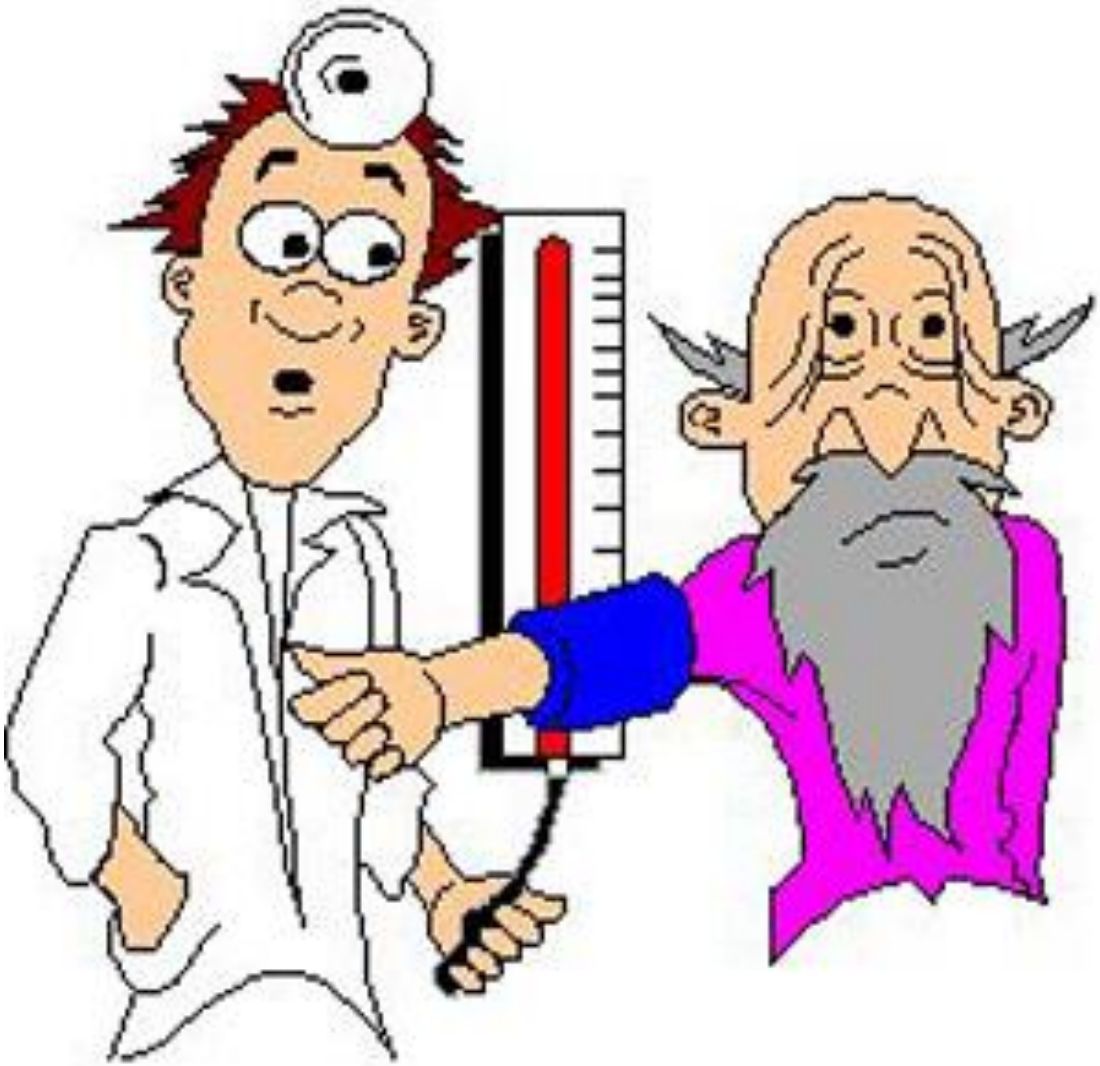
MANAGEMENT OF HYPERTENSIVE URGENCIES AND HYPERTENSIVE CRISIS

Jason Klein DO

Cleveland academy of osteopathic Medicine's 50th annual january seminar

January 23. 2015

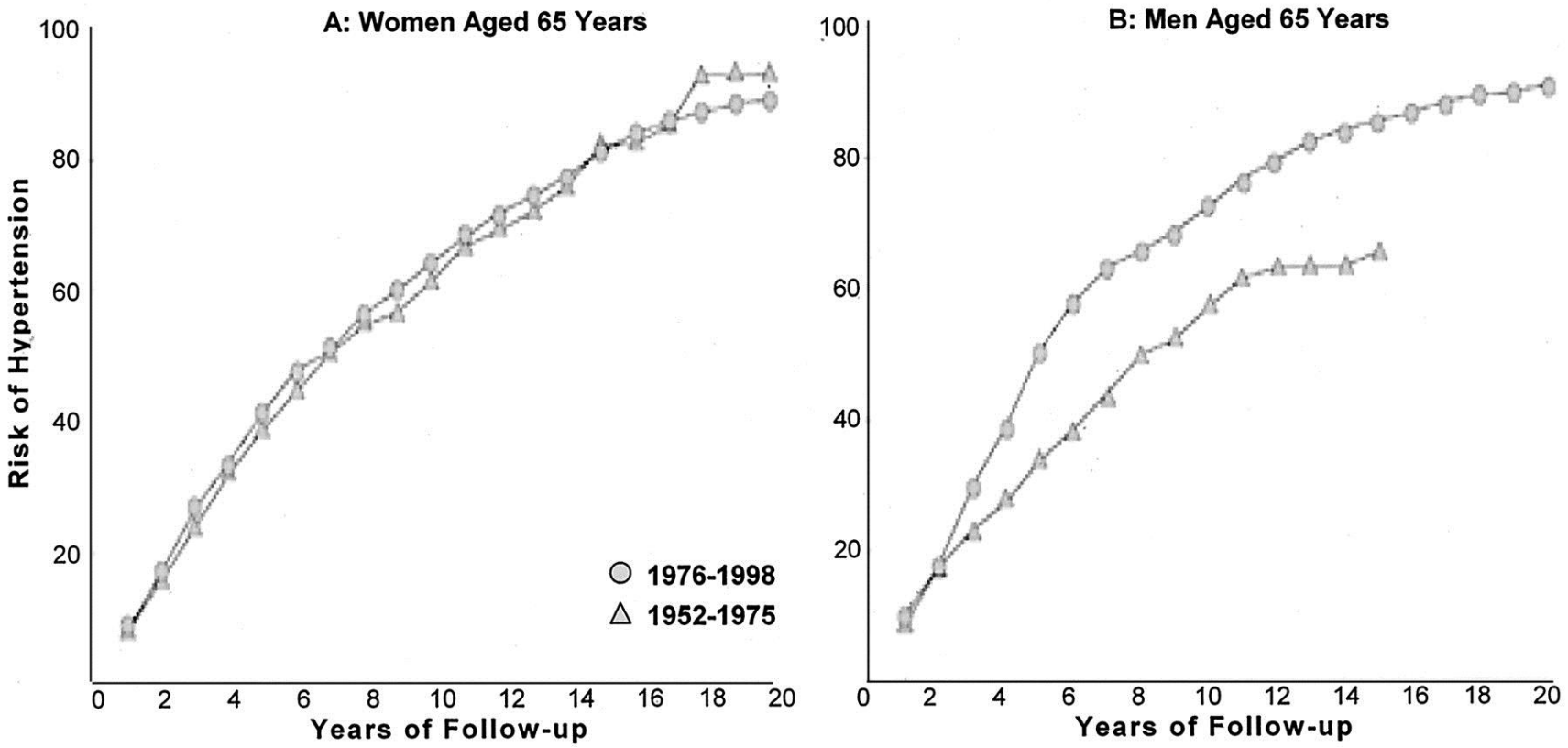
Hypertension



EPIDEMIOLOGY

- **Most common reason for office visits of adults in the US**
- **In 2008 it was estimated that 30% of all adults in the US were affected**
  - Fewer than 50% undergoing appropriate treatment
- **Uncontrolled hypertension is one of the most important cardiovascular risk factors in the world today, and contributes to increased risk of stroke, MI, heart failure, and renal failure.**
- **About 60-65 million HTN adults exist in the US today and is likely to continue to increase**
- **>50% adults aged 60-69 are affected**
- **>75% adults aged 70 years are affected**

JNC-7


A: Women Aged 65 Years
B: Men Aged 65 Years
Risk of Hypertension
100
80
60
40
20
0
2
4
6
8
10
12
14
16
18
20
Years of Follow-up
1976-1998
1952-1975

BLOOD PRESSURE CLASSIFICATION BY JNC

JNC 6 Category		JNC 7 Category
	SBP/DBP	
OPTIMAL	<120/80	NORMAL
NORMAL	120-129/80-84	PREHYPERTENSION
BORDERLINE	130-139/85-89	PREHYPERTENSION
HYPERTENSION	>140/90	HYPERTENSION
Stage 1	140-149/90-99	Stage 1
Stage 2	160-179/100-109	Stage 2
Stage 3	>180/110	Stage 2

PATHOGENESIS

- **Multifactorial and highly complex**
  - Can be divided into:
    - Essential (Primary): constitutes 90% of cases because etiology unknown and potential factors involved include
      - Volume
      - Renin-angiotensin system
      - Sympathetic nervous system
    - Secondary: specific cause identified (about 10% cases)
      - Primary aldonsteronism
      - Cushing syndrome
      - Pheochromocytoma
      - Renovascular HTN
- **Develops**
  - (1) result of alterations in contractile properties of smooth muscle in arterial walls or
  - (2) response to failure of normal autoregulatory mechanisms within vascular beds of vital organs

HTN RISK FACTORS

- ❑African Americans
- ❑Family History
- ❑Excess Na intake
- ❑Excess ETOH intake
- ❑Obesity
- ❑Vitamin D deficiency
- ❑Hyperlipidemia
- ❑Physical inactivity
- ❑Smoking

CAUSES OF HTN

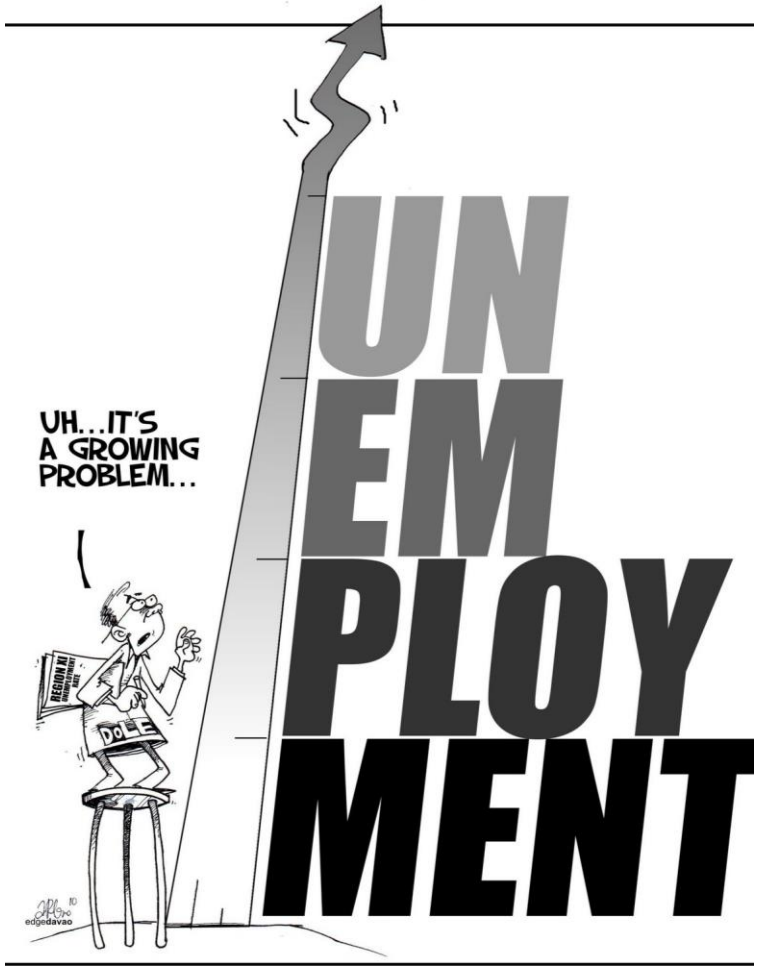
HOW DO WE EVALUATE PATIENTS WITH HTN?

- **Must answer a few simple questions:**

  - Is the HTN new or old?
  - Are we getting accurate readings?
  - Do we think this is primary (essential) or secondary HTN?
  - Does the patient have signs or symptoms of end organ damage?
    - Hypertensive urgency
    - Hypertensive emergency

PATIENTS AT INCREASED RISK FOR HYPERTENSIVE CRISIS

- ❑Noncompliance with antihypertensive regimen
- ❑No primary care physician
- ❑No medical insurance
- ❑Alcohol related problems (withdrawal)
- ❑Illicit drug use
- ❑Herbal supplements (St. John's wart, Yohimbine)



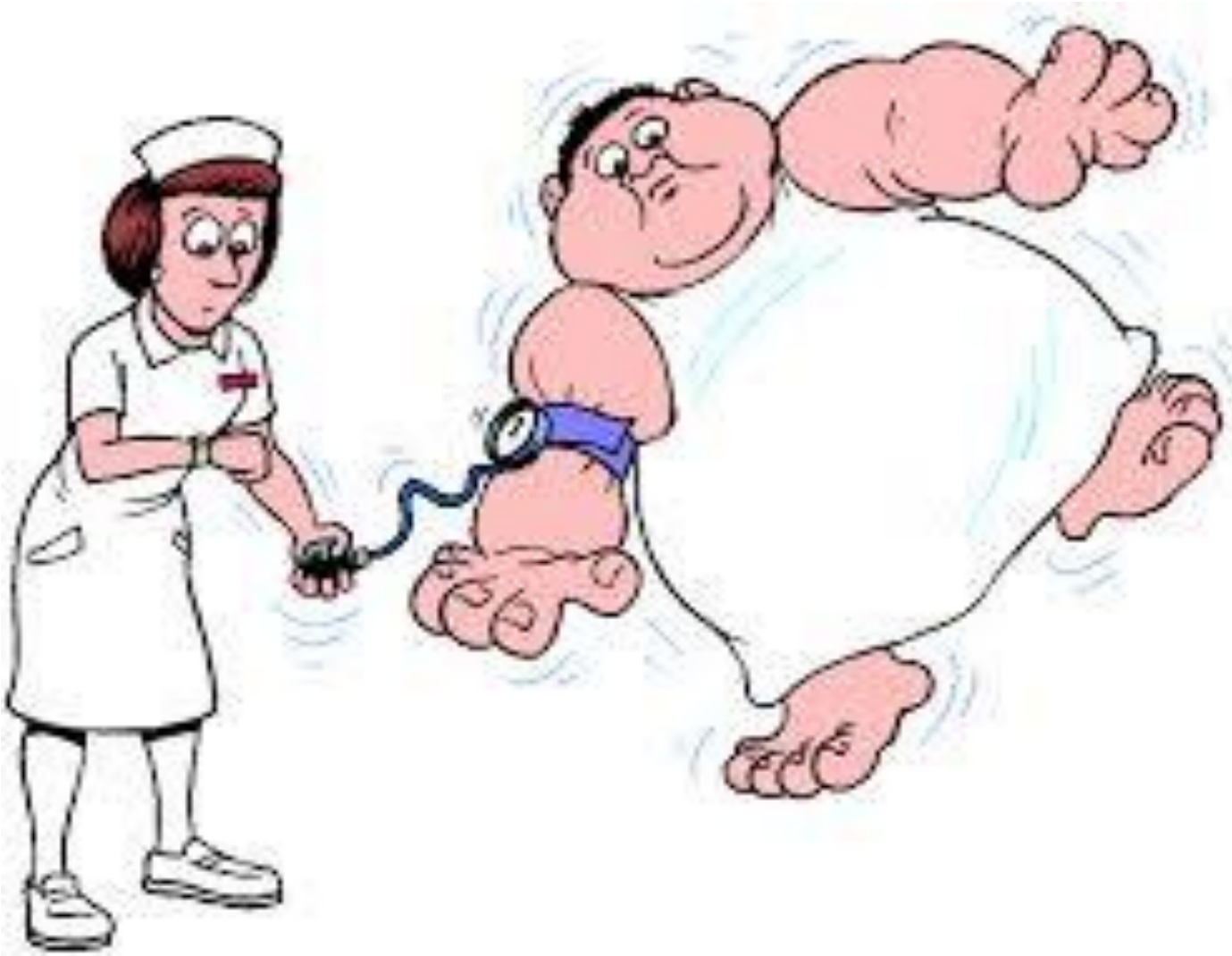
Key questions regarding history of present illness	Comments/Concerns
Have you ever been told you have high blood pressure?	Open-ended, inclusive questions; many people do feel they have HTN if they are taking medication
Do you have chest pain?	MI, dissection
Do you have SOB?	MI, Dissection, CHF, Pulmonary Edema
Are you on any medications, or using recreational drugs or herbal medicines?	NMS, Serotonin syndrome, sympathoimetics, cocaine, pcp
Have you recently stopped taking medications or recreational drugs?	DTs, Clonidine or other drug withdrawal
Do you have any focal weakness?	Stroke, TIA, hemorrhage
Do you snore or wake up during sleep? Do you feel tired throughout the day?	Sleep apnea
Have you had HTN resistant to prior treatments?	Renovascular HTN, Hyperaldosteronism, pheochromocytoma

NON-EMERGENT HTN EVALUATION

- **Take BP right at least 2 x on any occasion**
- **Take it on at least 2-3 separate days**
- **Take effective preventive measures in management immediately**
  - weight reduction
  - decreased sodium intake
  - increase physical activity to 30 minutes/day
  - decrease alcohol intake
  - DASH eating (increase fruits, vegatables, low fat and reduced saturated fat)

PHYSICAL EXAM

- **SHOULD BE SYSTEMATIC AND COMPLETE**
  - COMPLETE SET OF VITAL SIGNS AND IN MULTIPLE EXTREMITIES IF NECESSARY
  - FUNDOSCOPIC EXAM IN WARRANTED
  - CARDIAC AND PULMONARY AUSCULTATION
  - THYROID EXAM
  - COMPLETE NEUROLOGIC EXAM TO EVALUATE FOR ANY EVIDENCE OF ISCHEMIA OR DEFICITS
  - EXTREMITY EXAM TO EVALUATE CIRCULATION AND EDEMA



INITIAL LAB ASSESSMENT

TEST	FINDINGS	1 VS 2 HTN	CV RISK	ORGAN DAMAGE
H/H	ANEMIA			X
UA	PROTEIN/BLOOD/GLUCOSE	X	X	X
POTASSIUM	HYPO-ALDOSTERONE EXCESS	X		
CREATININE	KIDNEY DISEASE	X	X	X
GLUCOSE	DM		X	
LIPID PROFILE	HIGH TG, LDL		X	
EKG	LVH/Q WAVES			X

ASYMPTOMATIC HTN EMERGENT MANAGEMENT

- **2006 ACEP "Clinical Policy: Critical issues in the Evaluation and Management of Adult Patients with Asymptomatic Hypertension in the Emergency Department."**
  - 2 Questions Addressed:
    - 1. Accuracy and reliability of blood pressure readings in the ED for screening asymptomatic patients for HTN
    - 2. Is there benefit of rapid lowering of elevated blood pressures in the ED.
  - 2 Answers
    - 1. If blood pressure persistently elevated >140/90 then should be reffered to pcp for BP management (level B)
    - 2. Initial lowering is not necessary if have close follow up. Rapid lowering of BP may be harmful in asymptomatic patients. If attempted then gradual lowering should be target and not normalization. (level B)

ASYMPTOMATIC HTN EMERGENT MANAGEMENT

- **2013 ACEP "Clinical Policy: Critical Issues in the Evaluation and Management of Adult Patients in the Emergency Department With Asymptomatic Elevated Blood Pressure."**
  - 2 New Questions Addressed:
    - 1. In ED patients with asymptomatic HTN, does screening for target organ injury reduce rates of adverse outcomes?
    - 2. In patients with asymptomatic markedly elevated blood pressures, does ED medical intervention reduce rates of adverse outcomes?
  - 2 Answers:
    - 1. In ED patients routine screening is not required. In select populations (poor follow up), screening for creatinine may affect disposition. (level C)
    - 2. Routine ED medical intervention not required. In select populations treatment in ED or initiating medication is appropriate. Patients should be referred for follow up. (level C)

Figure 1. Mechanisms Of Antihypertensive Medications

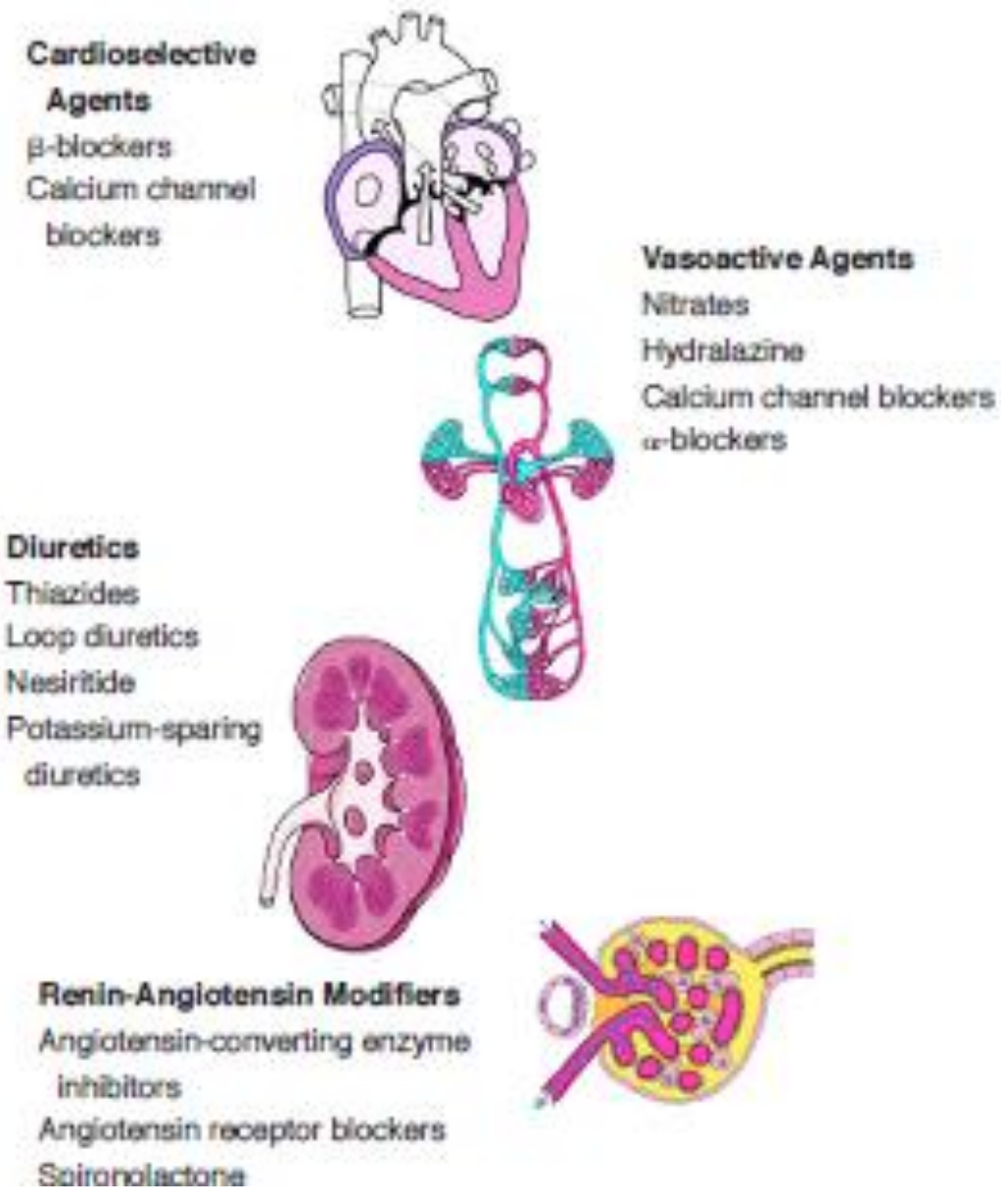
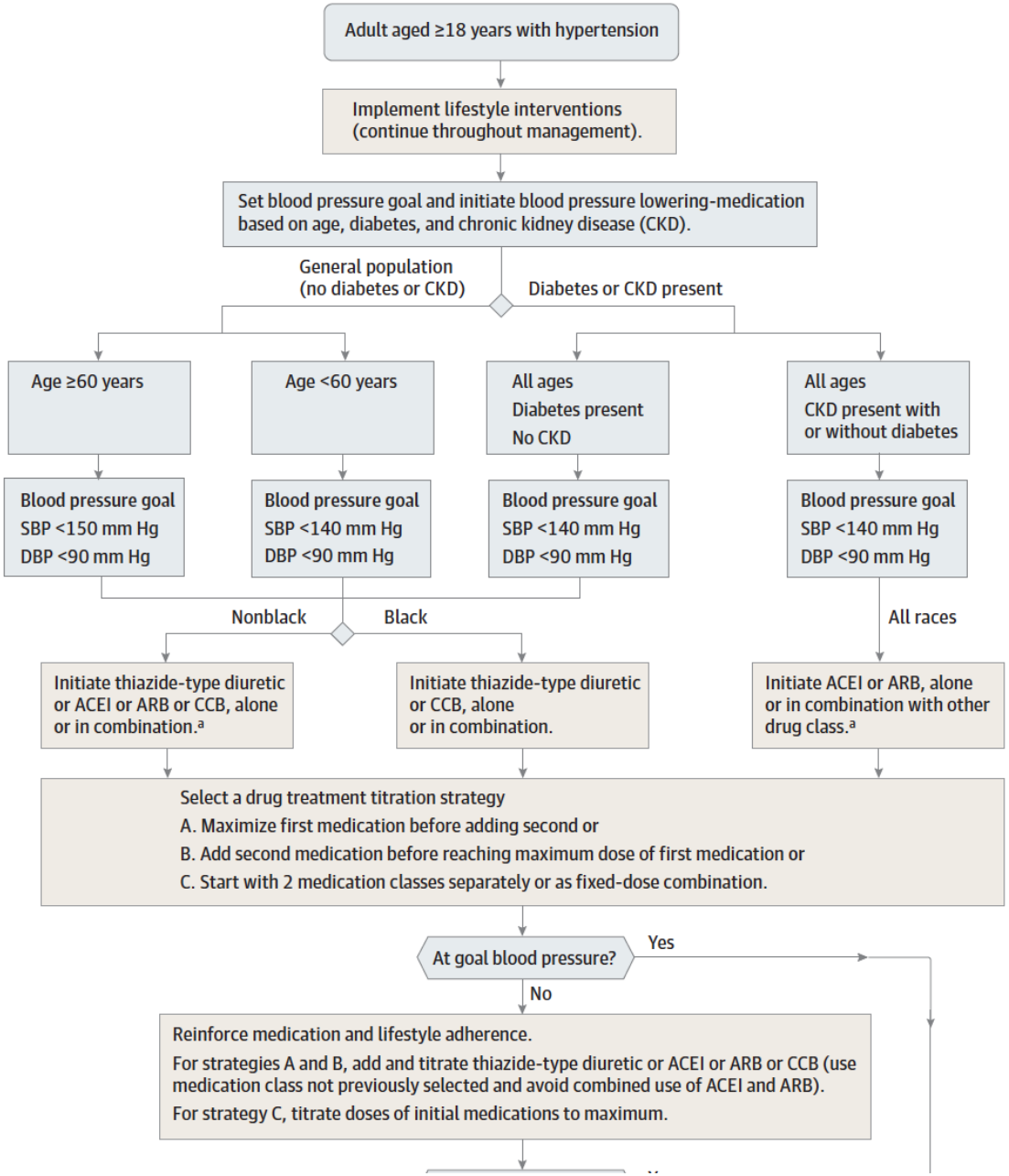


Figure. 2014 Hypertension Guideline Management Algorithm



Copyright 2008 by Randy Glasbergen.
www.glasbergen.com

"I heard that smokers live an average of 60 years. That's a lot longer than I'd live if I didn't smoke!"

EMERGENCY EVALUATION

- **Hypertensive Urgency (DBP >110)**
  - No signs or symptoms of end organ damage
- **Hypertensive Emergency**
  - Acute end-organ damage
    - Brain (encephalopathy, stroke, IC hemorrhage)
    - Eyes (papilledema)
    - Heart (ACS)
    - Lungs (pulmonary edema)
    - Aorta (dissection)
    - Kidneys (ARF)
    - Uterus (eclampsia)
  - Requires IV medications and rapid lowering of BP in 1-2 hours

DIFFERENTIAL OF HTN EMERGENTLY:

Acutely Dangerous	Less Acutely Dangerous
Stroke	Obstructive uropathy
Aortic Dissection	hyperthyroidism/parathyroid
Drug intoxication: cocaine, amphetamine, MAOI	Sleep apnea
Drug Withdrawal: antihypertensives, alcohol	Cushing syndrome
Renal failure	Primary aldosteronism
Pheochromocytoma	Renovascular HTN
Thyroid Storm	Essential HTN

WORK UP EMERGENTLY

- **Labs**
  - CBC
  - BMP
  - TROPONIN
  - COAGULATION PANEL
  - UA
- **RADIOLOGY**
  - CT HEAD
  - CXR
  - CT CHEST
- **EKG**

HTN EMERGENCIES/END ORGAN DAMAGE

- **Cardiopulmonary**
  - most commonly affected organ system
    - acute aortic dissection
    - ACS
    - Acute Left Ventricular failure
    - S/P CABG
- **Renal**
    - Acute renal failure
    - renal crisis from collagen vascular disease
    - severe HTN after transplantation
- **Opthalmologic**
    - Papilledema
    - Retinal hemorrhages

HTN EMERGENCIES/END ORGAN DAMAGE

- **CNS**
  - Hypertensive encephalopathy
  - Ischemic or hemorrhagic CVA
  - SAH
  - Intracerebral hemorrhage
- **Hematologic**
  - Micorangiopathic hemolytic anemia
  - Severe epistaxis
  - Postoperative bleeding from vascular suture lines
- **Eclampsia**
- **Excessive Circulating catecholamines**
  - Pheochromocytoma
  - Cocaine
  - Rebound HTN after medication cessation

HTN EMERGENCY/DRUG TREATMENT OPTIONS

- **Sodium nitroprusside**
  - Mode of action: arterial and venous dilation
  - Onset:1-2 minutes
  - Metabolized to thiocyanate (cyanide) therefore do not use for long in renal or pregnant patients
  - Ideal medication for hypertensive emergencies (rapid onset, potent, short half-life)
  - Can cause reflex tachycardia, therefore use with beta blocker
- **Labetalol**
  - Alpha and beta blocker (primarily beta)
  - Onset: 5-10 minutes
  - Half life: 5.5 hours
  - Low doses may lead to paradoxical HTN due to predominant beta effect (unopposed alpha)
  - Contraindicated in bronchospasm, CHF, AV blocks

Medications cont'd

- **Nitroglycerin**
  - Venodilation primarily; arteriolar dilation at high doses
    - Limited utility with profound HTN
  - Onset: immediate
  - Half life: 4 minutes
  - Tachyphylaxis
  - Ideal for cardiac emergencies such as CHF, MI
  - Side effects: headache and tachycardia
- **Nicardipine**
  - CCB
  - Onset: 5-15min
  - Duration: 4-6 hours
  - Theoretically reduces cardiac and cerebral ischemia
- **Fenoldopam**
  - Dopamine agonist, no alpha or beta effects
  - Onset: 5 min
  - Duration: 30-60min
  - Increases renal blood flow and sodium excretion
  - Might be preferred agent in the setting of renal dysfunction

Medications cont'd

- **Hydralazine**
  - Direct arteriolar vasodilator
  - Onset: 10 min (IV)
  - Half-life: 2-4hours
  - Indicated in pregnancy-related HTN, pediatric nephritis
  - Side effects include reflex tachycardia (limits use in CAD, Dissection), chronic use associated with "lupus-like" syndrome

Table 8. Parenteral Drugs For Treatment Of Hypertensive Emergencies*

Drug	Dose	Onset of Action	Duration of Action	Adverse Effects†	Special Indications
Vasodilators					
Sodium nitroprusside	0.25-10 µg/kg/min as IV infusion‡	Immediate	1-2 min	Nausea, vomiting, muscle twitching, sweating, thiocynate and cyanide intoxication. May increase intracranial pressure	Most hypertensive emergencies; caution with high intracranial pressure or azotemia
Nicardipine hydrochloride	5-15 mg/h IV	5-10 min	15-30 min, may exceed 4 hrs	Tachycardia, headache, flushing, local phlebitis	Most hypertensive emergencies except acute heart failure; caution with coronary ischemia
Fenoldopam mesylate	0.1-0.3 µg/kg/min IV infusion	< 5 min	30 min	Tachycardia, headache, nausea, flushing	Most hypertensive emergencies; caution with glaucoma
Nitroglycerin	5-100 µg/min as IV infusion‡	2-5 min	5-10 min	Headache, vomiting, methemoglobinemia, tolerance with prolonged use	Coronary ischemia
Enalaprilat	1.25–5 mg every 6 hrs IV	15-30 min	6-12 hrs	Precipitous fall in pressure in high-renin states; variable response	Acute left ventricular failure; avoid in acute myocardial infarction
Hydralazine hydrochloride	10-20 mg IV 10-40 mg IM	10-20 min IV 20–30 min IM	1-4 hrs IV 4-6 hrs IM	Tachycardia, flushing, headache, vomiting, aggravation of angina	Eclampsia
Adrenergic Inhibitors					
Labetalol hydrochloride	20-80 mg IV bolus every 10 min 0.5-2.0 mg/min IV infusion	5-10 min	3-6 hrs	Vomiting, scalp tingling, bronchoconstriction, dizziness, nausea, heart block, orthostatic hypotension	Most hypertensive emergencies except acute heart failure
Esmolol hydrochloride	250–500 µg/kg/min IV bolus, then 50–100 µg/kg/min by infusion; may repeat bolus after 5 min or increase infusion to 300 µg/min	1-2 min	10-30 min	Hypotension, nausea, asthma, first-degree heart block, heart failure	Aortic dissection, perioperative
Phentolamine	5–15 mg IV bolus	1-2 min	10-30 min	Tachycardia, flushing, headache	Catecholamine excess

Abbreviations: h, hour; hrs, hours; IM, intramuscular; IV, intravenous; min, minute(s).

* These doses may vary from those in the Physicians' Desk Reference (51st ed.)

† Hypotension may occur with all agents

‡ Requires special delivery system

Reprinted from The Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure. US

TREATMENT BY CONDITION

- **Acute Ischemic Stroke**
  - Can be cerebral protective
  - Usually rely on expert opinion
  - If >220/120 then initiate IV therapy
  - Labetalol or nicardipine IV is preferred treatment options
  - Second-line nitroprusside (may raise ICP)
  - Goal is 10-15% reduction in BP
- **Acute Pulmonary Edema/CHF**
  - Hypertensive Heart failure = HF + Hypertension
  - Nitroglycerin or nitroprusside
  - Lasix IV

TREATMENT BY CONDITION

- **Hypertensive encephalopathy**
  - Rapid rise in BP that overwhelms the autoregulatory mechanisms of the brain and leads to blood-brain permeability and brain edema
  - Headache, seizures, visual disturbance, nausea and vomiting
  - No preferred agent
  - Treatment goal is 20-25% reduction in MAP or a DBP of 100-110

TREATMENT BY CONDITION

- **Acute Intracerebral Hemorrhage**
  - Must maintain sufficient perfusion pressure to the brain without worsening the amount of hemorrhage
  - Nicardipine is becoming the preferred agent at this time

1. If SBP is >200 mm Hg or MAP is >150 mm Hg, then consider aggressive reduction of BP with continuous intravenous infusion, with frequent BP monitoring every 5 min.
2. If SBP is >180 mm Hg or MAP is >130 mm Hg and there is the possibility of elevated ICP, then consider monitoring ICP and reducing BP using intermittent or continuous intravenous medications while maintaining a cerebral perfusion pressure ≥60 mm Hg.
3. If SBP is >180 mm Hg or MAP is >130 mm Hg and there is not evidence of elevated ICP, then consider a modest reduction of BP (eg, MAP of 110 mm Hg or target BP of 160/90 mm Hg) using intermittent or continuous intravenous medications to control BP and clinically reexamine the patient every 15 min.

Note that these recommendations are Class C. SBP indicates systolic blood pressure; MAP, mean arterial pressure.

TREATMENT BY CONDITION

- **Aortic Dissection**
  - false lumen created in the wall of the aorta
  - Stanford classification
    - Type A: any involvement of the ascending aorta (proximal to left subclavian artery)
      - Require emergent surgical procedure
    - Type B: spares the ascending aorta
      - Medical management with surgical consultation
  - Treatment:
    - Pain medications
    - Esmolol
    - Nitroprusside
  - Treatment goal: lowest pressure tolerated by the patient to SBP 100-120 and heart rate control to 60-70

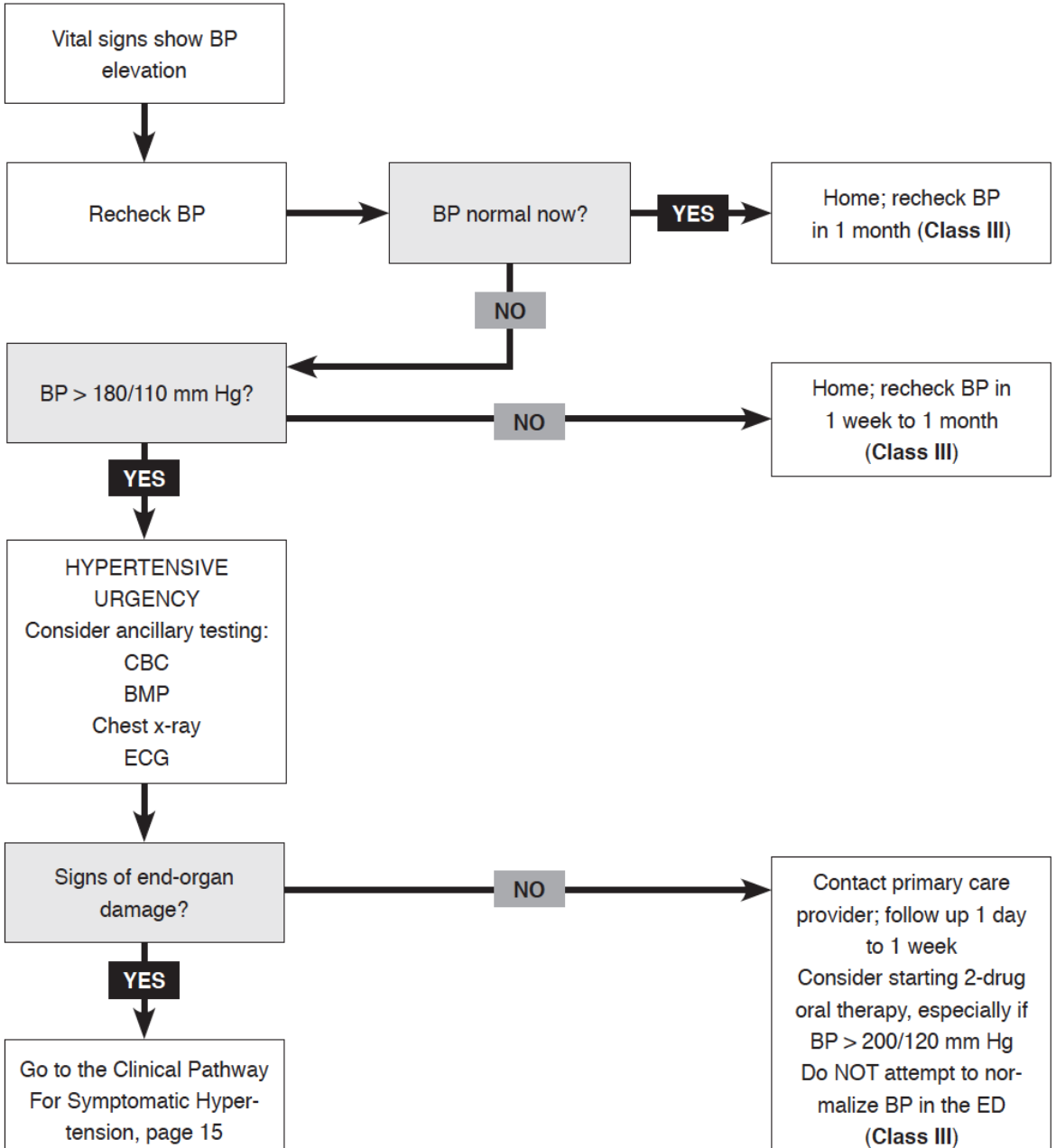
TREATMENT BY CONDITION

- **Sympathetic crisis**
  - Can be caused from withdrawal, or due to recreational drug use (cocaine, methamphetamine, PCP)
  - Treatment
    - Cocaine
      - Benzo's to calm patient first
      - Phentolamine and nitro
    - PCP
      - Benzo's
    - Pheochromocytoma
      - Oral alpha-blockers (doxazosin)
      - Phentolamine
      - Nicardipine

TREATMENT BY CONDITION

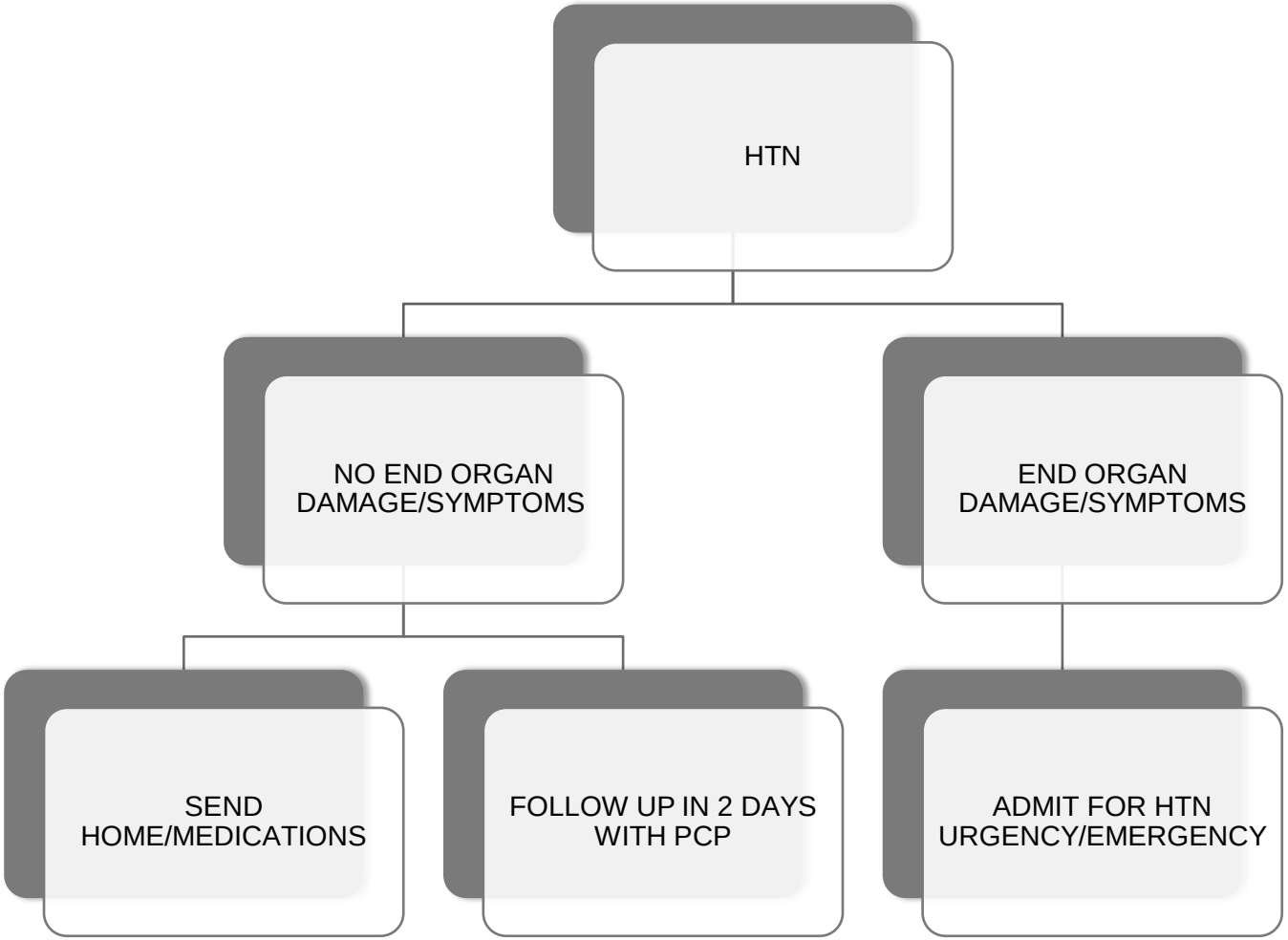
- **Unstable angina/NSTEMI/MI**
  - Nitroglycerin
  - Beta-blockers IV or oral within 24 hours
  - ACE inhibitors oral or IV can be used for HTN and LV dysfunction
- **Preeclampsia/Eclampsia**
  - HTN + Proteinuria +/- seizure
  - After 20th week of gestation
  - Goal is to lower to 140/90
  - Labetalol/methyldopa/hydralazine/nicardipine agents of choice
- **Renal Failure**
  - ACE or ARB medication options

Clinical Pathway For Asymptomatic Hypertension




BRANXTON LIONS CLUB
DRIVE CAREFULLY
60
We have
TWO CEMETERIES
NO HOSPITAL

DISPOSITION



REFERENCES

- Jagoda A., Decker W., et al. Clinical Policy: Critical Issues in the Evaluation and Mangement of Adults Patients With Asymptomatic Hypertension in the Emergency Department. Annals of Emergency Medicine 2006 Mar;47(3) 237-242.
- Wolf S, Lo B, et al. Clinical Policy: Critical Issues in the Evaluation and Management of Adults in the Emergency Department With Asymptomatic Elevated Blood Pressure. Annals of Emergency Medicine 2013 July; 62(1): 59-68.
- Johnson W, Nguyen ML, Patel R. Hypertension in the emergency department. Cardio Clin, 2012 Nov;30(4): 533-43.
- James P, Oparil S, et al. 2014 Evidence-based guideline for the Management of High Blood Pressure in Adults, JNC 8. JAMA 2014 Feb;311(5): 507-520.
- McKinnon M, O'Neill J. Hypertension In The Emergency Department: Treat Now, Later or Not At All. Emergency Medicine Practice 2010 June;12(6): 1-23.
- Chobanian A, Bakris George, et al. Seventh report of the JNC on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure. Hypertension, 2003 December;42: 1206-1252.
- Brown A. Approach To The Patient With Hypertension. ACOFP 2012 Conference Presenation.
- Mattu A. Cardiovascular. National Emergency Medicine Board Review 2014 Conference Presentation.
- Ma J, Cline D. Emergency Medicine: Just the Facts. 2nd ed. 2004. Page 115.

THANK YOU


SOMETIMES I FEEL THAT I HAVE THE WORST JOB IN THE WORLD!
YA...RIGHT!