

TABLE 12-8 INTRAVENOUS DRUGS FOR HYPERTENSIVE EMERGENCIES

DRUG	ONSET OF ACTION	HALF-LIFE	DOSE	CONTRAINDICATIONS AND SIDE-EFFECTS
Labetalol	5-10 min	3-6 hours	0.25-0.5 mg/kg; 2-4 mg/min until goal BP is reached, thereafter 5-20 mg/hr	2nd or 3rd degree AV block; systolic heart failure, COPD (relative); bradycardia
Nicardipine	5-15 min	30-40 min	5-15 mg/hr as continuous infusion, starting dose 5 mg/hr, increase Q 15-30 min with 2.5 mg until goal BP, thereafter decrease to 3 mg/hr	Liver failure
Nitroprusside	Immediate	1-2 min	0.3-10 µg/kg/min, increase by 0.5 µg/kg/min Q 5 min until goal BP	Liver/kidney failure (relative), cyanide toxicity
Nitroglycerine	1-5 min	3-5 min	5-200 µg/min, 5 µg/min increase Q 5 min	
Urapadil	3-5 min	4-6 hrs	12.5-25 mg as bolus injections; 5-40 mg/hr as continuous infusion	
Esmolol	1-2 min	10-30 min	0.5-1.0 mg/kg as bolus; 50-300 µg/kg/min as continuous infusion	2nd or 3rd degree AV block, systolic heart failure, COPD (relative); bradycardia
Phentolamine	1-2 min	3-5 min	1-5 mg, repeat after 5-15 min until goal BP is reached; 0.5-1 mg/hr as continuous infusion	Tachyarrhythmia, angina pectoris

Modified from van den Born BJ, Beutler JJ, Gaillard CA, et al: Dutch guideline for the management of hypertensive crisis—2010 revision, *Neth J Med* 69:248–255, 2011.

Most patients in the emergency department with hypertensive urgencies are nonadherent to their medical regimen or are being treated with an inadequate regimen. To expedite the necessary changes in medications, outpatient follow-up should be arranged within 72 hours. To manage BP during the short interim period, effective oral medication includes labetalol, clonidine, or captopril, which is a short-acting ACEI.

BPs greater than 160/110 mm Hg are a common incidental finding among patients in emergency departments and other acute care settings for urgent medical or surgical care of symptoms that are unrelated to BP (e.g., musculoskeletal pain, orthopedic injury). In these settings, the elevated BP is more often the first indication of chronic hypertension than a simple physiologic stress reaction, providing an important opportunity to initiate primary care referral for formal evaluation and treatment of chronic hypertension. Home and ambulatory BP monitoring are indicated to determine whether the patient's BP normalizes completely once the acute illness has resolved.

PROGNOSIS

One of the most important prognostic factors in hypertension is ECG or echocardiographic left ventricular hypertrophy, the latter of which is already present in as many as 25% of patients with newly diagnosed hypertension. Left ventricular hypertrophy predisposes the patient to heart failure, atrial fibrillation, and sudden cardiac death.


Because of their relatively short duration (typically <5 years), randomized controlled trials underestimate the lifetime protection against premature disability and death afforded by several decades of antihypertensive therapy in clinical practice. In the Framingham Heart Study, treatment of hypertension for 20 years in middle-aged adults reduced total cardiovascular mortality by 60%, which is considerably greater than the results achieved in most randomized trials, despite the less intense treatment guidelines when therapy was initiated in the 1950s through the 1970s.

PROSPECTUS FOR THE FUTURE

1. Further delineation of genetic causes of hypertension and application of this research to the treatment and prevention of hypertension, including development of pharmacologic

and nonpharmacologic therapies that target the various signaling pathways in hypertension and prehypertension.

2. Further work to define the efficacy of catheter-based renal denervation to treat resistant hypertension.
3. Evaluation of drug-eluting stents for the prevention of restenosis after percutaneous revascularization of infrainguinal vascular disease.
4. Further assessment of safety and efficacy of emerging antithrombotic therapies in patients with atrial fibrillation, venous thromboembolism, and vascular disease.
5. Improvements in techniques for noninvasive imaging of the vasculature, including three-dimensional reconstruction using CT angiography, MR angiography, and duplex ultrasonography.

 For a deeper discussion on this topic, please see Chapters 67, "Arterial Hypertension," and 68, "Pulmonary Hypertension," in *Goldman-Cecil Medicine, 25th Edition*.

SUGGESTED READINGS

- ACCORD Study Group: Effects of intensive blood-pressure control in type 2 diabetes mellitus, *N Engl J Med* 362:1575–1585, 2010.
- Bhatt DL, Kandzari DE, O'Neill WW, et al: A controlled trial of renal denervation for resistant hypertension, *N Engl J Med* 370:1393–1401, 2014.
- Eckel RH, Jakicic JM, Ard JD, et al: 2013 AHA/ACC guideline on lifestyle management to reduce cardiovascular risk: a report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines, *J Am Coll Cardiol* 63(25 Pt B):2960–2984, 2014.
- EINSTEIN-PE Investigators: Oral rivaroxaban for the treatment of symptomatic pulmonary embolism, *N Engl J Med* 366:1287–1297, 2012, 2012.
- Kearon C, Akl E, Comerota A, et al: Antithrombotic therapy for VTE disease: antithrombotic therapy and prevention of thrombosis, 9th ed: American College of Chest Physicians evidence-based clinical practice guidelines, *Chest* 141(Suppl):e419S–e494S, 2012.
- Jaff M, McMurtry S, Archer S, et al: Management of massive and submassive pulmonary embolism, iliofemoral deep vein thrombosis, and chronic thromboembolic pulmonary hypertension: a scientific statement from the American Heart Association, *Circulation* 123:1788–1830, 2011.
- Jamerson K, Weber MA, Bakris GL, et al: for the ACCOMPLISH Trial Investigators: Benazepril plus amlodipine or hydrochlorothiazide for hypertension in high-risk patients, *N Engl J Med* 359:2417–2428, 2008.
- James PA, Oparil S, Carter BL, et al: 2014 evidence-based guideline for the management of high blood pressure in adults: report from the panel members