



**Emergency Department Patient
Hypertensive Emergencies:
*What treatment modalities do
emergency physicians utilize in
the ED?***

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Disclosures

- No disclosures

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Hypertensive Crisis

- Hypertensive urgency:
 - elevation of blood pressure without acute end organ damage
- Hypertensive emergency
 - elevation of blood pressure with acute end organ damage
- Diastolic BP usually >120 in both instances

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Sessions Objectives

- Identify agents for hypertensive emergencies
- What hypertensive emergencies?
- What are management principles?
- Which agents are best suited for the given clinical scenario?

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ED Hypertensive Emergencies: *Therapies*

- Nitrates: NTG, sodium nitroprusside
- Beta-blockers: labetalol*, esmolol
- Ca channel blockers: nicardipine
- ACE inhibitors: enalaprilat
- SVR modulators: fenoldopam, hydralazine, phentolamine

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Nitrates

- Nitroglycerin indications: ACS, CHF, pulmonary edema
- Dilates venous circulation and coronary artery dilator by stimulating nitric oxide release
- Cerebral vasodilatation commonly results in headache when administered
- Tachyphylaxis commonly seen

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Nipride

- Indicated first line for hypertensive emergencies
- Onset within seconds, duration 1-2 min.
- Dose 0.25-10 mcg/kg/min
- Arteriolar and venous dilator with rapid onset action and short duration
- Use limited by need for arterial BP monitoring
- Risk for cyanide toxicity, coronary steal

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Beta Blockers

- Esmolol
- Short acting, selective beta blocker
- Onset within 5 min, half life 8 min
- Dose 80 mg bolus, 150 mcg/kg/min infusion
- Reduces systolic pressure and MAP
- Decreases myocardial consumption
- Bradycardia and asthma contraindications

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Beta Blockers

- Labetalol
- Combined alpha and beta blocker
- Alpha blockade- beta blockade 1:3 ratio
- Onset 5 - 10 min, duration 2-6 hours
- Dose 20 - 80 mg bolus q 10 min.,
- Alternate 2mg/min infusion
- Avoid in asthmatics and bradycardia
- Good 1st line agent due to combined activity

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Ca Channel Blocker

- Nicardipine
- Smooth muscle relaxation from blockade of Ca influx
- Afterload reduction, decreases SVR
- Rapid onset of action in 5-10min, duration of 1-4 hours
- Dose 5mg /h increase in 2.5 mg increments to max of 15mg/h
- Safe for post bypass patients

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ACE Inhibitors

- Enalaprilat
- Blocks angiotensin converting enzyme
- Useful for treating CHF and hypertensive emergencies
- 0.625- 1.25 mg q 6 hr iv
- 1.25 mg IV equal to 5 mg po

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Other Agents: Fenoldapam

- Fenoldapam
- Dopamine agonist
- Reduces SVR, increases renal perfusion
- Short term agent, tolerance develops in 48 hr
- Onset 10- 15 min, duration 10- 15 min
- Dose 0.1 - 1 mcg/kg/min, titrate 0.1 mcg q 15 min, max 1.6 mcg/kg/min

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Other Agents: Hydralazine

- Hydralazine
- Vasodilator
- Safe in pregnancy
- Reflex tachycardia, lupus like syndrome
- Onset 10 min, duration 2 - 6 hr
- Dose 10 - 20 mg bolus
- 1 - 4 mcg/kg/min infusion

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Other Agents: Phentolamine

- Phentolamine
- Alpha blocker
- Reduces SVR
- Dose 0.5-5 mg
- Infusion 0.5 -20 mcg/kg/min

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ED Hypertensive Emergencies: End Organ Damage

- Assess for end organ damage
- CNS: Encephalopathy, ischemia, ICH
- Cardiopulmonary: ACS, AMI, edema
- Vascular: Aortic dissection, aneurysm
- Renal failure or insufficiency
- Gastrointestinal ischemia
- Pregnancy induced HTN

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ED Hypertensive Emergencies: End Organ Damage

- Neurological emergencies
- Encephalopathy, intracerebral hemorrhage and subarachnoid hemorrhage
- Reduce blood pressure 25% or to diastolic 100 mm Hg

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Case Presentation

- 64 year old presents to ED
- Trouble using L hand and slurred speech
- Symptoms for 60 minutes
- No headache or trauma
- History of TIA x 1, similar symptoms
- Hx DM, HTN, smoker
- BP 240/135

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ED Patient Management

- Verify hypertensive emergency
- Recheck BP yourself
- Check manually as needed
- Calculate MAP
- Determine baseline chronic BP

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MAP Calculation

- BP 240/135
- $MAP = 1/3 SBP + 2/3 DBP$
- One third systolic = 80
- Two thirds diastolic = 90
- MAP = 170 mm Hg

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ED Patient BP Management

- BP 240/135
- MAP = 170 mm Hg
- 25% reduction??
- MAP = 130 mm Hg
- BP 180/105

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ED CVA Pt Blood Pressure Rx

- Acute CVA
- Blood pressure reduction not advised except extremely elevated diastolic >130, or in preparation for thrombolysis
- Nipride, Labetalol (NTG)

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ED Myocardial Ischemia Pt

- Severe hypertension with myocardial ischemia
- Goal: reduce SVR, improve coronary flow
- Nitroglycerin, Nipride

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ED Aortic Dissection Pt

- Aortic dissection
- Type A blood pressure reduction plus surgery
- Type B medical management-reduce shearing forces
- B blocker + nifedipine
- Labetalol

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ED HTN Pt with Renal Dx

- Renal insufficiency
- Precipitant and manifestation of severe hypertension
- Reduce SVR without sacrificing perfusion and GFR
- Fenoldopam
- Beta & Ca channel blockers options which do not change

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Hypertension in Pregnancy

- Pre eclampsia and eclampsia
- Many traditional agents contraindicated in pregnancy
- Hydralazine
- Labetalol

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ED HTN Pts: Catecholamines

- Pheochromocytoma, cocaine abuse
- Hypertensive crisis from catecholamine excess
- Controlled with alpha blockade
- Phentolamine
- Avoid Beta blockers

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Conclusions

- Many hypertensive emergencies
- Treatment options must be individualized for each patient
- Goals for BP control critical
- Optimal Rx limits complications, enhances patient outcomes

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Questions?

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