

# Evaluation and Treatment of Severe Asymptomatic Hypertension

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Poorly controlled hypertension is a common finding in the outpatient setting. When patients present with severely elevated blood pressure (i.e., systolic blood pressure of 180 mm Hg or greater, or diastolic blood pressure of 110 mm Hg or greater), physicians need to differentiate hypertensive emergency from severely elevated blood pressure without signs or symptoms of end-organ damage (severe asymptomatic hypertension). Most patients who are asymptomatic but have poorly controlled hypertension do not have acute end-organ damage and, therefore, do not require immediate workup or treatment (within 24 hours). However, physicians should confirm blood pressure readings and appropriately classify the hypertensive state. A cardiovascular risk profile is important in guiding the treatment of severe asymptomatic hypertension; higher risk patients may benefit from more urgent and aggressive evaluation and treatment. Oral agents may be initiated before discharge, but intravenous medications and fast-acting oral agents should be reserved for true hypertensive emergencies. High blood pressure should be treated gradually. Appropriate, repeated follow-up over weeks to months is needed to reach desired blood pressure goals. (*Am Fam Physician*. 2010;81(4):470-476. Copyright © 2010 American Academy of Family Physicians.)

Approximately one third of adults in the United States have some degree of hypertension,<sup>1-3</sup> and up to 5 percent of patients presenting to the emergency department have severely elevated blood pressure.<sup>4</sup> In one study, about one fourth of patients presenting with diastolic blood pressure of 110 mm Hg or greater were unaware of their hypertension, including 28 percent of those with severe asymptomatic hypertension and 8 percent of those with a hypertensive emergency.<sup>5</sup> There are few prospective, randomized controlled trials on the treatment of severe asymptomatic hypertension. Physicians should not expect to reduce blood pressure to desired levels before discharge. Instead, gradual reduction is achieved over time with repeated follow-up visits.

## Definitions

The Seventh Report of the Joint National Committee on the Prevention, Detection, Evaluation, and Treatment of High Blood Pressure (JNC 7) defines normal blood pressure as less than 120 mm Hg systolic or less than 80 mm Hg diastolic; prehypertension as 120 to 139 systolic or 80 to 89 diastolic;

stage 1 hypertension as 140 to 159 systolic or 90 to 99 diastolic; and stage 2 hypertension as 160 or greater systolic, or 100 or greater diastolic.<sup>6</sup> However, there is no universal terminology to describe severe stages of hypertension.<sup>7</sup>

For this article, we define severely elevated blood pressure as 180 mm Hg or greater systolic, or 110 mm Hg or greater diastolic.<sup>8</sup> Severely elevated blood pressure can be classified as severe asymptomatic hypertension or hypertensive emergency.<sup>9-11</sup> Severe asymptomatic hypertension is defined as severely elevated blood pressure without signs or symptoms of end-organ damage. Hypertensive emergency (sometimes called hypertensive crisis<sup>12</sup>) is the point when signs or symptoms of end-organ damage occur. Although hypertensive emergency is usually associated with diastolic blood pressure greater than 120 mm Hg (except in children and pregnant women),<sup>5,13</sup> it can occur at any hypertensive level.

Severe asymptomatic hypertension can be further classified as hypertensive urgency or severe uncontrolled hypertension, based on the patient's medical history and global

**SORT: KEY RECOMMENDATIONS FOR PRACTICE**

| <i>Clinical recommendation</i>  | <i>Evidence rating</i> | <i>References</i>    |
|---|------------------------|----------------------|
| Severe asymptomatic hypertension should be distinguished from hypertensive emergency, then classified as hypertensive urgency or severe uncontrolled hypertension.  | C                      | 8, 12-14             |
| In patients with severe asymptomatic hypertension, those with more cardiovascular risk factors should be evaluated and treated more aggressively than those with fewer risk factors.  | C                      | 6, 16                |
| Initiating treatment for asymptomatic hypertension in patients previously diagnosed with hypertension is optional with appropriate follow-up. However, in patients with a systolic blood pressure of 200 mm Hg or greater, or diastolic blood pressure of 120 mm Hg or greater, oral medication should be initiated before discharge. | C                      | 6, 8, 12, 14, 17, 23 |
| Blood pressure should not be expected to decrease to desired levels during the initial visit for severe asymptomatic hypertension. Blood pressure should instead be reduced gradually with repeated follow-up visits.   | C                      | 6, 8, 12, 14, 17, 23 |

A = consistent, good-quality patient-oriented evidence; B = inconsistent or limited-quality patient-oriented evidence; C = consensus, disease-oriented evidence, usual practice, expert opinion, or case series. For information about the SORT evidence rating system, go to <http://www.aafp.org/afpsort.xml>.

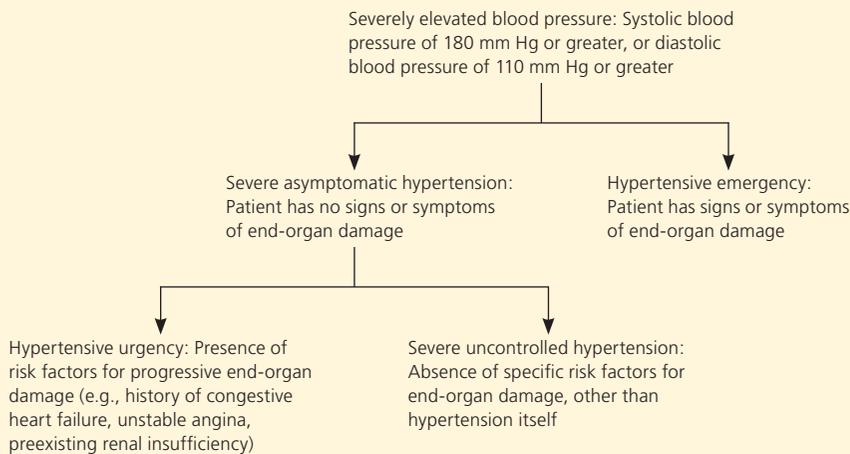
cardiovascular risk. Hypertensive urgency is defined as the presence of risk factors for progressive end-organ damage (e.g., history of congestive heart failure, unstable angina, or preexisting renal insufficiency), whereas severe uncontrolled hypertension is defined as the absence of these risk factors.<sup>8</sup> The

classification of severely elevated blood pressure is presented in *Figure 1*.

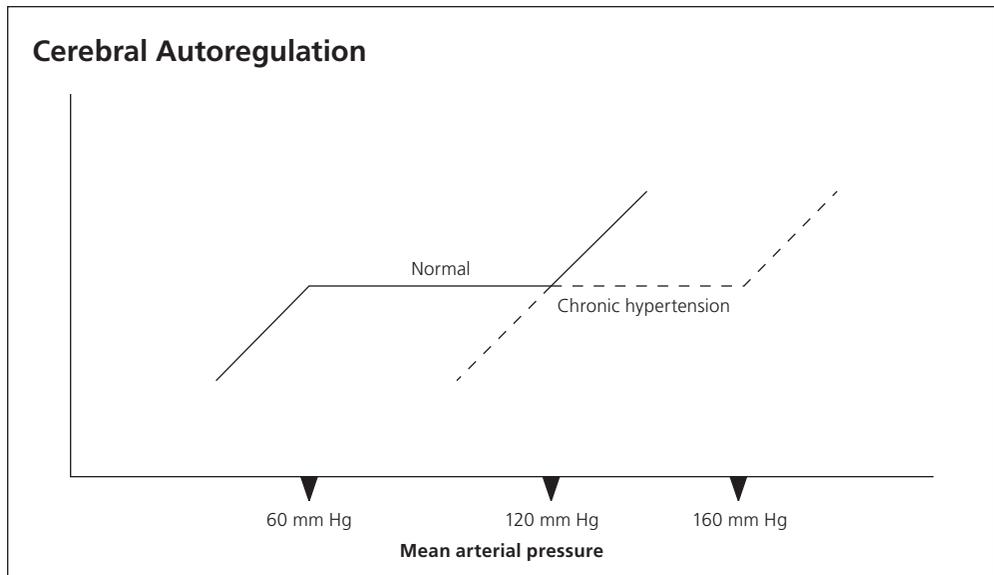
**Pathophysiology**

Hypertension may be present for many years before it becomes an emergency.<sup>14</sup> The rapidity of blood pressure elevation and severity

**Classification of Severely Elevated Blood Pressure**



**Figure 1.** Classification of severely elevated blood pressure.



**Figure 2.** Cerebral blood flow is tightly regulated within a certain range of mean arterial pressure (solid line). With chronic hypertension, cerebral autoregulation undergoes a rightward shift (dotted line). Abruptly decreasing the mean arterial pressure can potentially lead to a significant drop in cerebral blood flow and, thus, cerebral ischemia.

Adapted with permission from Varon J, Marik PE. Clinical review: the management of hypertensive crises. *Crit Care.* 2003;7(5):374.

of end-organ damage during an emergency are caused by the failure of normal autoregulatory function and abrupt increases in systemic vascular resistance. Moreover, there is concurrent endovascular injury with fibrinoid necrosis of arterioles. This leads to a cycle of ischemia, platelet deposition, and further failure of autoregulation as vasoactive substances are released.

Normally, tissue perfusion in the brain, heart, and kidneys is tightly regulated at a constant level, despite fluctuations in systemic blood pressure.<sup>14</sup> With severely elevated blood pressure, autoregulation shifts to the right over time (Figure 2).<sup>15</sup> Thus, there is a lower threshold for hypoperfusion to occur if the current blood pressure abruptly decreases by more than 20 to 25 percent. Because of this, physicians should avoid the common practice of giving asymptomatic patients excessive doses of antihypertensives in an attempt to normalize blood pressure rapidly. This can lead to unnecessary delays in emergency department discharge for observation, or even admission for iatrogenic hypotension.

### Evaluation

A 2007 European guideline emphasizes the role of determining global cardiovascular risk in the evaluation of patients with

hypertension.<sup>16</sup> Treatment should be based on a complete cardiovascular risk profile that takes into account coexisting risk factors and any history of end-organ damage (Table 1).<sup>16</sup> Risk can then be stratified as low, moderate,

**Table 1. Risk Factors for End-Organ Damage in Persons with Severely Elevated Blood Pressure**

- Systolic blood pressure of greater than 160 mm Hg, with diastolic blood pressure of less than 70 mm Hg
- Diabetes mellitus
- Metabolic syndrome
- At least three cardiovascular risk factors (e.g., age older than 55 years for men or 65 years for women, smoking, dyslipidemia, impaired fasting glucose, obesity)
- One or more of the following findings associated with subclinical organ damage:
  - Left ventricular hypertrophy on electrocardiography (particularly with strain) or echocardiography (particularly concentric)
  - Reduced estimated glomerular filtration rate or creatinine clearance
  - Microalbuminuria or proteinuria
- Established cardiovascular or renal disease

Information from reference 16.

high, or very high. This risk stratification is dynamic, taking into account that a patient with lower blood pressure and multiple risk factors may have a similar prognosis to a patient with more poorly controlled hypertension and no risk factors.

#### HISTORY AND PHYSICAL EXAMINATION

After rechecking an elevated blood pressure reading, physicians should determine if the patient has symptoms or signs that suggest secondary causes of hypertension or the presence of end-organ damage. A thorough review of systems with an emphasis on neurologic, cardiac, and renal symptoms should be performed to detect new vision changes, mild confusion, dyspnea on exertion, and oliguria.<sup>17</sup> A complete medication history should be obtained to review adherence to current antihypertensives, as well as the use of new drugs or nonprescription supplements (e.g., nonsteroidal anti-inflammatory drugs, herbal or dietary supplements, weight-loss drugs).

Orthostatic vital signs should be evaluated in older patients and in patients with diabetes or suspected postural hypotension. All patients should receive focused cardiopulmonary, neurologic, and funduscopic examinations. Mild retinal changes, such as arteriolar narrowing and arteriovenous nicking, are largely nonspecific except in younger patients. However, hemorrhages and exudates, and papilledema are associated with increased cardiopulmonary risk.<sup>16</sup> Papilledema is a sign of hypertensive emergency, whereas hemorrhages may be caused by hypertensive emergency or diabetes.

#### DIAGNOSTIC TESTING

There is no consensus about the necessary laboratory workup of patients with severe asymptomatic hypertension. The JNC 7 recommends an array of testing only before initiating therapy in patients with newly diagnosed hypertension.<sup>6</sup> Several studies have examined the usefulness of routine screening for end-organ damage in patients with severe hypertension.<sup>11,17,18</sup> These studies did not show clear evidence that electrocardiography (ECG), complete blood count,

basic metabolic profile, or urinalysis affects acute medical decisions or improves short-term outcomes. Until further guidelines are established, clinical judgment (and pre-test probability) must be used to determine which tests may be useful. *Table 2* presents a suggested approach to the initial evaluation of patients with severely elevated blood pressure.

A urinalysis that is negative for proteinuria and hematuria is strong evidence against an acute elevation in serum creatinine level,<sup>19</sup> although a basic metabolic profile may still be useful to calculate the glomerular filtration rate or creatinine clearance. Both measures are strong predictors of cardiovascular risk accompanying acute or chronic renal dysfunction.<sup>16</sup> ECG is unlikely to influence acute care in the absence of signs and symptoms of acute coronary syndrome. However, ECG is recommended for any patient with indicators of cardiovascular disease, such as chest pain, arrhythmia, and shortness of breath.

**Table 2. Suggested Initial Evaluation of Patients with Severely Elevated Blood Pressure**

|  |
|--|
| Confirm elevated blood pressure reading in a quiet area after the patient sits upright for at least five minutes, with the arm supported at the level of the heart.  |
| Inquire about medication history and compliance, as well as cardiovascular, pulmonary, and neurologic symptoms.  |
| Perform focused cardiopulmonary, neurologic, and funduscopic examinations.   |
| If the patient is at low risk of cardiovascular disease,* consider screening for acute renal failure with urinalysis. Check urine toxicology if drug use is suspected.   |
| For a patient with moderate or high cardiovascular risk,* perform urinalysis and a basic metabolic profile.  |
| Consider chest radiography and/or electrocardiography if the patient has clinical signs and symptoms that may suggest end-organ cardiopulmonary damage or cardiac ischemia.  |
| Check hemoglobin levels only if anemia is suspected.   |
| If initiating a new oral antihypertensive agent, particularly one that is renally metabolized, perform a basic metabolic profile to establish baseline renal function (via a calculated creatinine clearance), unless recent test results are available. |
| If a hypertensive emergency is diagnosed, treat accordingly. Otherwise, treat the patient for severe asymptomatic hypertension (Table 3).  |

\*—See Table 1 for risk factors.

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More extensive testing for secondary causes is not generally indicated, unless the clinical or laboratory evaluation strongly suggests an identifiable cause or blood pressure control has been refractory despite multiple treatments over time.<sup>6</sup> In the absence of other signs of central nervous system dysfunction, an isolated, nonspecific headache has not been shown to be a risk factor for end-organ central nervous system damage; therefore, imaging is generally not recommended.<sup>8</sup>

### Treatment

Rapidly lowering blood pressure in the emergency department is usually unnecessary in asymptomatic patients and may be harmful.<sup>6,17</sup> There are no controlled studies demonstrating long-term improved outcomes with acute treatment of severe asymptomatic hypertension. Severely elevated blood pressure likely does not develop abruptly, but rather over days, weeks, or months. Aggressive dosing with intravenous medications or fast-acting oral agents, such as nifedipine (Procardia) or hydralazine, can lead to hypotension. Reducing severely elevated blood pressure below the autoregulatory zone too quickly can result in markedly decreased perfusion to the brain and eventually ischemia or infarction.

An early trial including 143 patients with a diastolic blood pressure between 115 and 129 mm Hg compared hydrochlorothiazide, reserpine, and hydralazine therapy with no treatment.<sup>20</sup> No adverse events occurred in the untreated group within the first three months. Another study evaluated the benefit of initiating a loading dose of oral medication before discharge in patients with severely elevated blood pressure.<sup>9</sup> There was no significant difference among groups in the degree of blood pressure improvement at 24 hours and one week.

The VALUE (Valsartan Antihypertensive Long-term Use Evaluation) trial compared valsartan (Diovan) with amlodipine (Norvasc) to determine their effects on cardiovascular outcome in high-risk patients with hypertension.<sup>21</sup> Many of the cardiovascular events occurred within the first six months of treatment, when the blood pressure

difference between the two treatment groups was greatest. Of note, the difference in adverse cardiovascular events between the two groups decreased as blood pressure control became more similar.

Although there is no evidence that treating poorly controlled hypertension within hours or days is beneficial, the VALUE findings suggest that blood pressure goals should be reached within a relatively short time (certainly within six months), at least in patients at high cardiovascular risk. Thus, a loading dose of an antihypertensive in the physician's office or emergency department is generally not warranted, and most patients only need a maintenance dose with follow-up after a few days. True hypertensive emergencies require admission to an intensive care unit and immediate treatment within one to two hours. Even in the emergent setting, blood pressure should not be acutely lowered because of the risk of hypoperfusion.

### Follow-up and Monitoring

Recommendations for treatment and follow-up of patients with severe asymptomatic hypertension are shown in *Table 3*.<sup>8,12,15,22,23</sup> Outpatient treatment is generally acceptable, with appropriate follow-up. If it is unclear whether the patient will comply with follow-up, a short hospital stay may be needed. Initiating treatment for asymptomatic hypertension is optional with appropriate follow-up. Previously treated patients usually need adjustments in their long-term oral antihypertensive therapy, particularly the use of combination drugs, or reinstitution of medications if they have been nonadherent.<sup>6</sup> If the patient has no history of hypertension, elevated blood pressure should be confirmed at a follow-up visit. However, a patient with severe asymptomatic hypertension can be expected to have some degree of hypertension at follow-up. In one study, more than one half of emergency department patients with two increased blood pressure readings and no history of hypertension met the definition of hypertension the following week based on home blood pressure monitoring.<sup>24</sup>

If a maintenance dose of an oral antihypertensive is initiated, the patient may be

**Table 3. Treatment Recommendations for Severe Asymptomatic Hypertension**

| Type of severe asymptomatic hypertension | Recommendations  |
|--|--|
| Hypertensive urgency*                    | <p>Initiate treatment and follow-up within 24 to 48 hours of presentation.</p> <p>Initiate a maintenance dose of an oral medication before discharge in patients with SBP of 200 mm Hg or greater, or DBP of 120 mm Hg or greater; this is optional for patients with lower blood pressure.</p> <p>Consider a short observation period, depending on the patient's risk factors.</p> <p>Safely discharge the patient, emphasizing the importance of close follow-up.</p> <p>If follow-up is uncertain and the patient has many risk factors, consider hospitalization for initial therapy.</p> |
| Severe uncontrolled hypertension†        | <p>Initiate treatment and follow-up within one to seven days of presentation.</p> <p>Initiate a maintenance dose of an oral medication before discharge in patients with SBP of 200 mm Hg or greater, or DBP of 120 mm Hg or greater; this is optional for patients with lower blood pressure.</p> <p>Safely discharge the patient, emphasizing the importance of close follow-up.</p>   |

NOTE: Severe asymptomatic hypertension is defined as SBP of 180 mm Hg or greater, or DBP of 110 mm Hg or greater in a patient without signs or symptoms of end-organ damage.

DBP = diastolic blood pressure; SBP = systolic blood pressure.

\*—Presence of risk factors for progressive end-organ damage.

†—Absence of risk factors for progressive end-organ damage.

Information from references 8, 12, 15, 22, and 23.

sent home without waiting for normalization of blood pressure. However, it is imperative to educate patients about the importance of compliance with antihypertensive medications and multiple follow-ups, as well as the risks of uncontrolled hypertension. Over weeks to months, the dosage and selection of medications may be modified to achieve desired goals.

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