

**Guidelines  
For The Management Of**

**Hypertensive Crisis**

**BY**

**Dr. Sinan Butrus**

**Dr.Layla Al-Shahrabani**

**F.I.C.M.S  
Clinical Standards  
& Guidelines**

**F.R.C.P (UK)  
Director of Clinical  
Affairs**

2009 AD

2709 K

**Kurdistan Higher Council  
For Medical Specialties**

*Bordi Kurdistan Bo Psporayati Pziski*

**Setting Clinical and Professional Excellence**

Hypertensive crisis is a medical emergency and requires immediate treatment  
It is defined as elevation of blood pressure (BP) over 180/120 mm Hg  
It is important to assess whether target-organ dysfunction (mainly brain, heart, eyes, kidneys, as well as the rest of the vasculature) is present or not to differentiate hypertensive emergency from urgency as there are no symptoms of target organ dysfunction in hypertensive urgency.  
**Hypertensive emergency** should be treated with parenteral therapy.  
**Hypertensive urgency** may be treated with oral drugs, but the situation must be carefully assessed  
Ischemic stroke is a special situation. Blood pressure should not be rapidly reduced nor should it be lowered too far.

### **Goals**

Lower the arterial BP by no more than 20% within an hour after the patient is seen  
Titrate the BP to the range of 160/100-110 mm Hg within the next 2 to 6 hours.  
In aortic dissection, the reduction should be done in 10 minutes

### **Treatment**

Admission to the ICU

IV crystalloids might be needed because of volume depletion.

Closely monitor BP every 15 minutes for the first 2 hours and every 30 minutes for 6 hours

After 24 to 48 hours if the patient is stable, switch to oral therapy.

At any stage, if you feel the patient is critical or not responding, try to get advice from senior doctor.

**Labetalol [Trandate]** Onset/duration: 5-10 min/2-6 hr. Peak effect in 30 minutes

Can be given as an intravenous bolus or infusion

The bolus dose is 20 mg initially (over 2 min), followed by 20 to 80 mg every 10 minutes to a total dose of 300 mg.

The infusion rate is 0.5 to 2 mg/min to a maximum of 4 - 5 mg / min

**Nitroglycerin** is useful; especially for patients with myocardial ischemia

Diluting 5 mg nitroglycerin injection into 100 mL of 5% DW will yield a concentration of 50 mcg/mL.

Intravenous infusion, initially administered at a rate of 5 mcg (0.005 mg) per minute.

The dosage being increased by increments of 5 mcg per minute at three- to five-minute intervals until an effect is obtained or until the rate is 20 mcg (0.02 mg) per minute.

If no effect is obtained at 20 mcg per minute, the dosage may be increased further by increments of 10 mcg (0.01 mg) per minute at the same time intervals, and later increased by increments of 20 mcg (0.02 mg) per minute up to 200 mcg / min if necessary to obtain an effect

**Hydralazine [Apresoline]** 10 - 40 mg IV q4-6h, may be given q20-30 minutes till adequate response

IV push rate: 10 mg/min

there may be no reduction in BP from 1 to 2 and even 3 hours

**Nicardipine [Cardene]** Effects seen within 15 minutes

Dilute an ampoule of 25 mg in D5W 250 ml to yield concentration of 0.1 mg/ml

The initial dose of 5 mg/hr can be increased by 2.5 mg/hour every 15 minutes to maximum of 15 mg/hour.

Consider reduction to 3 mg/hour after response is achieved.

**Sodium nitroprusside** should not be used in renal failure because of thiocyanate toxicity  
50 mg of nitropruss diluted in 250 – 1000 ml 5% glucose, water and protected from light by opaque material but not necessary to cover the infusion drip chamber or the tubing  
Start infusion at 0.3 mcg/kg/min upward titrations of 1 mcg/kg/min till the desired effect reached or maximum recommended infusion of 10 mcg/kg/min to avoid methemoglobinemia and cyanide poisoning

Average effective rate 3 mcg/kg/min

Continuously monitoring to avoid hypotension

Avoid in elderly, hepatic or renal dysfunction, or more than 500 mcg/kg administered faster than 2 mcg/kg/min as cyanide will be generated faster than unaided patient can eliminate it.

**Esmolol [Brevibloc]** is ultra-short-acting Beta-1 selective blocker,

very useful in critical care situations in surgery

Its effects begin almost immediately, total duration of action ~ 30 minutes

500 mcg/kg IV bolus over 1- 3 minute, and start infusion at 50 - 100 mcg/kg/min over 4 min

If no effect within 5 minutes, repeat bolus dose of 500 mcg/kg and follow with maintenance infusion using increments of 50 mcg/kg/min over 4 min

Repeat cycle every 5 minutes up to 4 times, maximum infusion dose of 300 mcg/kg/min

**Phentolamine [Mesylate]** particularly useful in situations such as pheochromocytoma

5 mg of Phentolamine mesylate is dissolved in 1 mL of Sterile Water and injected rapidly, or infuse at a rate of 0.2 – 0.5 mg / min

Blood pressure is recorded immediately after injection, at 30-second intervals for the first 3 minutes, and at 60-second intervals for the next 7 minute

### **Hypertensive urgency**

There is a severe elevation in blood pressure but target-organ function remains intact.

Almost same signs & symptoms

There may be no need for hospitalization.

Oral agents may be used.

There should be a slow and controlled reduction in BP.

Close follow-up with the outpatient.

**Captopril** 12.5 – 25 mg sublingually repeats as needed every 30 minutes.

Onset/duration 10 – 20 min / 2 – 6 hr

**Labetalol** 200 – 400 mg orally, repeat every 2 – 3 hr, onset/duration 1 – 2 hr/ 2 – 12 hr

**Lasix** 20 mg, repeat as necessary

**Clonidine** 0.1 – 0.2 mg orally, followed by 0.05 mg – 0.1 mg every 1 – 2 hrs to a maximum of

0.6 – 0.7 mg

Onset / duration 30 – 60 min / 8 – 16 hr

**Many patients with hypertensive urgency may require at least 2 agents**

### **Hypertensive crisis with stroke**

Maintaining ventilation.

Fever treated with acetaminophen

Assess cardiac rhythm

Maintain glycemic control

In ischemic stroke, the administration for lytic therapy is strictly within 3 hours

If **systolic BP 155 – 180, diastolic BP 75 – 105 mm Hg**, just observe and treat complications like hypoxia, seizures,

If **SBP is >185** or their **DPB is >110 mm Hg**, use labetalol  
If **SBP is >220** or the **DBP is 121 to 140 mm Hg**, use labetalol or nicardipine  
If **DBP is >140 mm Hg**, use nitroprusside;

keeping in mind to have mean arterial B.P around 140 mm Hg

*Mean arterial pressure MAP = 1/3(SBP- DBP)+DBP*

*Diastole counts twice as much as systole because 2/3 of the cardiac cycle is spent in diastole.*

*An MAP of about 60 is necessary to perfuse coronary arteries, brain, kidneys.*

## **Further readings in hypertensive crisis**

### **Hypertensive emergency**

Severe elevation of blood pressure (BP), defined as >180/120 mm Hg, and it is complicated by target-organ dysfunction or target-organ damage, hypertensive encephalopathy, intracranial hemorrhage (ICH), acute myocardial infarction (AMI), acute left ventricular dysfunction with pulmonary edema, unstable angina, dissecting aortic aneurysm, or, in women who are pregnant, eclampsia

### **Presentation**

Headache, blurred vision, epistaxis, chest pain, dyspnea, psychomotor agitation, encephalopathy, aortic dissection, acute pulmonary edema, myocardial ischemia, eclampsia, acute renal failure, microangiopathic hemolytic anemia and postoperative hypertension

There are some differences between hypertensive urgency and emergency, but it is not hugely different. People who present with emergency tend to be slightly older; it appears that men slightly less commonly have hypertensive urgency; while sex variation is fairly equal for emergency. The BP is the same on average: 210 mm Hg, headache & epistaxis are slightly more common for patients who have urgency compared with emergency.

Chest pain & dyspnea, however, are more common for emergency.

Psychomotor agitation is more common with urgency, and neurologic deficit with emergency.

So, based on the patient having a certain symptom, we cannot determine if they have urgency or emergency.

### **Pathogenesis**

The elevations in BP are multifactorial. There is an increase in mechanical stress and vascular wall damage. There could be an increase in vascular permeability; there is cell proliferation and activation of the coagulation cascade. The endothelial cell surface lining of the vascular compartment is damaged, and when this is damaged, this leads to endothelial cell dysfunction, which further promotes vasoconstriction and platelet aggregation. There is the release of various vasoconstrictors with this situation. In addition to this, there is activation of the renin-angiotensin-aldosterone system (RAAS). Angiotensin II is a very potent vasoconstricting substance, but in addition, it increases the elaboration of cytokines such as interleukin-6 (IL-6) and NF-kappaB, which is a pro-inflammatory factor. There is white blood cell (WBC) adhesion, as well as proliferation of vascular smooth muscle cells. NADPH, which generates reactive oxygen species, is also increased. There is a reduction of nitric oxide, which is a protective substance that leads to vasodilation and inhibition of platelet aggregation and again, this leads to this inflammatory factor. So this is not a simple situation. There is not a single drug per se that attacks all of these potential targets within the cascade of hypertensive emergency.

Oxidative stress then leads to a reduction in nitric oxide, which is a protective substance, and an increase in reactive oxygen species. The oxygen species then go on to be pro-inflammatory, to promote platelet aggregation that actually accelerates the development of atherosclerosis.

Endothelial dysfunction is thought to be the final common pathway. There is a reduction in vasodilatation and an increase in vascular adhesion molecules, the activation of coagulation, and platelet aggregation.

## References

- [www.medscape.com/viewarticle/723665/Hypertensive Crisis in an Era of Escalating Health Care Changes/Theresa P. Yeo; Sherry A. Burrell/07/01/2010](http://www.medscape.com/viewarticle/723665/Hypertensive-Crisis-in-an-Era-of-Escalating-Health-Care-Changes/Theresa-P.-Yeo;Sherry-A.-Burrell/07/01/2010)
- [emedicine.medscape.com/article/758544-overview/ Hypertensive Emergencies/ Christy Hopkins/ Jun 17, 2010](http://emedicine.medscape.com/article/758544-overview/Hypertensive-Emergencies/Christy-Hopkins/Jun-17-2010)
- [emedicine.medscape.com/article/241640-overview/ Hypertension, Malignant/ John D Bisognano/ Apr 13, 2010](http://emedicine.medscape.com/article/241640-overview/Hypertension,Malignant/John-D-Bisognano/Apr-13-2010)
- [cme.medscape.com / Management of Hypertensive Crisis: Advances in Pathogenesis and .. ... Treatment/ Robert L. Talbert, PharmD/ 03/21/2008](http://cme.medscape.com/Management-of-Hypertensive-Crisis-Advances-in-Pathogenesis-and-Treatment/Robert-L.-Talbert,PharmD/03/21/2008)
- [www.medscape.org/viewprogram/8605/ Optimizing Blood Pressure Control: Challenges in the Acute Care Setting/ Denise H. Rhoney/ 03/21/2009](http://www.medscape.org/viewprogram/8605/Optimizing-Blood-Pressure-Control:Challenges-in-the-Acute-Care-Setting/Denise-H.-Rhoney/03/21/2009)
- [Oxford Handbook of Clinical Medicine/ Eighth Edition/Murray Longmore,Ian B Wilkinson, Tom Turmezei,Chee Kay Cheung/Hypertension- malignant](#)
- [www.globalrph.com/hypertensive\\_emer\\_oral.htm](http://www.globalrph.com/hypertensive_emer_oral.htm)
- [www.rxlist.com › home › drugs az list](http://www.rxlist.com/home/drugs/azlist)
- [www.medicinenet.com](http://www.medicinenet.com)
- [www.globalrph.com/map.htm](http://www.globalrph.com/map.htm)
- [www.nursingpub.com/how-to-calculate-mean-arterial-pressure](http://www.nursingpub.com/how-to-calculate-mean-arterial-pressure)