Hypertensive Urgency and Emergency

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Definitions

Hypertensive Emergency:
- Severe elevation in BP with evidence of acute TOD
  - Requires immediate reduction in BP to limit TOD
  - Must be treated in an ICU setting

Hypertensive Urgency:
- Severe elevations in BP without evidence of acute TOD
  - Can be treated in the outpatient setting
  - Requires scheduled followup

Emergency or Urgency?

- History: chest pain? breathing difficulty?
  focal neurologic deficit?
- Physical: heart, lung, neuro, pulses, eyes
- Lab: creatinine, lytes; consideration of ECG, CXR, toxicology screen
Causes of Hypertensive Emergencies and Urgencies

- Inadequate treatment of hypertension
- Non-adherence to antihypertensive therapy; ingestion of large quantities of salt
- Unrecognized secondary hypertension
- Illicit drugs

Hypertensive Urgency: Review

“We were unable to identify any high quality studies that addressed what blood pressure defines hypertensive urgency, how quickly blood pressure should be decreased, or whether patients should be treated in observed settings.”

Cherney, Strauss. JGIM 2002; 17:937

Hypertensive Urgency: Review (cont)

“Few studies looked at outcomes more than 24 hours after randomization, and followup ranged from 15 minutes to 1 week.”

Cherney, Strauss. JGIM 2002;17:937
Hypertensive Pseudocrisis

Transient blood pressure elevation caused by an emotional, painful, or uncomfortable event such as headache, myofascial pain, or panic disorder

Hypertensive Urgency: Case Study

A 66 year old male calls the advice nurse at 10:30 pm because his home BP is 210/112 and he feels flushed but otherwise alright. He takes his blood pressure 6 times/day. It is occasionally high, but never this high.

Hypertensive Urgency: Your advice:

1) Take clonidine 0.1mg immediately
2) Come to the clinic next day to get a medical assistant BP check
3) Call paramedics
Hypertensive Urgency: Assumptions for Aggressive Therapy

- Prevention of hypertensive emergency
- No adverse consequences to acute therapy
- Improved short term BP control

Zeller KR. Arch Int Med 1989;149:2186-2189

Cumulative incidence of first cardiovascular disease events according to blood pressure (BP) category at index visit.
Normal BP is <140/90 mm Hg, mild elevation is 140-159/90-99 mm Hg, moderate is 160-179/100-109 mm Hg, and severe is >180/110 mm Hg.
Algorithm for Triage
Uncontrolled Blood Pressure

<table>
<thead>
<tr>
<th>Most common</th>
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<tbody>
<tr>
<td>BP &gt;180/110 mm Hg</td>
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Algorithm for Triage
Uncontrolled Blood Pressure

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Hypertensive Emergency
Cochrane Review 2008

“There is no RCT evidence demonstrating that antihypertensive drugs reduce mortality or morbidity in patients with hypertensive emergency.

There is insufficient evidence to determine which drug or drug class is most effective in reducing mortality and morbidity.”
Blood Pressure Thresholds

- \( \geq 180/110 \): thrombolysis for acute MI contraindicated (ACC/AHA)
- \( \geq 120/70 \) is threshold for treating acute aortic dissection; and, pulmonary edema with LV failure
- SBP \( \geq 160 \) increases chance of rebleed for acute subarachnoid hemorrhage, and hemorrhagic stroke with preeclampsia
- \( \geq 180/110 \) for any other acute target organ damage
- DBP > 120 is usual definition of urgency

Parenteral Drugs for Emergency

- Sodium nitroprusside
  Onset: immediate, duration: 2-3 mins
  Dose: 0.5-10 mcg/kg/min
- Labetalol
  Onset: 5-10 mins, duration: 3-6 hrs
  Dose: 10-80mg q 5-10 mins; 0.5-2mg/min up to 300mg/24hrs
- Hydralazine
  Onset: 10-20 mins, duration: 3-6 hrs
  Dose: 5-10 mg q 20 mins

Parenteral Drugs for Emergency

- Nicardipine
  Onset: 1-5 mins, duration: 3-6 hrs
  Dose: 5mg/hr, increase by 2.5mg/hr q 15mins; max = 15mg/hr drip
- Esmolol
  Onset: 1-2 mins, duration: 10-30 min
  Dose: 500 mcg/kg bolus, 50-300 mcg/kg/min drip
- Fenoldapam
  Onset: 5-10 minutes, duration 10-15 minutes
  Dose: 0.1 -0.6 mcg/kg/min drip
- Enalaprilat
  1.25 mg IV q 6hr, titrated by increments of 1.25 mg at 12-24 hr intervals to max of 5 mg IV q6hr
Volume Depletion in Hypertensive Emergency

- Pressure diuresis is due to excessive angiotensin II effect on efferent renal arterioles
- In the absence of obvious fluid excess, fluid administration is key to prevent worsened target organ damage
- IV NSS 100 cc/hr to start, then gradually taper
- IV NTG is primary treatment of cardiogenic pulmonary edema; 40% with cardiogenic pulmonary edema have intravascular euvoemia or hypovolemia – use careful diuresis

Neurologic Emergencies

- Hypertensive encephalopathy
- Acute ischemic stroke
- Intracranial / subarachnoid hemorrhage
- Acute head injury
Cerebrovascular autoregulation in health chronic hypertension
Rose JC. Neurocritical Care 2004; 1:287-299

Mean Arterial Pressure (MAP)

MAP = DBP + (SBP-DBP) / 3

MAP of 175/100 = 100 + (175-100) / 3

MAP = 125

Case Study

A 65 yo previously normotensive male is brought to the ED lethargic with a BP 240/140 four weeks following successful carotid endarterectomy. He has severe headache and blurry vision. Serum creatinine is 3.5mg/dl compared to baseline 1.5 mg/dl. Noncontrast brain CT is negative. He takes atenolol for a prior history of MI.
Case of Hypertensive Encephalopathy with Renal Dysfunction

Goal BP Reduction is:
1) To about 200/100 in first hour, then to 180/90 over the next 24 hrs
2) To about 160/90 immediately, then to 140/90 over the next 12 to 24 hrs
3) To about 140/90 over a few hours

Case of Hypertensive Encephalopathy with Renal Dysfunction

Preferred initial antihypertensive agent is:
1) Nitroprusside 0.5 mcg/kg/minute
2) Labetalol 10mg IVP then 1 mg/min drip
3) Nicardipine 5mg/hr IV infusion

Case of rtPA Candidacy

A 72 yo female is observed by friends to collapse with right sided weakness at the golf course. Paramedics bring her to the E.D. within 60 minutes of the event and brain CT reveals an acute ischemic left parietal stroke. BP is 200/115.
Case of rtPA Candidacy

1) Labetolol 10mg IV then 1 mg/min with goal BP about 180/100 within one hour; Not a candidate for rtPA due to BP>185/110.

2) Enalaprilat 1.25 mg IV STAT

3) Labetalol 10-20 mg IV, repeat after 10 minutes if necessary to get BP < 185/110; give rtPA.

Acute Ischemic Stroke
2007 AHA/ASA Guidelines

rtPA eligible and BP > 185/110:

1. Labetalol 10 to 20 mg IV over 1-2 minutes
   or
2. Nitropaste 1 to 2 inches
   or
3. Nicardipine infusion 5 mg/h, titrate up by 0.25 mg/h at 5 to 10 minute intervals, max dose 15 mg/h; when desired BP attained, reduce to 3 mg/h
4. If BP remains > 185/110, do not give rtPA

Should We Be Treating BP More Aggressively After Stroke?

- CHHIPS study: 179 patients with ischemic or hemorrhagic stroke and SBP>160 within 36 hrs randomized to drug vs placebo: reduced 3 month mortality
- INTERACT study: 44 patients with hemorrhagic stroke with SBP 150-220 within 6 hrs, goal SBP 140 vs 180: hematoma growth 22.6% lower
Acute Hemorrhagic Stroke
2007 AHA/ASA Guidelines

- If SBP > 200 or MAP > 150: IV infusion
- If SBP > 180 (<200) or MAP > 130 (<150): Intermittent or continuous infusion
- Med choices:
  - Labetalol 5-20 mg q 15 min or 1-2 mg/min drip
  - Nicardipine 5 to 15 mg/h drip
  - Esmolol 250 µg/kg load, 25-300 µg/kg/min
  - Enalaprilat, hydralazine, niapride, nitroglycerin

Clinical diagnosis of acute stroke

- Reduce BP if >185/110 mm Hg
  - Using short acting IV medication

Ischemic stroke

- Candidate for thrombolysis
  - Reduce BP if >185/110 mm Hg
    - Using short acting IV medication
  - Emergent computed tomographic scan

- Not a candidate for thrombolysis
  - Reduce BP if >220/120 mm Hg
    - Using short acting IV medication

Intracerebral hemorrhage

- Suspect high ICP
  - Reduce BP if SBP >165/110 mm Hg
    - Using short acting IV medication; ICP monitoring recommended to maintain CPP >60 mm Hg
  - Do not suspect high ICP

- Do not suspect high ICP
  - Reduce BP if SBP >165/110 mm Hg
    - Using short acting IV medication

Oral antihypertensive agents may be considered after 24 hours; BP goal = 160/110 mm Hg.
Titrate to more aggressive goals after neurological stability is achieved.
Cardiac Emergencies

Types of Emergencies:
- ischemia/infarction: metoprolol, NTG
- acute pulmonary edema: NTG, loop diuretic, morphine
- aortic dissection: esmolol; labetalol plus nitrates to reduce dp/dt

Target Blood Pressure:
- Reduce ischemia and improvement in CHF
- aortic dissection SBP goal: 100-110

Catecholamine-Excess Emergencies

Types of Emergencies:
- Pheochromocytoma
- Drug-related
  • Recreational drug (cocaíne, amphetamines)

Drugs of Choice:
- Cocaine:
  • IV NTG, verapamil
  • B-blockers contraindicated
- Pheochromocytoma:
  • Phentolamine, nicardipine, nitroprusside
  • B-blockers contraindicated

Renal Emergencies

Types of Emergencies:
- Acute Renal Failure
- Scleroderma renal crisis

Drugs of Choice:
- Nicardipine
- Fenoldopam
- Enalaprilat (scleroderma renal crisis)
- Stop EPO
Hypertension Urgency: Summary

BP \geq 180-200/120
- Look for etiology
  - In hospital: pain, volume overload
  - In nursing home: bladder distension
  - In clinic: medication nonadherence, salt loading
- Treatment
  - Based on etiology
  - Look for target organ damage
  - Initiate 2 drugs, advance therapy; add diuretic
  - Scheduled follow up in 1-3 days

Hypertension Emergency: Summary

Acute target organ damage:
- Renal failure: nicardipine, fenoldapam
- CNS failure: nitroprusside, labetalol, nicardipine
- Cardiac
  - Aortic dissection goal SBP < 100: esmolol; labetalol/nitroprusside
  - Pulmonary edema goal SBP<120:
    - I.V. NTG, furosemide, morphine
  - MI goal SBP <140: 5 mg metoprolol q 5 minutes x 3, I.V. NTG, morphine
- Preeclampsia: I.V. magnesium, labetalol, hydralazine