Hypertension in Emergency Medicine

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- 64 year old female you've diagnosed with acute bronchitis
- Initial BP = 250/130
- On no meds
- No history of hypertension
- Feels fine except for cough
- Ready for discharge: BP = 210/110

"Hey Doc, whadya want to give her?"

- 64 year old female you've diagnosed with acute bronchitis
- Initial BP = 250/130
- On no meds
- No history of hypertension
- Feels fine except for cough
- Ready for discharge: BP = 250/140

"Hey Doc, whadya want to give her?"

- 64 year old male complaining of severe chest pain for 3 hours
- Initial BP = 230/120
- EKG normal
- Widened mediastinum on CXR
- Repeat BP = 170/90
- "Doc, they're ready in CT."

"Hey Doc, whadya want to give him?"

Questions to be addressed

In the Emergency Department

- When should HBP be treated ?
- When should HBP *not* be treated ?
- When should outpatient therapy be started?
- What agents should we use?
  - For what conditions?

Agenda for Our Discussion

- General Considerations
- Blood Pressure Readings in the ED
- Pathophysiology
- Pharmacologic Treatment Modalities
- Specific Emergencies Requiring BP Reduction in the ED
- Post ED Therapy
- Summary - Hypertension in the ED

- I will use primarily generic names
- But I will also include on the slides the brand names since these are most commonly used in the real world - where we practice
- When there are several brand names I will try to include them all
- I have no idea which companies make which drugs

I have no financial relationship with any drug company

General Considerations

What is Normal Blood Pressure ??

Prehypertension

130-139/80-90

- Compared with normal BP
  - Double the risk for developing hypertension.
- Lifestyle & diet intervention warranted

Joint National Committee on Hypertension,2003

Incidence of Hypertension in U.S.A.

- > 140/90 (HTN)
  - 27% of adults
- > 130/90 (pre HTN + HTN)
  - 60% of adults!
  - 88% > 60 years old
  - 40% ages 18-39 !!

Wang *Arch Intern Med* 2004

Scope of the Problem

- Normotensive people at age 55 have a 90% lifetime risk of developing HTN (Ref: Vasan)
- Between age 40-70, the risk of cardiovascular disease doubles for every (independent variables)
  - 20 mm Hg systolic above 115
  - 10 mm Hg diastolic above 70

»Lewington *Lancet* 2002

Should BP Rise with Age?

NO !!

In societies with natural diet, less salt, and less obesity, more exercise
- BP does not rise with age

• Diet is a particular problem -
- We love our unhealthy diet!

BP and Gender

- Estrogens protect
- After menopause, women catch up with men and eventually surpass the men

(in blood pressure that is….)

BP and Ethnicity

- Incidence of HTN
  - 1.5 - 2 x more common in Blacks
    - 1 in 3 African Americans
    - 1 in 4-5 Caucasian and Hispanic Americans
    - ? Asians
- African Americans
  - HTN begins earlier
  - More end organ damage
  - ACEI's & ARB's less effective

High Blood Pressure Readings in the Emergency Department

Is that reading real?

- Asymptomatic E.D. patients with BP >140/90
  - BP at home bid
  - > 1/2 continued >140/90
  - Most of rest continued at pre-hypertensive level
  - Independent of pain or anxiety in E.D.

» Tanabe *Ann Emerg Med* 2008

- E.D. patients with BP >140/90 followed in clinic
  - 54% continued >140/90

» Cline *Acad Emerg Med* 2000

Question

Are ED BP readings accurate & reliable for screening asymptomatic patients for HTN?

ACEP Clinical Policy

- Level B Recommendation
  - If SBP persistently > 140 or
  - If DPB persistently > 90

  Refer for follow up of possible HTN and BP management

Ann Emerg Med. 2006;47:237-249

Question

Do asymptomatic patients with elevated BP benefit from rapid lowering of their BP?

ACEP Clinical Policy

- Level B Recommendation
  - Initiating Tx in the ED is not necessary if F/U is available
  - Rapid lowering of BP is not necessary and may be harmful
  - When Tx is initiated, BP should be lowered gradually and should not be expected to be normalized during the ED visit

Ann Emerg Med. 2006;47:237-249

HBP in the ED

- Most useful terminology
  - Hypertensive Emergency
  - Hypertensive Urgency
  - Elevated Blood Pressure

Why is this the most useful classification?

HBP in the ED

- Hypertensive Emergency
  - *Treated in ED with IV meds*
- Hypertensive Urgency
  - May be treated in ED - oral meds OK
  - Usually give prescription
- Elevated Blood Pressure
  - Not treated in ED
  - May or may not give prescription
  - We should refer for further evaluation

Hypertensive Emergency

- By definition
  - *Evidence of acute end organ damage*
  - *Usually brain, heart, or kidney*
- Definition implies that organ dysfunction is caused by acute HPB, rather than vice versa
- Systolic usually > 220
- Diastolic usually > 130

Hypertensive "Urgency"

- Major elevation of BP (roughly in range of >220/>120) *but*
  - Without evidence of acute organ failure
  - No acute symptoms directly attributable to elevated BP

Hypertensive Urgency

- Treatment *may* be administered in the ED if BP remains very elevated
  - Controversial
  - Trend toward *not* treating in the ED
- Outpatient treatment should generally be initiated, however
- Basic studies may be indicated

Diagnostic Studies in the ED

- Incidental finding of moderate HBP
  - ED workup not necessarily indicated -> refer
- If initiating outpatient treatment
  - Basic studies in ED may be considered
  - CBC, lytes, renal, glucose, UA, EKG
- If ED treatment required
  - Basic studies usually indicated
- If hypertensive emergency - basic plus
  - Studies specific to disorder (CT, etc.)

Pathophysiology of Hypertension

Regulation of Blood Pressure

A Balance Between

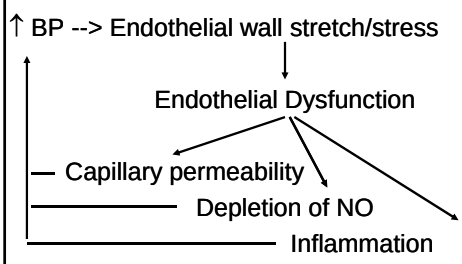
- Inherent stiffness of the arterial wall
- Vasodilation
- Vasoconstriction

Inherent stiffness of arterial wall

Cardiovascular risk factors lead to:

- Replacement of elastin in arterial walls by collagen and fibrous tissue->
  - Decreased compliance
  - Increased resistance
- Endothelial dysfunction

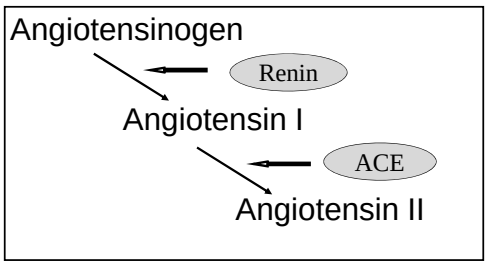
Pathophysiology



Acute
Regulation of BP

- Vasodilation
  - Beta-2 adrenergic innervation
  - Nitric oxide → c-AMP
- Vasoconstriction
  - Alpha-1 adrenergic innervation
  - Circulating catecholamines
  - Angiotensin II

Renin-Angiotensin-Aldosterone



Renin-Angiotensin-Aldosterone

Angiotensin II

- Powerful vasoconstrictor
- Release of aldosterone
- Inflammatory response
- Hypertrophy of smooth muscle cells
- Decreased nitric oxide -> further vasoconstriction

Auto-Regulation and Hypertensive Crisis

Autoregulation and Hypertensive Crisis

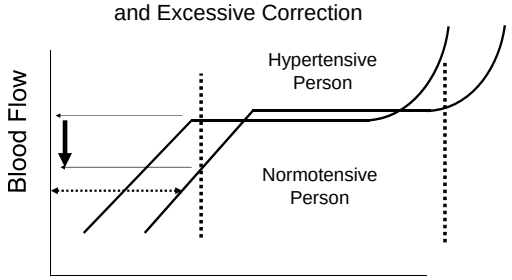
Organ-specific autoregulation

- Normally maintains capillary pressure & flow within an acceptable range
  - Increased systemic BP -> vasoconstriction
  - Decreased systemic BP -> vasodilation

Autoregulation of Cerebral Blood Flow

- Cerebral arterial resistance varies directly with BP to maintain cerebral perfusion within acceptable limits
- "Set point" rises with chronic HBP
- Rapid ED reduction of BP may drop CPF below adequate level
- *Lower BP gently,*
- *And usually never < 110 diastolic*
  - Except
    - *with aortic dissection*

Cerebral Autoregulation, Hypertension, and Excessive Correction



Adapted from Elliott:Crit Care Clin 2001;17:435

Autoregulation and Hypertensive Crisis

Hypertensive crisis
Autoregulation fails ->
Endothelial dysfunction

- Capillary permeability & edema
- Inflammatory response
- Prothrombotic response
- Decreased nitric oxide
- Release of vasoconstrictors

→ Cell necrosis

Pharmacologic Treatment Modalities

Pharmacologic Treatment Modalities

- Parenteral Vasodilators
- Beta Blockers
- Calcium Channel Blockers
- Angiotensin Converting Enzyme Inhibitors
- Angiotensin II Receptor Blockers
- Direct Renin Inhibitors
- Diuretics
- Others

Parenteral Vasodilators

Parenteral Vasodilators

Nitroprusside (Nipride™, Nitropress™)
- Arterial > venodilator
- Advantages
  - Most commonly used agent in EM
  - Extremely effective
  - Very short half-life
- *Are there better agents ??*

Parenteral Vasodilators

Nitroprusside
- Potential problems
  - Unstable to UV light-must be wrapped
  - Orthostatic hypotension - keep supine
  - Metabolized to cyanide/thiocyanate
  - Toxic at higher dose
    - Potentially toxic to fetus
  - Tissue necrosis if extravasation
  - Increases intracranial pressure

Parenteral Vasodilators

- Fenoldopam (Corlopam™)
- Newer IV alternative to nitroprusside
  - Peripheral dopamine (DA-1) receptor *agonist*
  - Rapid onset & offset of action
  - Improves renal function ?
  - Less chance of overshoot vs. nitroprusside
  - No thiocyanate toxicity or light sensitivity

Parenteral Vasodilators

Nitroglycerin

- Venodilation > arterial dilation
  - Good for CHF & angina
  - *Not a good drug for hypertensive crisis*

Beta Blockers

Beta blockers

- $ß_1$ blockade
  - Lusitropic
    - (decreased cardiac contractility)
  - Decrease renin
  - Decrease norepinephrine

Beta blockers

- Advantages
  - Especially good with CAD
    - Decreased myocardial oxygen demand
  - Good with anxiety
  - Long acting preparations best for PO

Beta blockers

- Most useful for Emergency Medicine
  - Labetalol (IV, also alpha blocker)
  - Metoprolol (PO & IV)
  - Esmolol
    - (short acting cardioselective IV agent)
- Among many other preparations available
  - Propranolol
  - Atenolol
  - Nadolol
  - Carvedilol (also alpha blocker)

Calcium Channel Blockers

Calcium Channel Blockers

- Decrease heart rate & contractility
- Dilate peripheral vasculature
- 2 classes
  - Dihydropyridines
  - Nondihydropyridines

Calcium Channel Blockers

- Nondihydropyridines
  - Cardiac effect > vascular
    - verapamil, diltiazem
- Dihydropyridines
  - Vascular effect > cardiac
    - nifedipine, amlodipine,
    - felodipine, nicardipine
- Dihyropyridines thus best for HBP

Calcium Channel Blockers

Most useful for Emergency Medicine

- In the ED (for blood pressure control)
  - Nicardipine (Cardene™) IV
  - Clevidipine (Cleviprex™) IV
- Outpatient Rx
  - *Long acting* formulations of
    nicardipine (DynaCyrc™, Cardene™)
    nifedipine (Procardia™, Adalat™)
  - Do not use short acting dihydropyridines

Calcium Blockers vs. Nitroprusside

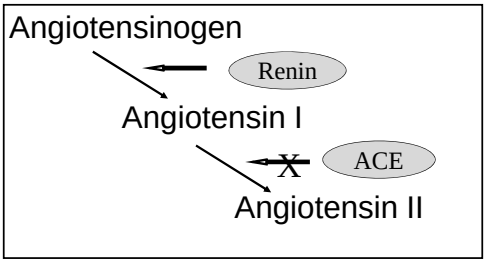
Advantages of IV calcium blockers (nicardipine, clevidipine)

- As effectifve as nitroprusside
- No cyanide/thiocyanate toxicity
- Not light sensitive; no need for foil wrap
- Less need for rate adjustment (1/3 as often)
- No need for arterial line
- No intracerebral vasodilation causing edema

Angiotensin Converting Enzyme (ACE) Inhibitors

ACE Inhibitors

Regulation of BP
Renin-Angiotensin-Aldosterone



Regulation of BP
Renin-Angiotensin-Aldosterone

Angiotensin II

- Powerful vasoconstrictor
- Release of aldosterone
- Inflammatory response
- Hypertrophy of smooth muscle cells
- Decreased nitric oxide -> further vasoconstriction
  ACEI's block these effects

ACE Inhibitors

- Also block metabolism of bradykinin
- Bradykinin is a strong vasodilator
- However, bradykinin may cause the principal potential side effects of ACEI's
  - Cough
  - Angioedema

ACE Inhibitors

- Especially beneficial with
  - Diabetes
  - Renal failure
  - Heart failure
- Potential side effects - bradykinin mediated
  - Cough (1/10)
  - Angioedema (1/2,000)

ACE Inhibitors

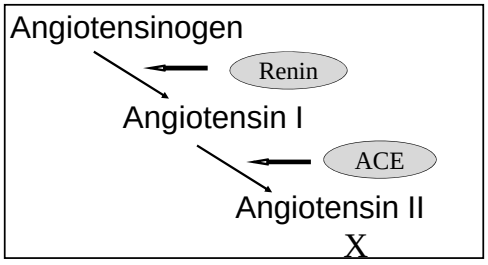
Most useful for Emergency Medicine
- In the ED
  - Enalaprilat IV (Vasotec™)
- Outpatient Rx examples
  - Captopril (Capoten™)
  - Benazepril (Lotensin™)
  - Enalapril/enalaprilat (Vasotec™)
  - Lisinopril (Prininvil™, Zestril™)
  - Quinapril (Accupril™)

Angiotensin II Receptor Blockers

ACE Inhibitors

Regulation of BP

Renin-Angiotensin-Aldosterone



Angiotensin II receptor blockers

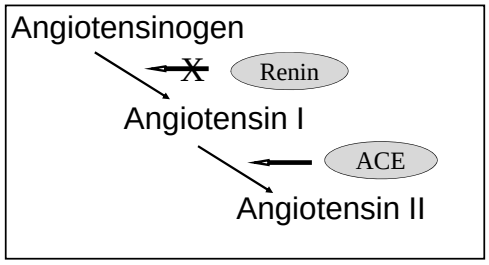
- Similar therapeutic effect as ACEI's
- Fewer side effects because unlike ACEI's, they do not block bradykinin breakdown. Therefore:
  - No bradykinin mediated cough
  - Extremely rare angioedema
- Rx examples: losartin (Cozaar™), valsartin (Diovan™), irbesartan (Avapro™)

Direct Renin Inhibitors

ACE Inhibitors

Regulation of BP

Renin-Angiotensin-Aldosterone



Direct Renin Inhibitor

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- Fewer side effects because unlike ACEI's, they do not block bradykinin breakdown. Therefore:
  - No bradykinin mediated cough
  - Extremely rare angioedema
- Rx examples: aliskiren (Tekturna™)

Diuretics

Diuretics

- Reduce blood volume
- Dilate vessels
- 3 types
  - Loop (furosemide) - best for diuresis
  - Thiazide (hydrochlorothiazide) - best for lowering blood pressure
  - K^+ sparing (spironolactone)

Diuretics

- Advantages of thiazide diuretics
  - Inexpensive
  - Chronic Tx: at least as effective as newer drugs (ACEI & Ca blockers) in:
    - Lowering BP
    - Preventing CV complications of HBP
      (Ref: ALLHAT, 2002)
  - Most patients will require additional meds
    - (Ref: Joint National Committee on Hypertension, 2003)

Diuretics

Value for treating HBP in Emergency Medicine

- In the ED
  - None
- Outpatient Rx
  - Hydrochlorothiazide
  - Chlorthalidone

Other Antihypertensive Agents

Alpha Adrenergic Agents Blockers & Agonists

- Alpha-1 receptors
  - Vasoconstriction
    - Alpha-1 blockers --> lower BP
- Alpha-2 receptors
  - Inhibition of sympathetic (adrenergic) NS
    - Alpha-2 agonists --> lower BP

Alpha Adrenergic Agents Blockers & Agonists

Alpha-1 receptors
- Vasoconstriction
  - Alpha-1 blockers --> lower BP

•Phentolamine IV and
•Phenoxybenzamine PO
- Pheochromocytoma (with ß-blocker)
- MAOI toxicity

Alpha Adrenergic Agents Blockers & Agonists

Alpha-2 receptors
- Inhibition of sympathetic (adrenergic) NS
  - Alpha-2 agonists --> lower BP

Most useful in Emergency Medicine
- Clonidine (Catapres™)
  - PO for hypertensive *urgency*

Rarely used older agents

- Ganglionic blockers
  - Trimethophan (Arfonad™)
- Central sympatholytics
  - Reserpine
  - Alpha methyldopa (Aldomet™)
- Direct vasodilators
  - Hydralazine (Apresoline™) ⟸ Pre-/Eclampsia?
  - Minoxidil (Lonitin™)

Specific Emergencies Requiring Blood Pressure Reduction in the ED

Your Patient

- 72 year old male
- Gradual onset headache past 2 days
- Nausea & vomiting
- Blurred vision
- No motor weakness
- BP = 260/140

Hypertensive Encephalopathy

- Acute HTN overwhelms cerebral autoregulation ->
  - arteriolar spasm
  - cerebral ischemia
  - vascular permeability
  - edema
  - hemorrhage

Your Patient

- 72 year old male
- Awakens not moving right side
- Mild headache and nausea
- BP = 180/110
- CT = early infarct signs
- What drug to lower his BP ?

Ischemic Stroke

Acutely elevated BP on ED presentation
- Common response to the stroke
- Probably beneficial
  - May increase CBF to ischemic region
- Usually transient

- Don't treat!
  - Unless stays very high
  - Danger of cerebral hypoperfusion

Ischemic Stroke

- If BP remains very high, *gentle* reduction *may* be reasonable
  - 10-15% reduction of MAP
  - To diastolic no lower than 110
- May lower to 180/110 in ischemic stroke to meet t-PA criteria

Ischemic Stroke

- "The level of blood pressure that would mandate such treatment is not known, but consensus exists that medications should be withheld unless the systolic blood pressure is >220 mm Hg or the diastolic blood pressure is >120 mm Hg"
  - Class I, Level of Evidence C

Adams: American College of Neurology *Circulation* 2007

Your Patient

- 67 year old female
- Sudden onset of severe headache and vomiting
- Not moving left side
- BP = 230/130
- CT = intracranial hemorrhage

Hemorrhagic Stroke

- Recent evidence that size of hemorrhage may be lessened – with no deleterious effect on perihematomal edema - if systolic BP is lowered to the 140's
- Preliminary studies

Arima, *Hypertension* 2010
Anderson, *Stroke* 2010

Hemorrhagic Stroke

- "In patients presenting with a systolic BP of 150 to 220 mm Hg, acute lowering of systolic BP to 140 mm Hg is probably safe"
- *Class IIa; Level of Evidence: B*
- *New recommendation*

Morgenstern, AHA/ASA Guidelines 2010

Acute Brain Syndromes

- *Hypertensive Encephaopathy*
- *Ischemic Stroke*
- *Hemorrhagic Stroke*
  - *What Agents Should We Use??*

Acute Brain Syndromes

- Nitroprusside may not be best agent
  - Increases ICP
  - Impairs cerebrovascular reactivity to PCO_2 changes
  - Exacerbates drop in CPP in response to a given decrease in peripheral BP (Ref: Adams)

Acute Brain Syndromes

Labetalol
Both alpha & beta adrenergic blocker
- Theoretically
  - Alpha blockade shifts cerebral autoregulation "set point" to lower level (Ref: Adams)
    - Preserves CO_2 reactivity
    - Preserves CBF at lower BP level

Acute Brain Syndromes

Treatment
- Controlled reduction of BP over 1 hour
- Never < 110 diastolic
  - Labetalol
  - Nicardipine – increasingly used by stroke neurologists
  - Clevidipine and Fenoldopam may be alternatives

Your Patient

- 65 year old male with hx of HBP
- Sudden onset of excruciating chest pain radiating to the back
- EKG = LVH
- CXR = ? Widened mediastinum
- BP = 180/110

Acute Aortic Dissection

- Goals
  - *Rapid* reduction of BP to nearly hypotensive level
    - Systolic 100 - 120
    - Within 20 minutes
      - The only time a rapid drop is indicated - or safe
  - Prevention of reflex tachycardia

Acute Aortic Dissection

- BP Reduction: Vasodilator
  - Nitroprusside (most rapid)
  - Alternatives: fenoldopam, nicardipine
- Tachycardia prevention: Beta blocker
  - Metoprolol or esmolol
- Alternatively
  - Labetalol alone ->
    - alpha + beta blockade

Your Patient

- 55 year old female
- Chest pain for 1 hour
- Dyspnea increasing x 2 days, severe x 2 hours
- Rales throughout chest
- CXR = acute pulmonary edema
- BP = 170/110

Acute Coronary Syndromes & Pulmonary Edema

- Nitroglycerin
- If BP stays high, cause is usually insufficient nitroglycerin or analgesia
  - Increase nitroglycerin infusion rate
- Nitroprusside is rarely needed
  - An indication that acute HTN may be the cause of the acute cardiac problem rather than vice versa

Your Patient

- 35 year old pregnant female
- Headache & blurred vision
- Nausea & vomiting
- Hyper-reflexic
- Pre-tibeal edema
- Proteinuria
- BP = 150/90

Eclampsia/Pre-eclampsia

Treatment
- Classically
  - IV hydralazine
- Better allternatives
  - Labetalol, nicardipine
  - Nitroprusside falling out of favor
    - concern re fetal cyanide

Your Patient

- 22 year old male
- Partying with friends
- (Not your son….)
- Chest pain and dyspnea
- Freaked out
- Jittery
- BP = 220/140

Cocaine & Amphetamine Toxicity

- Benzodiazepines
  - Usually effective & sufficient
- BETA BLOCKERS CONTRAINDICATED
  - Unopposed alpha adrenergic effect

Your Patient

- 33 year old female
- Diabetic
- Increasing creatinine over past month
- Creatinine 8.0
- Lungs with slight basilar crackles
- Cannot dialyze till morning
- BP = 220/120

Acute Renal Failure

- Nitroprusside has been traditional Tx
  - Slowly metabolized by kidney
  - Danger of cyanide toxicity in ARF
- Probably safer
  - Fenoldopam
  - Nicardipine, clavidipine

Your Patient

- 55 year old male
- Sprained ankle
- No other symptoms
- No medical history
- Reading sports page
- Ready for discharge
- BP = 240/130

Hypertensive Urgency

- Sustained BP in range of >220/>120 without evidence of acute organ dysfunction
- Growing trend NOT to treat in the ED
- If treated, JNC-7 recommends
- Oral clonidine
  - 0.1 - 0.2 mg PO to start
  - then 0.1 mg/hr
  - Goal: 20% reduction of MAP or to 110 diastolic

Post ED Therapy

Guidelines for Writing Prescriptions

Post ED Therapy

- If BP stays high, Rx from ED may be indicated, especially in patients with
  - Consistently > 100 diastolic
  - Chronic CHF
  - Coronary artery disease
  - Chronic renal failure
  - Diabetes

Post ED Therapy – ALLHAT recommendations

- Diuretics are the bedrock of therapy
- Probably all patients should be on a diuretic (usually a thiazide), with additional meds added as needed
- Additional meds eventually *will* be needed in most patients
- But start with thiazides

ALLHAT *JAMA* 2002
Moser *J* Hypertens 2007

Diuretics are the Bedrock of Outpatient Therapy

Post ED Therapy – ALLHAT recommendations

- If not on HBP medication
  - Start hydrochlorothiazde (HCTZ)
    - low dose
    - 12.5 - 25 mg per day
- If taking other HBP medication(s),
  - Add HCTZ
    - 6.25 - 12.5 mg per day

Post ED Therapy

- If already taking a diuretic, additional drug may be tailored to other conditions
  - CAD - Beta blocker
  - CHF - ACEI or ARB
  - Renal failure - ACEI or ARB
  - Diabetes - ACEI or ARB
  - Isolated systolic hypertension
    - Long acting CCB or ACEI/ARB

Post ED Therapy

- Regardless of the ALLHAT recommendations, may physicians begin with an ACI, ARB, or beta blocker, and then add a diuretic if needed
- This alternative is acceptable for beginning treatment from the ED

Post ED Therapy - Combined Preparations

- Many new products now with varying combinations of 2 or even 3 classes of anti-hypertensive agents
- Also comibinations with lipid-lowering statins
- Disadvantage - cost
- Advantage - convenience and therefore compliance

Summary

Hypertension in the Emergency Department

Summary

- High BP readings in the ED
  - Usually decline before discharge
  - Rarely require treatment
    - in the ED
  - Often do reflect real HTN
  - Sometimes warrant writing a prescription

Summary - Hypertensive Emergencies

- Hypertensive emergencies with acute organ damage require IV treatment in the emergency department

Summary - Hypertensive Emergencies

- In general
  - Reduce MAP about 20% gradually over at least 1 hour
    - Aortic dissection -> over 20 minutes
  - Not lower than 110 diastolic
    - As low as 100 systolic with dissection OK

Summary - Hypertensive Emergencies

- Encephalopathy
- Stroke – if treated
  - Labetalol
  - Nicardipine
  - Alternatives
    - Clevidipine, Fenoldopam

Summary - Hypertensive Emergencies

- Aortic dissection
  - Nitroprusside, fenoldopam, or nicardipine

PLUS

  - Beta-blocker: metoprolol or esmolol

OR

  - Labetalol alone

Summary - Hypertensive Emergencies

- Acute coronary syndromes
  - Nitroglycerin, analgesic
  - beta-blockers, ?ACEI
- Acute CHF
  - Nitroglycerin, diuretic (?)
  - ? ACEI

Summary - Hypertensive Emergencies

- Pre-/Eclampsia/Eclampsia
  - Labetalol or nicardipine
  - ? Hydralazine
- Acute renal failure
  - Nicardipine
  - Alternatives: Fenoldopam, clevidipine

Summary - Hypertensive Emergencies

- Cocaine/amphetamine toxicity
  - Benzodiazepine
- Pheochromocytoma
  - Nitroprusside IV or phentolamine
    - *PLUS* beta-blocker

Summary - Hypertensive Emergencies

- Hypertensive URGENCY
  –Clonidine PO (if treated)

- Not as a prescription, however

Summary - Outpatient Rx

Start with diuretic or add diuretic
If already on diuretic:
- CAD - beta-blocker
- CHF - ACEI or ARB
- CRF - ACEI or ARB
- DM - ACEI or ARB
- Isolated systolic HTN - long acting CCB
  – Often eventually need ACE or ARB

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- No history of hypertension
- Feels fine except for cough
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