Hypertensive Urgencies and Emergencies
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Hypertension afflicts 50 million people in the United States and approximately one billion people worldwide. Estimates are that 30% of the population is unaware they have hypertension, while only 34% of those who are being treated for hypertension are at a goal blood pressure measurement of $<140/90$ mmHg [1]. Although it is common for patients to be seen in the office with poorly controlled hypertension, hypertensive urgencies, and emergencies are less common. It is important for the primary care physician to recognize those patients with hypertensive urgencies and emergencies to avoid missing a life-threatening medical condition as well as not to overtreat elevations in blood pressure that may precipitate unnecessary patient morbidity.

Definitions

According to JNC VII guidelines, patients with elevated blood pressures may be characterized into one of three stages: prehypertension, Stage I, and Stage II hypertension (Table 1). The degree to which a patient’s blood pressure is higher than recommended guidelines compels the clinician to further define the blood pressure elevation, with the implication being that more aggressive treatment may be necessary.

Terminology for severely elevated blood pressure measurements is confusing. Although clinicians may feel that they know a hypertensive urgency or emergency when they see one, there is lack of uniformity in terms used to describe dangerously high blood pressures. The term “accelerated hypertension” has been used to describe individuals with chronic hypertension who had associated group 3 Keith-Wagener-Barker retinopathy, marked by retinal hemorrhages and exudates. Malignant hypertension has been used to
describe those individuals with group 4 Keith-Wagener-Barker retinopathy, marked by papilledema.

The term hypertensive crisis has been abandoned by some individuals because of confusion. Some interpret hypertensive crisis to mean a hypertensive emergency and others interpret it to mean hypertensive urgency. We prefer the terms normal blood pressure, prehypertension, stage 1 hypertension, and stage 2 hypertension. Stage 2 hypertension may be further delineated as hypertensive urgency and hypertensive emergency.

There is no absolute blood pressure that indicates a hypertensive emergency. The typical individual presents with a severe elevation in blood pressure. Severe is defined by a blood pressure measurement >180/120 mmHg according to JNC VII. Key to the diagnosis of hypertensive emergency is evidence of target end-organ damage most commonly affecting the central nervous, cardiovascular, or renal systems. The conditions noted in Box 1 constitute evidence of end-organ damage, in the face of hypertensive emergency [2]. Hypertensive urgency is characterized by a severe elevation in blood pressure that may or may not be associated with symptoms such as severe headache, anxiety, or shortness of breath. The individual with hypertensive urgency has no physical findings that indicate impending target end-organ damage.

Table 1
Classification of blood pressure for adults

<table>
<thead>
<tr>
<th>BP classification</th>
<th>SBP mmHg</th>
<th>DBP mmHg</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal</td>
<td>&lt;120</td>
<td>and &lt;80</td>
</tr>
<tr>
<td>Prehypertension</td>
<td>120–139</td>
<td>or 80–89</td>
</tr>
<tr>
<td>Stage I</td>
<td>140–159</td>
<td>or 90–99</td>
</tr>
<tr>
<td>Stage II</td>
<td>&gt; or = 160</td>
<td>or &gt; or = 100</td>
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</tbody>
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Box 1. Conditions constituting evidence of end-organ damage

1. Hypertensive encephalopathy
2. Intracerebral hemorrhage
3. Ischemic heart disease—the most common form of target organ damage associated with hypertension
   a. Acute myocardial infarction
   b. Acute left ventricle failure with pulmonary edema
   c. Unstable angina
4. Aortic dissection
5. Eclampsia
6. Stroke
7. Head trauma
8. Life-threatening arterial bleeding
The most important consideration for the primary care provider is the clinical context for the patient's elevated blood pressure. When a patient with a severe elevation in blood pressure is encountered the clinician must entertain whether the elevation is acute or chronic, and whether there is evidence of acute target end organ damage.

Causes

The most common cause of severe hypertension is an abrupt increase in blood pressure in patients with chronic hypertension. An important factor in hypertensive emergency and urgency is the rate at which the mean arterial pressure rises [3,4]. Noncompliance with medical therapy may therefore play a role in some patients who present with this severely elevated blood pressure [5,6].

Pathophysiology

The pathophysiology of severely elevated blood pressure differs, depending on whether hypertensive urgency or emergency is present and in the case of hypertensive emergency the target end organ(s) affected. Normally with a rise in blood pressure, the blood vessels change in diameter to autoregulate the pressure flow, thus limiting damage. When the mean arterial pressure increases abruptly, the body's ability to hemodynamically adjust to such a rapid change is thwarted, allowing for damage to the end organ [7]. Additional postulates of the mechanisms by which hypertensive emergencies create damage involve the rennin–angiotensin–aldosterone system [8].

Evaluation

The role of a primary care doctor in the evaluation of severely elevated blood pressure in an outpatient setting is to distinguish as quickly as possible those patients who require aggressive blood pressure reduction from those who can be managed in the office. Rapid triage of the most concerning patients requires a concise but complete history and physical examination, supported by appropriate and available laboratory data. Although no perfect algorithm exists for the evaluation of a patient with a severely elevated blood pressure in the outpatient setting, initial steps involve the search for the presence of acute target end-organ damage, specifically heart failure, renal failure, encephalopathy, or papilledema, or the presence of any concurrent conditions that would necessitate aggressive blood pressure control such as aortic dissection, acute myocardial infarction, stroke, pheochromocytoma crisis, or preeclampsia [8]. If no hypertensive emergency is identified, there is still a determination to be made between hypertensive urgency that would require rapid but not immediate lowering of blood pressure and severe uncontrolled hypertension that would benefit from tighter long-term
control but does not require rapid blood pressure reduction. Figure 1 presents a flowchart for the triage of patients in the outpatient setting.

Most of the hypertensive urgency and emergency review papers focus on evaluation and treatment in the emergency room setting. The approach in the outpatient setting is necessarily different, and will be limited by resources available in any given office. Because most laboratory data and imaging modalities are not readily accessible, the history and physical become the most critical tools in determining the severity of the situation.

History

Patients with severe elevations in blood pressure can present at any age, and may be the initial presentation for a previously undiagnosed hypertensive patient. The incidence of hypertensive urgencies and emergencies is

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**Severe Hypertension in the Office**
(Blood Pressure >180/120)

**Evidence of End Organ Compromise?**
- Heart Failure
- Renal Failure
- Encephalopathy
- Papilledema

**Concurrent condition which may mandate intensive blood pressure control?**

**Cardiovascular**
- Aortic Dissection
- Acute MI

**Cerebrovascular**
- SAH/ IC hemorrhage
- Acute Cerebral Infarction

**Other**
- Acute renovascular hypertension
- Pheochromocytoma
- Severe Burns
- Severe Epistaxis
- Eclampsia

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**Conservative Management**
- Oral Antihypertensive Therapy

**Consider Transfer to ED**
- For Rx and Invasive Monitoring

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Fig. 1. Algorithm for triage of patients with severe hypertension in the office. *(Modified from Gilmore RM, Miller SJ, Stead LG. Severe hypertension in the emergency department patient. Emerg Med Clin North Am 2005;23(4):1141–58; with permission.)*
greater in the elderly and African Americans. Most patients who present with severely elevated blood pressure are those with chronic essential hypertension who have been noncompliant or inadequately treated [1,5,6]. Therefore, it is critical to gain a thorough hypertension history. This includes current blood pressure medications, any recent changes, compliance with medications, and if the blood pressure had been previously controlled. The patient should be specifically asked if he or she abruptly discontinued a blood pressure medication or if they have had a previous “crisis” [9].

A full medical history, medication list including any nutritional supplements, and use of any illicit drugs will aid the evaluation. It is important to know if a patient currently uses a monoamine oxidase (MAO) inhibitor. Although rarely used today, when combined with foods or medications containing tyramine, MAO inhibitors can trigger a hypertensive crisis [10]. Baseline medical information is critical in assessing the acute nature of the presentation. Any previous renal insufficiency or failure, heart attacks, strokes, and any baseline deficits from a previous stroke should be noted. A patient’s outpatient chart may provide critical information in these areas as well as baseline laboratory data, especially in cases when a patient does not easily recall the information.

Next, a patient’s current symptoms should be addressed with a focus on determining whether there is evidence for target end-organ damage. Chest pain, shortness of breath, a prominent apical pulse, or signs of congestive heart failure may indicate cardiovascular involvement. Visual changes, severe headache, dizziness, somnolence, or altered mental status may signify neurologic compromise. Renovascular damage may be evidenced by an acute onset of oliguria or anuria [11]. Severe headache or shortness of breath have been associated with hypertensive urgency as well, but in the presence of elevated blood pressure, these symptoms warrant further investigation to rule out myocardial infarction, congestive heart failure, or stroke [1].

Although a full discussion of the evaluation and treatment of elevated blood pressure in pregnancy is beyond the scope of this article, it is important to note that minor elevations (>140/90 mmHg) warrant further investigation. Hypertension in pregnancy can fall into several categories when it occurs after 20 weeks gestation. Preeclampsia is defined as new-onset elevated blood pressure with the presence of proteinuria (0.3 g or more of protein in a 24-hour urine collection, or ≥1 + on a urine dipstick) [12,13]. Women with mild preeclampsia may be asymptomatic at the time of diagnosis [14]. Severe preeclampsia in which the blood pressure is ≥160/110 mmHg with significant proteinuria (≥5 g of protein on 24-hour urine or 3 + on a dipstick) can be accompanied by oliguria, blurred vision, scotomata, epigastric or right upper quadrant pain, pulmonary edema or cyanosis, impaired liver function, thrombocytopenia, and intrauterine growth restriction [12,13]. The definitive treatment for preeclampsia is delivery; however, the management of preeclampsia requires a careful consideration of the risks to the mother and the fetus [12]. The severity of the illness and the gestational age are
key components in decision making. If there is no proteinuria present in a patient with new hypertension after 20 weeks gestation, this is considered gestational hypertension (previously known as pregnancy-induced hypertension). Patients with chronic hypertension can develop superimposed preeclampsia before 20 weeks gestation and require special evaluation and monitoring throughout the pregnancy [13].

**Physical examination**

First, the blood pressure measurement must be confirmed. The blood pressure should be rechecked, making sure that the patient is in the proper position and that the appropriate cuff size is used [15]. Blood pressures should be checked in both arms and some advocate measurements in the lower limbs [6].

The physical examination should focus on the organs commonly affected by elevated blood pressure seeking evidence of acute or chronic injury. Although many chronic hypertensives will have findings on fundoscopic examination, focus should be on the presence of acute changes. These include the presence of new hemorrhages (superficial or flame shaped, or deep and punctuate), retinal exudates (hard or “cotton wool”), or papilledema [8]. A cardiovascular examination should include signs of heart failure such as pulmonary rales, elevated jugular venous pressure, and an S3 heart sound. Pulse discrepancy among limbs and a new aortic regurgitation murmur may indicate aortic dissection and requires further investigation [11]. Neurologic findings such as a change in mental status, abnormal visual fields, and focal neurologic signs point to possible intracranial hemorrhage, acute ischemic stroke, and hypertensive encephalopathy.

A review of a complete history and physical is found in Box 2.

**Laboratory evaluation**

The laboratory evaluation in an outpatient setting will be limited by the resources available in any given office. An EKG should be performed in anyone with a severely elevated blood pressure or any signs or symptoms of heart involvement to identify evidence of myocardial ischemia or hypertrophy [16]. If possible, any EKG abnormalities should be compared with a baseline EKG. Some practitioners advocate using a urinalysis in the office to assess for end-organ damage. Hematuria or significant proteinuria may be indicative of acute or progressive renal failure. Gross hematuria is not usually present in a hypertensive emergency, and requires additional workup once the crisis has been managed [17]. A chest radiograph if immediately or quickly available may reveal evidence of pulmonary edema of heart failure. The presence of a widened mediastinum would be concerning for aortic dissection [18]. Further assessment with a head CT or laboratory data such as complete blood count, basic metabolic panel, urine toxicology if urgent,
may be triaged to the emergency department. If an emergency does not exist, the above data can be collected in an outpatient setting to assist in longer term care.

**Treatment**

A large number of pharmacologic agents now exist to treat essential hypertension, making the need to treat hypertensive urgencies and emergencies less likely than several decades ago. However, the need has not totally disappeared. Hypertensive urgencies and emergencies may account for as many as 27.5% of all medical emergencies presenting to an emergency department and 3% of all emergency room visits. As many as 50% of individuals who present with a hypertensive urgency or emergency will already have a diagnosis of essential hypertension [19,20].

Both hypertensive urgencies and emergencies require immediate medical attention but use different treatment strategies. How the hypertension is treated depends on how the patient presents. The initial challenge for the clinician is to quickly and accurately determine whether the patient has target end-organ damage associated with the severely elevated blood pressure. Appropriate therapeutic decisions start with the triage process in the primary care physician’s office, and include such considerations as those listed in Box 3, which are indicative of office readiness.

Hypertensive emergencies develop over hours or days, and require immediate blood pressure reduction, but not necessarily blood pressure normalization, to prevent or limit target end-organ damage. In the office, a patient with a hypertensive emergency may require the clinician to immediately evaluate the patient’s airway, breathing, or circulation because of a stroke, myocardial infarct, or other life-threatening condition. Patients with hypertensive emergency should be transported to the hospital using the emergency medical system. Such patients require continuous monitoring of blood pressure in a hospital setting where parenteral administration of antihypertensive agents are used to reduce mean arterial blood by no more than 25% within minutes to 1 hour of therapy initiation. If the patient is stable, the blood pressure is then titrated to 160/100 to 110 within the next 2 to 6 hours. If the patient remains stable, the blood pressure may be reduced to normal over the next 24 to 48 hours. Caution must be used to avoid excessive lowering of blood pressure, which may compromise renal, cerebral, or coronary blood flow. For this reason short-acting nifedipine is no longer considered acceptable in the initial treatment of severely elevated blood pressures. Caution should be used in patients with ischemic stroke in which there is no clear evidence from clinical trials to support the use of immediate antihypertensive treatment, patients with aortic dissection who should have the systolic blood pressure lowered to <100 mmHg if tolerated, and patients in whom blood pressure is lowered to enable the use of thrombolytic agents [1].
Box 2. Key aspects of the history and physical examination of the hypertensive patient

Hypertension history
Last known normal blood pressure, prior diagnosis and treatments, dietary and social factors

Cardiac history
Previous heart attacks, angina, arrhythmias
Symptoms of dyspnea, chest pain, claudication, flank pain, back pain

Neurologic history
History of prior strokes, neurologic dysfunction
Visual changes, blurriness, loss of visual fields, headache, nausea, and vomiting
Renal history
History of proteinuria, underlying renal disease
Changes in urinary frequency

Endocrine history
Diabetes, thyroid dysfunction, Cushing’s Syndrome

Family history
Early hypertension in family members, cerebrovascular and cardiovascular disease, diabetes, pheochromocytoma

Social history
Smoking, alcohol, illicit drugs (especially cocaine, stimulants), noncompliance

Medications
Steroids, estrogens, sympathomimetics, nutritional supplements (eg, ephedra, mah huang), monoamine oxidase inhibitors (MAO-Is)
Nutritional supplements (eg, ephedra, mah huang)

Other comorbidities
Organ transplant (especially cardiac or renal), current pregnancy (eclampsia or preeclampsia)

Physical examination
Vital Signs: blood pressure, pulse rate, weight, body habitus, buffalo hump, moon facies
Cardiovascular: enlarged heart, presence of S3 heart sounds, asymmetric pulses, arrhythmias
Neck: enlarged thyroid, carotid pulses, jugular venous distention
Pulmonary: signs of left ventricular dysfunction (crackles, rhonchi)
Hypertensive urgency develops over days to weeks. In the office, a patient with hypertensive urgency will have a marked elevation in blood pressure with or without symptoms such as headache, shortness of breath, or anxiety. They will have no physical findings indicative of target end-organ damage. The elevated blood pressures in these individuals often make the clinician feel the need to act aggressively. There is no evidence to suggest that patients who present with severe blood pressure elevation and no indication of target end-organ damage have an increased short-term risk when their blood pressure is not aggressively lowered in the clinical setting [1]. The term “urgency” has often lead to aggressive dosing with intravenous or oral antihypertensives to rapidly lower the blood pressure in these individuals. Such an approach is not without risk. Oral or intravenous loading of antihypertensives in the office may lead to cumulative effects of blood pressure lowering that are not experienced by the patient until they have left the office exposing the patient to unnecessary morbidity.

**Box 3. Office readiness for hypertensive urgency or emergency**

1. An office process to identify and immediately assess blood pressure measurement for those patient with complaints which may indicate target end-organ damage from elevated blood pressure
2. Appropriate office equipment including accurately functioning syphgmanometers with various blood pressure cuff sizes and electrocardiogram machine(s)
3. An office process to summon providers for emergent clinical need
4. An understanding by all clinicians of medication available for office administration
5. A clear process for activating the emergency system when transport to the emergency room is indicated

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When presented with a patient with hypertensive urgency the clinician has to not only select the appropriate antihypertensive agent but also assess how rapidly the blood pressure should be lowered. If the patient has a current diagnosis of hypertension the clinician may choose to adjust the patient's medication regimen, or if necessary, address issues of compliance with current medications. Such an approach will generally produce blood pressure lowering, which occurs over days to weeks.

For some patients, the blood pressure elevation may warrant the reduction of blood pressure in hours to days. Such patients rarely require hospitalization. The approach is to treat with an oral antihypertensive agent, conduct serial blood pressure measurements in the office, and arrange reasonable short-term follow-up to assure long-term effectiveness of and adherence to treatment [17].

Oral hypertensive agents given in single or multiple dosages may promptly lower the blood pressure, but are associated with variable lag times before onset of action, and may be difficult to titrate because of long durations of action. The ideal pharmacologic agent selected to lower blood pressure with hypertensive urgency should have the following characteristics: no adverse effects on the patients underlying clinical profile, relative short onset of action, and relatively short duration of action. Agents most commonly used to lower blood pressure in the office setting have included clonidine, labetalol, captopril, and minoxidil. Although diuretics have little role in managing hypertensive urgency, they are known to potentiate the effect of other antihypertensive agents, and therefore may have an important role in the overall management of the patient with poorly controlled blood pressure.

Once the hypertensive urgency has resolved and the blood pressure is stable, the clinician should investigate possible reasons for the patient’s elevation in blood pressure. Questions should explore factors that affect the patient’s ability to be compliant with prescribed therapy. The clinician should be satisfied that any medication prescribed will be filled and taken by the patient until seen in the office for follow-up. Be aware that financial difficulty may prohibit some patients from obtaining prescribed therapy. Once necessary medication adjustment(s) are made, close follow-up should be arranged for the patient with severely elevated blood pressure.

References


