypertension, which might have included specialist investigations.

In cases where a blood pressure taken in primary care within the last twelve months is not available the hospital matron for surgical outpatients is responsible for managing a system that ensures that patients blood pressure is taken following best practice. If the blood pressure is raised above 180/110 the patient should return to their general practice for a primary care assessment of their blood pressures and if necessary control of their blood pressure to less than 160/100. If the blood pressure is above 140/90 but below 180/110 the GP should be informed, but this should not be a reason to postpone surgery.

Reference

Best practice: the treatment of hypertension [1]

This section summarises the recommendations for primary care following the diagnosis of hypertension. There is good evidence (GRADE 1a) for the treatment of hypertension via mono- or combination therapy with diuretics (thiazide, chlortalidone and indapamide), beta-blockers, calcium channel-blockers, ACE inhibitor or an angiotensin-II receptor blocker. In the future the threshold for starting blood pressure lowering treatment might change to cardiovascular risk (see “The treatment of cardiovascular risk, not hypertension”).

Step 1 treatment
- Offer people aged under 55 years an angiotensin-converting enzyme (ACE) inhibitor or a low-cost angiotensin-II receptor blocker (ARB). If an ACE inhibitor is prescribed and is not tolerated (for example, because of cough), offer a low-cost ARB.
- ACE inhibitors and ARBs are not recommended in women of childbearing potential.
- Do not combine an ACE inhibitor with an ARB.
- Offer a calcium-channel blocker (CCB) to people aged over 55 years and to black people of African or Caribbean family origin of any age. If a CCB is not suitable, for example because of oedema or intolerance, or if there is evidence of heart failure or a high risk of heart failure, offer a thiazide-like diuretic.
- If diuretic treatment is to be initiated or changed, offer a thiazide-like diuretic, such as chlortalidone (12.5-25.0 mg once daily) or indapamide (1.5 mg modified-release once daily or 2.5 mg once daily) in preference to a conventional thiazide diuretic such as bendroflumethiazide or hydrochlorothiazide.
- For people who are already having treatment with bendroflumethiazide or hydrochlorothiazide and whose blood pressure is stable and well-controlled, continue treatment with the bendroflumethiazide or hydrochlorothiazide.
- Beta-blockers are not a preferred initial therapy for hypertension. However, beta-blockers may be considered in younger people, particularly: those with an intolerance or contraindication to ACE inhibitors and ARBs or women of child-bearing potential or people with evidence of increased sympathetic drive.
- If therapy is initiated with a beta-blocker and a second drug is required, add a CCB rather than a thiazide-like diuretic to reduce the person's risk of developing diabetes.

Step 2 treatment
- If blood pressure is not controlled by step 1 treatment, a CCB in combination with either an ACE inhibitor or an ARB.
- If a CCB is not suitable for step 2 treatment, for example because of oedema or intolerance, or if there is evidence of heart failure or a high risk of heart failure, offer a thiazide-like diuretic.
- For black people of African or Caribbean family origin, consider an ARB in preference to an ACE inhibitor, in combination with a CCB.

Step 3 treatment
- Before considering step 3 treatment, review medication to ensure step 2 treatment is at optimal or best tolerated doses.
• If treatment with three drugs is required, the combination of ACE inhibitor or ARB, CCB and thiazide-like diuretic should be used.

**Step 4 treatment**

Regard clinic blood pressure that remains higher than 140/90 mmHg after treatment with the optimal or best tolerated doses of an ACE inhibitor or an ARB plus a CCB plus a diuretic as resistant hypertension, and consider adding a fourth antihypertensive drug and/or seeking expert advice.

For treatment of resistant hypertension at step 4:

• Consider further diuretic therapy with low-dose spironolactone (25 mg once daily) if the blood potassium level is 4.5 mmol.l⁻¹ or lower. Use particular caution in people with a reduced estimated glomerular filtration rate because they have an increased risk of hyperkalaemia.

• Consider higher-dose thiazide-like diuretic treatment if the blood potassium level is higher than 4.5 mmol.l⁻¹.

• When using further diuretic therapy for resistant hypertension at step 4, monitor blood sodium and potassium and renal function within 1 month and repeat as required thereafter.

• If further diuretic therapy for resistant hypertension at step 4 is not tolerated, or is contraindicated or ineffective, consider an alpha- or beta-blocker.

• If blood pressure remains uncontrolled with the optimal or maximum tolerated doses of four drugs, seek expert advice if it has not yet been obtained.

As recently as 2008 the HYVET study has demonstrated the clinical benefits of treating hypertension in people aged ≥80, while health economic analysis has confirmed the cost effectiveness of this strategy [1, 25]. As a result, NICE now recommends that patients aged ≥ 80 ys should be offered treatment only if they have Stage 2 hypertension. The 2011 hypertension guideline also recommends that the decision to treat should be based on standing blood pressure, and should take into account the presence of co-morbidities such as dementia. The guideline also makes a distinction between initiating treatment in the over-80s and continuing long-term and well-tolerated treatment when patients reach this age. In other words, patients who were started on treatment when younger should not have their current therapy back-titrated when they celebrate their 80th birthday.

The treatment of cardiovascular risk, not hypertension

It is likely that treatment for hypertension will no longer be based upon blood pressure [26]. This is a surprising statement: the diagnosis of hypertension that merits treatment has – until recently – been based upon the blood pressure, irrespective of other cardiovascular risk factors, despite the NICE guidance recognising their importance [1]. This practice conflicts with the treatment of hypercholesterolaemia, which is not based upon the cholesterol concentration but instead on the composite 5 or 10 year risk of: stroke; myocardial infarction; heart failure; cardiovascular morbidity; or death, ascribed to these diagnoses. The magnitude by which cardiovascular disease is reduced by treatment for both hypercholesterolaemia and hypertension is dependent upon the composite cardiovascular risk, not upon the concentration of cholesterol or the blood pressure. Anaesthetists should gauge their concern for a hypertensive patient by the calculated 5 year rate of cardiovascular event, not by the blood pressure measurement.

Hypertension is common. It is this commonness that is responsible for the well-publicised reduction in population rates of stroke by antihypertensive treatment. The absolute effect of treatment for the individual, even over a five year period, is smaller than many anaesthetists might realise. Table 2 presents the effect of five years’ antihypertensive treatment for cardiovascular risk in a population quartered by the five year rate of any cardiovascular event.

Table 2 The effect of antihypertensive treatment on the five year rates of events (per 1000) in a population quartered on the basis of the untreated cardiovascular five year risk: lowest quartile (< 11% risk); next quartile (11-15% risk); next quartile (15-21% risk); highest quartile (> 21% risk).

<table>
<thead>
<tr>
<th>Quartile of risk</th>
<th>Any event</th>
<th>Stroke</th>
<th>CHD</th>
<th>Heart failure</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>No treatment</td>
<td>Treatment</td>
<td>No treatment</td>
<td>Treatment</td>
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<tr>
<td>Highest quartile</td>
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<tr>
<td>Event reduction</td>
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<td>10/1000</td>
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</tr>
<tr>
<td>Second quartile</td>
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<td>Event reduction</td>
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<tr>
<td>Third quartile</td>
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<td>36/1000</td>
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<tr>
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<tr>
<td>Event reduction</td>
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Planned major surgery temporarily increases mortality. For instance planned open repair of abdominal aortic aneurysm increases mortality in the first postoperative month ten times, whilst endovascular repair increases mortality four times. If cardiovascular events are similarly increased by major planned surgery one would anticipate that the preoperative antihypertensive treatment of cardiovascular risk would have a proportionately greater absolute effect on the rates of events whilst their risk remains elevated. Table 3 illustrates the absolute effect of established antihypertensive treatment in the month following a planned operation in patients from the third quartile in Table 2, assuming two scenarios: that the operation does not affect the rates of cardiovascular events; that the operation increases the rates of cardiovascular events six times.
Table 3 The absolute reduction in event rates per 1000 patients per month by antihypertensive treatment, assuming that the control rate is unaffected by surgery (‘same’) or increased, in this example six fold (‘x 6’).

<table>
<thead>
<tr>
<th>Quartile of risk</th>
<th>Any event</th>
<th>Stroke</th>
<th>CHD</th>
<th>Heart failure</th>
</tr>
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<tr>
<td></td>
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<td>x6</td>
<td>x6</td>
<td>x6</td>
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<tr>
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<tr>
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<td>1.8</td>
<td>0.1</td>
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<tr>
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<td>1.2</td>
<td>0.1</td>
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</table>

There is no practical impediment to surgery in the absence of a blood pressure measurement or the treatment of hypertension (diagnosed in primary care). This guideline has outlined that blood pressure before planned non-urgent surgery is measured in primary care where the diagnosis of hypertension is made and treatment is managed. Adult patients have the autonomy to decline investigations and treatment without which their chance of harm is increased and their chance of benefit is decreased. As part of this general principle patients are entitled to proceed to surgery despite high risks of harm or to decline – or to postpone – an operation that has a high chance of benefitting them.

An informed discussion should take place with patients who are failed by the system and attend hospital without this guidance being enacted. Clinicians should be wary of expressing undue confidence in the merits of postponing surgery for the assessment of cardiovascular risk by primary care and possible antihypertensive treatment. For instance, clinicians might like to consider the uncertainty in how long it takes for cardiovascular risk to fall with antihypertensive medication (as opposed to how long it takes for blood pressure to fall) and the 1% relative increase in cardiovascular risk that accompanies each postponed month, due to the patient aging. Clinicians might also consider that patients who smoke or who have hypercholesterolaemia are not subjected to the summary cancellations justified by blood pressure readings. A further consideration is the absence of a scale of enthusiasm for postponing surgery that matches the continuum of cardiovascular risk, which would result in older smoking hypercholesterolaemic normotensive men having surgery postponed more frequently than younger hypertensive women who do not have any other cardiovascular risk factors.

References

Communication

There are two possible letters that could be sent to the patient’s general practitioner. One for information, stating that the blood pressure was higher than normal but it was possible to proceed with the anaesthetic. The other to inform that the blood pressure was high, the procedure postponed and further action is required.

Here is an example of a letter to the patient’s general practitioner in the latter case. It is important that the patient has a copy and is instructed to make an appointment at their surgery with a nurse or a doctor and to take the letter with them. The language used should seek cooperative management rather than demand action. In the first instance, the GP will need to establish that the blood pressure is high and this is not a white coat effect. It must be clearly stated how to re-establish the procedural pathway when the blood pressure has been shown to be satisfactory, treated or not.

Dear Doctor

Unfortunately the procedure for Mr/Ms …………………. has been postponed because their blood pressure was found to be 182/114 in their pre-operative assessment. It was measured several times following the AAGBI/BHS guidelines. The guidelines suggest a blood pressure level higher than 180/110 is unsuitable for elective anaesthesia.
We have asked the patient to make an appointment at their surgery for further assessment of their blood pressure.
We would be grateful if you could verify that this is the true blood pressure level and not a white coat effect and treat appropriately if the patient has hypertension.
We will be pleased to accept the patient back for surgery if their clinical blood pressure is below 160/100. Please ask the patient to contact ………………………. and inform us of their current blood pressure and what medication, if any, was required to achieve this.

Many thanks in anticipation of your help with this matter

Note the GPs below were consulted (20)

Dr Chris Arden, Dr Ivan Benett, Dr Mark Davis, Dr Richard Falk, Prof David Fitzmaurice, Prof Ahmet Fuat, Dr Napa Gopi, Dr Kathryn Griffith, Dr Rosie Heath, Prof Richard Hobbs, Dr Paul Johnson Prof Richard McManus, Dr Jonathan Morrell, Dr Washik Parkar, Dr Neil Paul, Dr Jon Pittard, Dr Peter Savill, Dr Jonathan Shribman, Dr Harjit Singh, Dr Heather Wetherell.
**Table 4** Classification of the stages of hypertension.

<table>
<thead>
<tr>
<th>Category</th>
<th>Systolic Blood Pressure (mmHg)</th>
<th>Diastolic Blood Pressure (mmHg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage 1</td>
<td>140 – 159</td>
<td>90 – 99</td>
</tr>
<tr>
<td>Stage 2</td>
<td>160 – 179</td>
<td>100 – 109</td>
</tr>
<tr>
<td>Stage 3</td>
<td>180 – 209</td>
<td>110 – 119</td>
</tr>
<tr>
<td>Stage 4</td>
<td>$\geq$ 210</td>
<td>$\geq$ 120</td>
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</tbody>
</table>