Managing Hypertension in the Hospital

Ryan Freedle, MD
Associate Professor of Internal Medicine
Saint Louis University Hospital
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Disclosures

- I have no financial relationships to disclose
- I do not intend to discuss off-label/investigative use of a commercial product/device.

Goals/Objectives

- Explore the basis for present recommendations regarding outpatient blood pressure treatment
- Determine the the relevance of these goals to the management of hypertension in the inpatient setting
- Suggest an evidence-based approach to the management of hypertension in the inpatient setting

Case

A 56-year-old man with a past medical history of Insulin Dependent Type II Diabetes, CKD Stage 3a, and Essential Hypertension presents to the hospital with persistent nausea and vomiting for one day's duration. He was recently caring for his 4-year-old granddaughter who was diagnosed with viral gastroenteritis and other members of the household have similar symptoms. Initial workup in the ED with CMP, CBC and Troponin I as well as CT of the Abdomen and Pelvis is largely benign with normal findings apart from a mild metabolic alkalosis and elevated creatinine that is at his chronic baseline. Vitals are WNL other than some low-grade sinus tachycardia at 105 and elevated blood pressure at 185/110. When you come to examine the patient, he appears uncomfortable and is having an active episode of emesis when you enter the room. Apart from abdominal pain, nausea and vomiting he denies any other significant symptoms including chest pain, shortness of breath, lower extremity edema, orthopnea, PND, weakness, numbness or other neurological changes. He states that he has been compliant with his home blood pressure medications which include Losartan 50mg QD, Amlodipine 10mg QD and HCTZ 25mg QD. A physical exam apart from obvious discomfort as noted above and mild generalized abdominal pain to palpation is benign and within normal limits.

Thoughts?

- Anything else that you want to know about the case?
- What approach would you take to addressing his blood pressure?

Is Hypertension Dangerous?

SHEP (1991)

- Multicenter, randomized, double-blind, placebo-controlled
- Included 4736 patients average age 72 with SBP >160
- Randomized them to receive either chlorthalidone then atenolol or placebo.
- The 5-year average systolic blood pressure was 155 mm Hg for the placebo group and 143 mm Hg for the active treatment group
- Incidence of stroke fell by 3% and RR of a major cardiac event was 0.68.

Syst-Eur (1997)

- Multicenter, randomized, placebo controlled study and intention to treat analysis
- Examined 4695 patients aged >60 with SBO > 160 mm Hg.
- Randomized to receive nitrendipine (and possibly also enalapril or HCTZ) or placebo, aimed to reduce systolic BP to less than 150 mmHg in the treatment group.
- Patients were followed every 3 months for 2 years.
- Fatal/Non-fatal Stroke rate fell by 42% in treatment group and Fatal/Nonfatal CV endpoints fell by 26% as well

HYVET Trial (2008)

- Double-blind placebo format with an intention to treat analysis
- 3845 patients from Eurasia, who were >80yrs old and SBP >160 mmHg
- Received Indapamide (+/- Perindopril) or Placebo for target BP of <150/80 in treatment group.
- After randomization, patients were seen at least every 3 months during the first year and at least every 6 months thereafter for median follow up of 1.8 years
- 30% reduction in the rate of fatal/ nonfatal stroke, 39% reduction in the rate of death from stroke, 23% reduction in the rate of death from cardiovascular causes
- Fewer adverse events in the treatment group and only 5 total events in both groups were attributed to medications.

CARDIO-SIS (2009)

- Prospective multi-center, randomized study with intention to treat analysis.
- 1111 patients with average age of 67 years with SBP >150 mmHg
- Patients were randomized to either SBP goal of <140 or <130
- Patients received followup every 4 months for 2 years.
- EKG evidence of LVH was reduced by absolute rate of 5.6% and a composite of CV endpoints decreased by absolute rate of 4.6%
- "Side effects were rare and did not differ significantly between the two groups."

Is Hypertension Dangerous?

Recommendation 1:

- In the general population aged 60 years, initiate pharmacologic treatment to lower blood pressure (BP) at systolic blood pressure (SBP) 150 mmHg or diastolic blood pressure (DBP) 90 mm Hg and treat to a goal SBP <150 mm Hg and goal DBP <90 mm Hg. (Strong Recommendation – Grade A)
- In the general population aged 60 years, if pharmacologic treatment for high BP results in lower achieved SBP (eg, <140mmHg) and treatment is well tolerated and without adverse effects on health or quality of life, treatment does not need to be adjusted. (Expert Opinion – Grade E)

Should we control more aggressively?

JATOS Trial (2009)

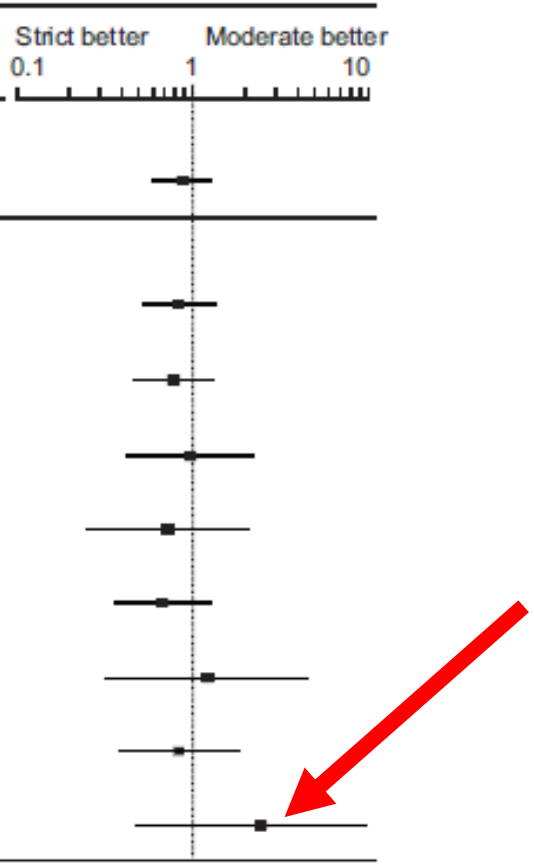
- Randomized, open-label multicenter study with intention to treat analysis
- Randomized 4418 Patients ages 65-85 to be treated to goal SBP <160 (mild) or <140 mm Hg (strict) with efonidipine as the baseline drug
- Patients were titrated to goal BP over 3 months
- The incidence of a combined CV/Stroke/Renal Failure endpoint was the same for both groups.

VALISH Trial (2010)

- Prospective, randomized, open-label, blinded end point study
- 3260 patients 70-85 years old with SBP > 160
- Randomized to a strict control of <140 or moderate control <150 group. All patients were started on Valsartan as initial drug.
- Clinic follow up every 3 months for an average of 3 years
- The combined CV/CVA endpoint was not significantly different between the two groups

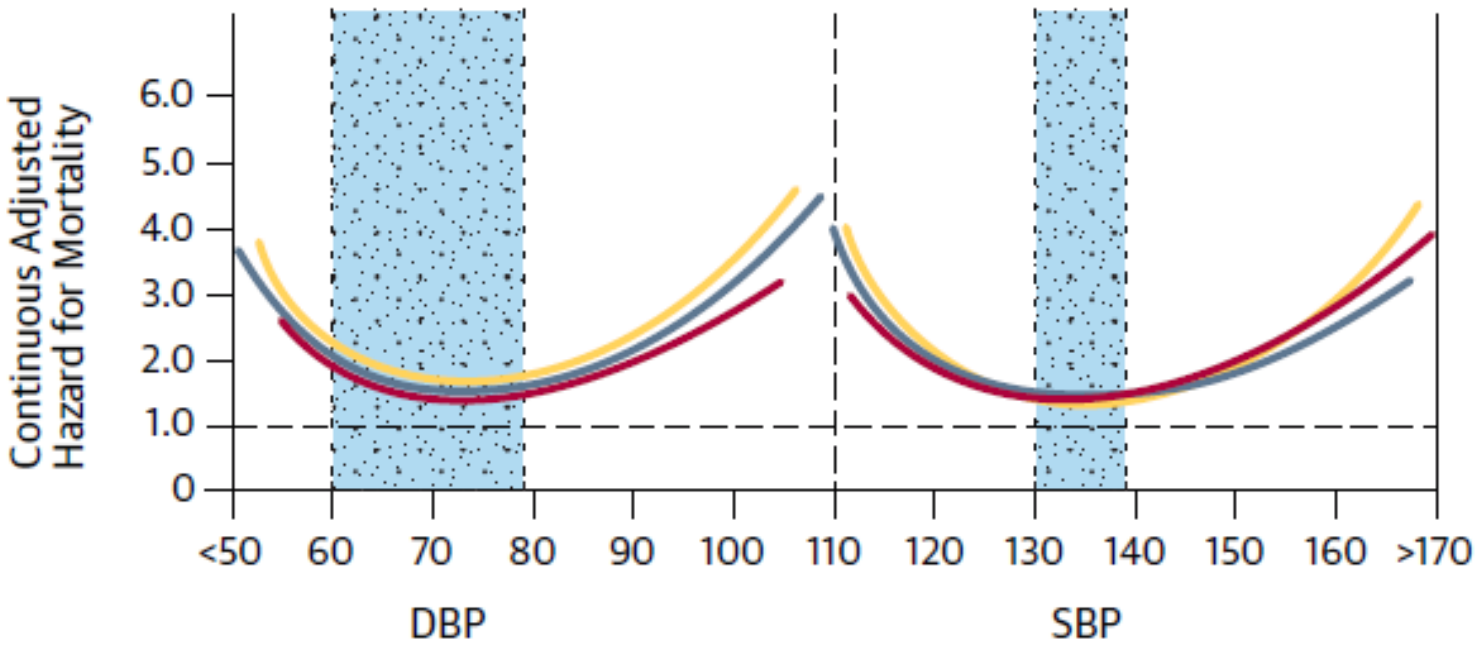
VALISH Trial (2010)

	Strict control (N=1545)		Moderate control (N=1534)		p value	Hazard ratio (95% CI)
Primary endpoint						
Composite endpoint [1)]	47	(3.04)	52	(3.39)	0.383	0.89 (0.60-1.31)
Secondary endpoint						
Hard endpoint [2)]	32	(2.07)	37	(2.41)	0.484	0.84 (0.53-1.36)
All cause death	24	(1.55)	30	(1.96)	0.362	0.78 (0.46-1.33)
Cardiovascular death	11	(0.71)	11	(0.72)	0.950	0.97 (0.42-2.25)
Sudden death	6	(0.39)	8	(0.52)	0.564	0.73 (0.25-2.11)
Fatal and non-fatal stroke	16	(1.04)	23	(1.50)	0.237	0.68 (0.36-1.29)
Fatal and non-fatal myocardial infarction	5	(0.32)	4	(0.26)	0.761	1.23 (0.33-4.56)
Unplanned hospitalization	12	(0.78)	14	(0.91)	0.656	0.84 (0.39-1.82)
Renal insufficiency	5	(0.32)	2	(0.13)	0.267	2.45 (0.48-12.64)



Sim et. al (2014)

- A retrospective cohort study using Kaiser data of 398,419 patients ages >18 with diagnosed HTN
- Primary Outcome: Combined endpoint of All-cause mortality and ESR



SPRINT 2015 (not included in JNC-8)

- Randomized, controlled, open-label trial
- 9361 persons with a systolic blood pressure of 130 mm Hg – 180mm Hg and an increased cardiovascular risk, (CV Disease excluding stroke, CKD, Framingham 10 year risk > 15% or age > 75) and no diabetes
- Randomized to goal SBP < 140 or <120, encouraged diuretics and BB but no specific drug requirement.
- Stopped early with median followup of 3.26 years due lower combined CV event rate in tight control group (1.65% per year vs. 2.19% per year) and lower all-cause mortality (hazard ratio, 0.73)
- Rates of hypotension, syncope, electrolyte abnormalities, and acute kidney injury or failure, were higher in tight control group

Other Recommendations

- Recommendation 2: In the general population <60 years, initiate pharmacologic treatment to lower BP at DBP 90 mm Hg and treat to a goal DBP <90 mm Hg. (For ages 30-59 years, Strong Recommendation – Grade A; For ages 18-29 years, Expert Opinion – Grade E)

- Recommendation 3: In the general population <60 years, initiate pharmacologic treatment to lower BP at SBP 140 mm Hg and treat to a goal SBP <140 mm Hg. (Expert Opinion – Grade E)

- Recommendations 4-9: Have to deal with specific agents to use and the order in which to start/stop agents

AHA Guidelines 2017

8.1.2. BP Treatment Threshold and the Use of CVD Risk Estimation to Guide Drug Treatment of Hypertension

Recommendations for BP Treatment Threshold and Use of Risk Estimation* to Guide Drug Treatment of Hypertension References that support recommendations are summarized in Online Data Supplement 23.		
COR	**LOE**	**Recommendations**
I	SBP: A DBP: C-EO	1. Use of BP-lowering medications is recommended for secondary prevention of recurrent CVD events in patients with clinical CVD and an average SBP of 130 mm Hg or higher or an average DBP of 80 mm Hg or higher, and for primary prevention in adults with an estimated 10-year atherosclerotic cardiovascular disease (ASCVD) risk of 10% or higher and an average SBP 130 mm Hg or higher or an average DBP 80 mm Hg or higher (1-9).
I	C-LD	2. Use of BP-lowering medication is recommended for primary prevention of CVD in adults with no history of CVD and with an estimated 10-year ASCVD risk <10% and an SBP of 140 mm Hg or higher or a DBP of 90 mm Hg or higher (3, 10-13).

*ACC/AHA Pooled Cohort Equations (http://tools.acc.org/ASCVD-Risk-Estimator/) (13a) to estimate 10-year risk of atherosclerotic CVD. ASCVD was defined as a first CHD death, non-fatal MI or fatal or non-fatal stroke.

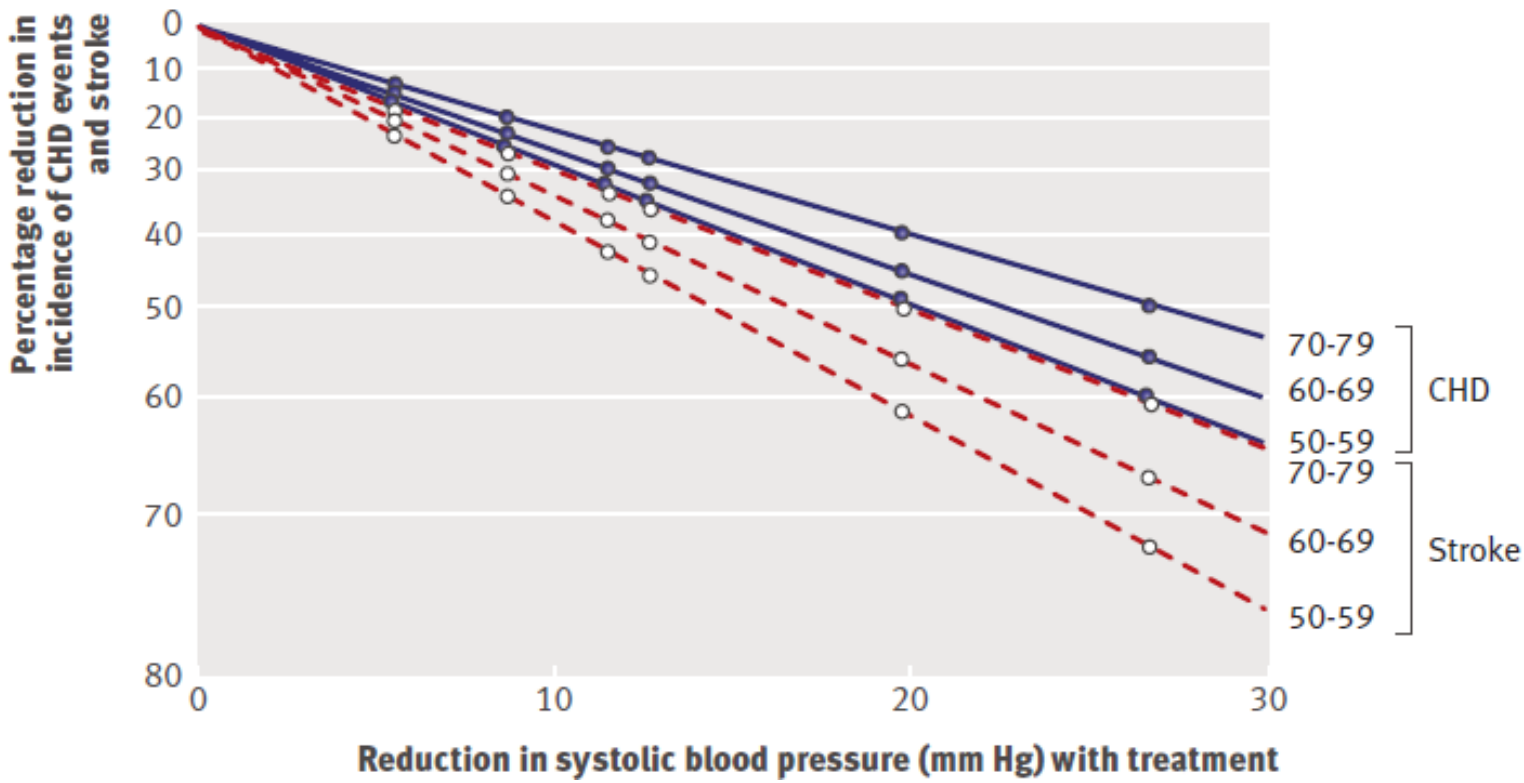
MANUSCRIPT

AHA Guidelines 2017

- 12 articles cited for this recommendation
  - Also the ASCVD equations and the 2013 AHA ASCVD Guidelines
- Most of these articles (10) are meta-analysis
  - Introduces selection and publication bias into results
- The two remaining articles are the SPRINT Trial and the ADVANCE Trial

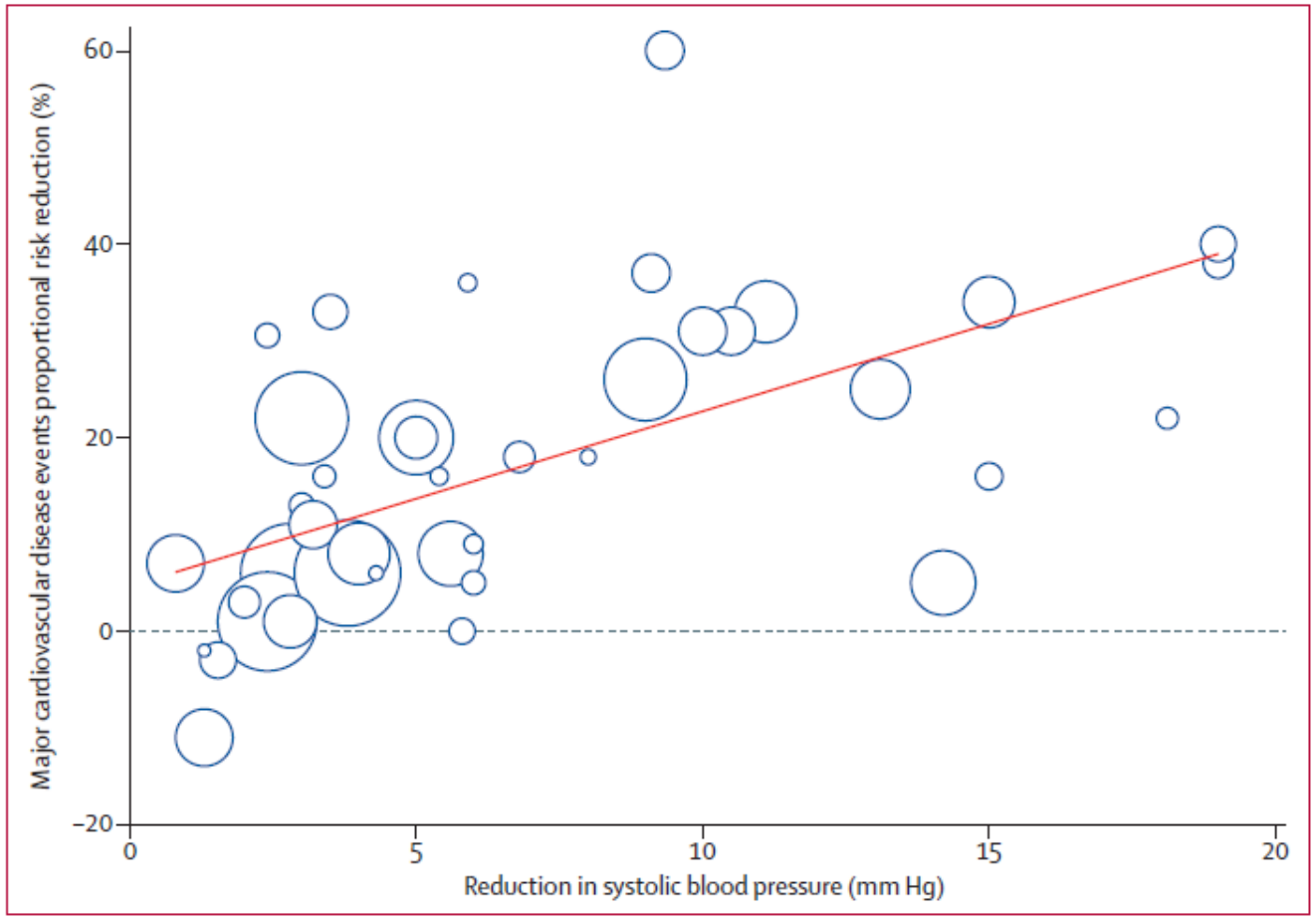
M R Law M, Morris J & Wald N (2009)

- Meta-analysis of 147 trials covering nearly a million patients.
- Purpose: To determine the quantitative efficacy of different classes of blood pressure lowering drugs in preventing coronary heart disease (CHD) and stroke, and who should receive treatment.

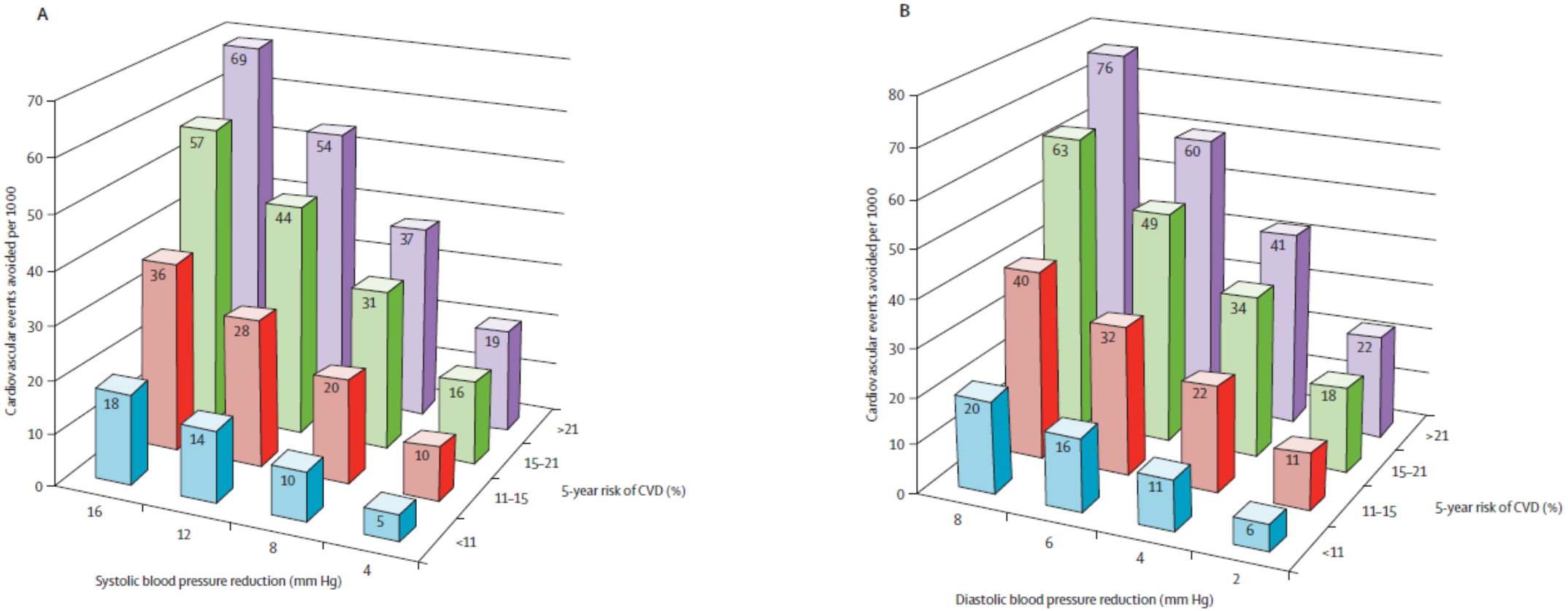


Ettehad D, et. al (2015)

- **Meta-analysis of 123 studies with 613,815 participants**
- **Purpose: To better understand the benefits of blood pressure lowering by baseline blood pressure and presence of comorbidities.**



The Blood Pressure Lowering Treatment Trialists' Collaboration (2014)



Meta-analysis of 37 Trials and 51,917 patients

Interpretation

- With increasing BP control, linear percentage drop in ASCVD/Stroke Risk
- Also increased percentage risk of harm
- Balancing this risk and benefit requires careful consideration of patient's baseline risk of each.

Summary

- Treating blood pressure to target goal in an outpatient setting is quite important and conveys a variety of health benefits, however even in that setting it is not without risk, particularly for the elderly and with more aggressive goals
- Which specific target goal strikes the correct balance between risk and benefit depends on underlying patient characteristics with higher ASCVD benefitting more from tighter control.
- There is no specific single target number that hits all patients, and benefits to the patient occur after control periods lasting years.

Should blood pressure be treated the same on shorter time intervals?

Patel, K. et al. (2016)

- Retrospective Cohort Study Design
- Looked at ~60,000 office visits between 2008 and 2013 where patient BP was >180/110 at the Cleveland Clinic
- Then did a propensity-matched analysis
- No significant difference in MACE at 7 days, 8 to 30 days, or 6 months
- Patients sent home were more likely to have uncontrolled hypertension at 1 month but not at 6 months
- Patients sent home had lower hospital admission rates at 7 days and at 8 to 30 days

Campos et al. (2017)

- Systematic Review/Meta-analysis of 32 articles
  - 20 Double-Blind Randomized Controlled Trials
  - 12 cohort studies
- "Side effects ranged from mild (dizziness, headache, nausea and vomiting, dry mouth, mild tachycardia, and sedation) to severe (hypotension, transient ischemic attack, uremia, and acute pulmonary edema)."
- "Lowering blood pressure too rapidly in patients with HU may be harmful. In their review, Kessler and Joudeh noted that there appears to be no benefit in attaining goal blood pressure within hours to days, and that findings from the VALUE trial suggest that lowering blood pressure within a 6 month-period may be a better approach"

What about hypertension in the hospital?

Axon R, Cousineau L, & Egan B (2010)

- Systematic review of studies of estimates of prevalence of HTN in the inpatient setting, included 9 articles
- Found prevalence of HTN to be between 50.5-72%
- 37%-77% of patients remained hypertensive at time of discharge
- "Most patients with inpatient HTN continued to have elevated blood pressures at outpatient follow up"

Accuracy of Inpatient BP Measures

In two studies, 24-hour BP monitors produced prevalence estimates ranging from 56.4% to 72.6%.[21,22] In both studies, a significant proportion of patients had masked HTN, or HTN detected by 24-hour BP monitoring alone. Also, 28% to 38% of patients without a prior HTN diagnosis, who were not detected by routine measures, were found to be hypertensive by 24-hour monitoring. Finally, Conen et al.[21] retested a subset of hypertensives with 24-hour monitoring one month after hospitalization, and 87.5% remained categorized as hypertensive on follow-up. Of note, it is unclear how this subset of patients was selected.

Mahdi et al (2021)

- Retrospective cross-sectional observation study of inpatients in the UK between 2014 and 2018
- Evaluated 41,455 patients with 1.7 million BP measurements
- 47% had a BP measurement that met AHA guidelines for outpatient hypertension during their admission

AHA Guidelines 2025

Table 7. Values of Systolic/Diastolic Blood Pressure for Ambulatory and Home Blood Pressure Monitoring Corresponding to Office Systolic/Diastolic Blood Pressure Levels

Office, mm Hg	HBPM, mm Hg	Daytime ABPM, mm Hg	Nighttime ABPM, mm Hg	24-Hour ABPM, mm Hg
120/80	120/80	120/80	100/65	115/75
130/80	130/80	130/80	110/65	125/75
140/90	135/85	135/85	120/70	130/80
160/100	145/90	145/90	140/85	145/90

Modified with permission from Whelton et al.[19] Copyright 2018 American College of Cardiology Foundation and American Heart Association, Inc.

ABPM indicates ambulatory blood pressure monitoring; BP, blood pressure; DBP, diastolic blood pressure; HBPM, home blood pressure monitoring; and SBP, systolic blood pressure.

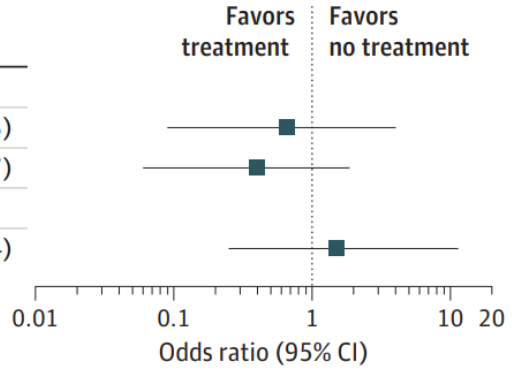
Rastogi et. al (2021)

- Cohort study of all inpatient adults in 2017 with HTN in the hospital in the Cleveland Clinic system, excluding those admitted for other cardiovascular reasons.
- Ultimately 22,834 patients included
- Patients who received treatment for HTN while inpatient had increased risk of AKI of (2% absolute risk increase) and myocardial injury (0.6% absolute risk increase).

Figure. Inpatient Outcomes for Treated vs Untreated Patients by Treatment Route and SBP Interval

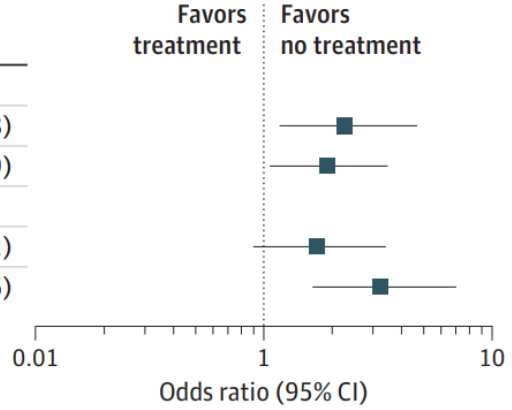
A Stroke

Source	Odds ratio (95% CI)
Treatment route	
IV	0.66 (0.09-4.03)
Oral	0.40 (0.06-1.87)
SBP interval (mm Hg)	
160-199	1.50 (0.25-11.4)



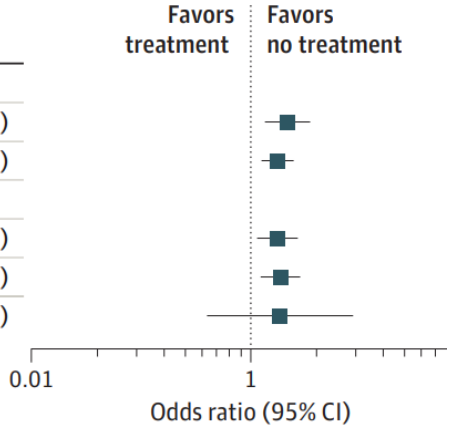
B Myocardial injury

Source	Odds ratio (95% CI)
Treatment route	
IV	2.27 (1.17-4.68)
Oral	1.89 (1.06-3.49)
SBP interval (mm Hg)	
140-159	1.72 (0.90-3.42)
160-199	2.32 (1.64-6.96)



C AKI

Source	Odds ratio (95% CI)
Treatment route	
IV	1.47 (1.16-1.87)
Oral	1.32 (1.12-1.57)
SBP interval (mm Hg)	
140-159	1.32 (1.07-1.64)
160-199	1.37 (1.11-1.68)
≥200	1.35 (0.63-2.94)



Anderson et. al (2023)

- Retrospective cohort study of patients 65+ hospitalized for non-cardiac admissions in the VA system between 10/2015 and 12/2017 who had elevated BP readings within 48 hours of hospitalization. (N of 66,140)
- Compared those who received a new oral class of antihypertensive they had not previously been prescribed or any intravenous antihypertensive, which they labeled “intensive treatment”
- Intensive treatment was associated with an approximately 2% absolute increase in risk for a combined endpoint of ICU transfer, stroke, in-hospital mortality, elevated BNP, elevated troponin, AKI and a few other measures
- Subgroup analysis showed stroke and mortality were not independently significant
- Findings were consistent across subgroups stratified by age, frailty, preadmission BP, early hospitalization BP, and cardiovascular disease history

Special Conditions

Condition	BP Recommendation	Recommendation Source
Acute Coronary Syndrome	<130/80	AHA
Acute Heart Failure (both HFpEF and HFrEF)	<130/80	AHA
Aortic Dissection	HR <60, Systolic BP target between 100 and 120	AHA
Ischemic Stroke	w/ TPA: <185/110 w/o TPA: <220/120	AHA/ASA
Hemorrhagic Stroke	<220 systolic, however with the caveat that <140 systolic may cause harm	AHA/ASA
Eclampsia/Preeclampsia	<160/110	ACOG

Some other noteworthy exceptions

- Hypertensive Encephalopathy (PRES)
- Endocrine Disorders
- Secondary Hypertension with elevated Intracranial Pressures (Papilledema)
- Procedure-Related Goals (such as Dialysis)

Hypertensive Emergency

BP > 180/110 **with evidence of end organ damage**

Treatment of Hypertensive Emergency

"The initial goal of therapy in hypertensive emergencies is to reduce mean arterial BP by no more than 25 percent (within minutes to 1 hour), then if stable, to 160/100–110 mmHg within the next 2–6 hours"

Varounis, C. (2017)

In cases with hypertensive urgency BP control should be managed with the use of low doses of oral antihypertensive medications, where a gradual decrease of BP over hours to days is expected. Medications that can be used to treat hypertensive urgencies are oral labetalol (3:1 ratio of antagonism of non-selective β-adrenergic and *a*1 receptor) and clonidine (central *a*-2 agonist).

On the other hand, hypertensive emergencies require rapid BP control with a parenteral antihypertensive medication, and in these instances the patient should be admitted to intensive care unit. The BP should be reduced within minutes to an hour to about 20–25% in the first hour and then to 160/100 or 160/110 mmHg within the next 2–6 h. However, BP should not be returned to normal values (14). This is due to the fact that additional BP reduction could cause brain ischemia due to abnormal cerebral flow autoregulation in these patients. An exception to this would be in the case of aortic dissection, where the rapid and immediate reduction of BP within 5–10 min using initially a parenteral β-blocker (i.e., esmolol) (BP target: SBP <120 mmHg and a mean

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Rodriguez MA, Kumar SK, De Caro M (2010)

observation. Similarly, patients who present with medication noncompliance are at risk for progressing to hypertensive emergency (ie, developing end-organ damage) and benefit from an inpatient observation.

Hypertensive emergencies require immediate admission to an intensive care unit for prompt BP control with a parenteral, titratable antihypertensive agent while continuously monitoring BP, neurologic status, and urine output. BP should be efficiently reduced within minutes to an hour, and not immediately to normal levels. The goal is to correct the BP to no less than 20% to 25% in the first hour and then if stable to 160/100 to 160/110 mm Hg within the next 2 to 6 hours.[7] An alternative is to reduce DBP by 10% to 15% or to approximately 110 mm Hg in 30 to 60 minutes;[47] with a goal reduction to normal within 24 to 48 hours. The aggressive lowering of BP may aggravate hypoperfusion and worsen end-organ damage.[48] Specific therapies are targeted to the end-organ damage present. The rapid-acting antihypertensives preferred in hypertensive emergencies are labetalol, esmolol, fenoldopam, clevidipine, nitroprusside, and nicardipine.[47] In addition, some patients, particularly those with normal kidney function, may have some element of volume depletion because of the preceding pressure natriuresis that occurred in the setting of very high BPs. Thus, in the absence of clinical signs of volume overload, some volume expansion with

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JNC-7 (2003)

Early triage to establish the appropriate therapeutic strategies for these patients is critical to limiting morbidity and mortality.[314] Patients presenting with severe hypertension may represent as much as 25 percent of all patient visits to busy urban emergency rooms (ERs).[315]

Patients with hypertensive emergencies should be admitted to an intensive care unit for continuous monitoring of BP and parenteral administration of an appropriate agent (table 23). The initial goal of therapy in hypertensive emergencies is to reduce mean arterial BP by no more than 25 percent (within minutes to 1 hour), then if stable, to 160/100–110 mmHg within the next 2–6 hours.

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Vidt (2001)

HYPERTENSIVE EMERGENCIES

The initial goal for blood pressure reduction is not to obtain a normal blood pressure, but rather to achieve a progressive but controlled reduction in blood pressure to minimize the risk of hypoperfusion in cerebral, coronary, and renal vascular beds.[5] It is recommended that the initial reduction in mean arterial pressure (MAP) not be more than 20%–25% below the pretreatment blood pressure, or that MAP be reduced within the first 30–60 minutes to 110–115 mm Hg.[6] If this level of blood pressure is well tolerated and the patient is clinically stable, further gradual reductions toward a normal blood pressure can be effected over the next 12–24 hours. Excessively rapid reduction in blood pressure has been associated with acute deterioration in renal function, ischemic, cardiac, or cerebral events, and occasional retinal artery occlusion and acute blindness.

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Authors' conclusions

There is no RCT evidence demonstrating that anti-hypertensive drugs reduce mortality or morbidity in patients with hypertensive emergencies. Furthermore, there is insufficient RCT evidence to determine which drug or drug class is most effective in reducing mortality and morbidity. There were some minor differences in the degree of blood pressure lowering when one class of antihypertensive drug is compared to another. However, the clinical significance is unknown. RCTs are needed to assess different drug classes to determine initial and longer term mortality and morbidity outcomes.

2020 International Society of Hypertension Global Hypertension Practice Guidelines

- "There is a lack of randomized controlled trial data to provide clear cut guidance on BP targets and times within which these should be achieved. Most recommendations are based on expert consensus. The type of acute HMOD is the main determinant of the preferred treatment choice. The timeline and magnitude of BP reduction is strongly dependent on the clinical context"

Hypertensive Urgency

- Definitions vary, perhaps most common is BP >180/110, based largely off of JNC-7

- Must have **NO** evidence of end organ damage
  - Headache alone, SOB (without pulmonary edema), or peripheral edema do not qualify as end-organ damage.

JNC-7

Some patients with hypertensive urgencies may benefit from treatment with an oral, short-acting agent such as captopril, labetalol, or clonidine followed by several hours of observation. However, there is no evidence to suggest that failure to aggressively lower BP in the ER is associated with any increased short-term risk to the patient who presents with severe hypertension. Such a patient may also benefit from adjustment in their antihypertensive therapy, particularly the use of combination drugs, or reinstitution of medications if noncompliance is a problem. Most importantly, patients should not leave the ER without a confirmed followup visit within several days.

Unfortunately, the term "urgency" has led to overly aggressive management of many patients with severe, uncomplicated hypertension. Aggressive dosing with intravenous drugs or even oral agents, to rapidly lower BP is not without risk. Oral loading doses of antihypertensive agents can lead to cumulative effects causing hypotension, sometimes following discharge from the ER. Patients who continue to be noncompliant will often return to the ER within weeks.

Summary

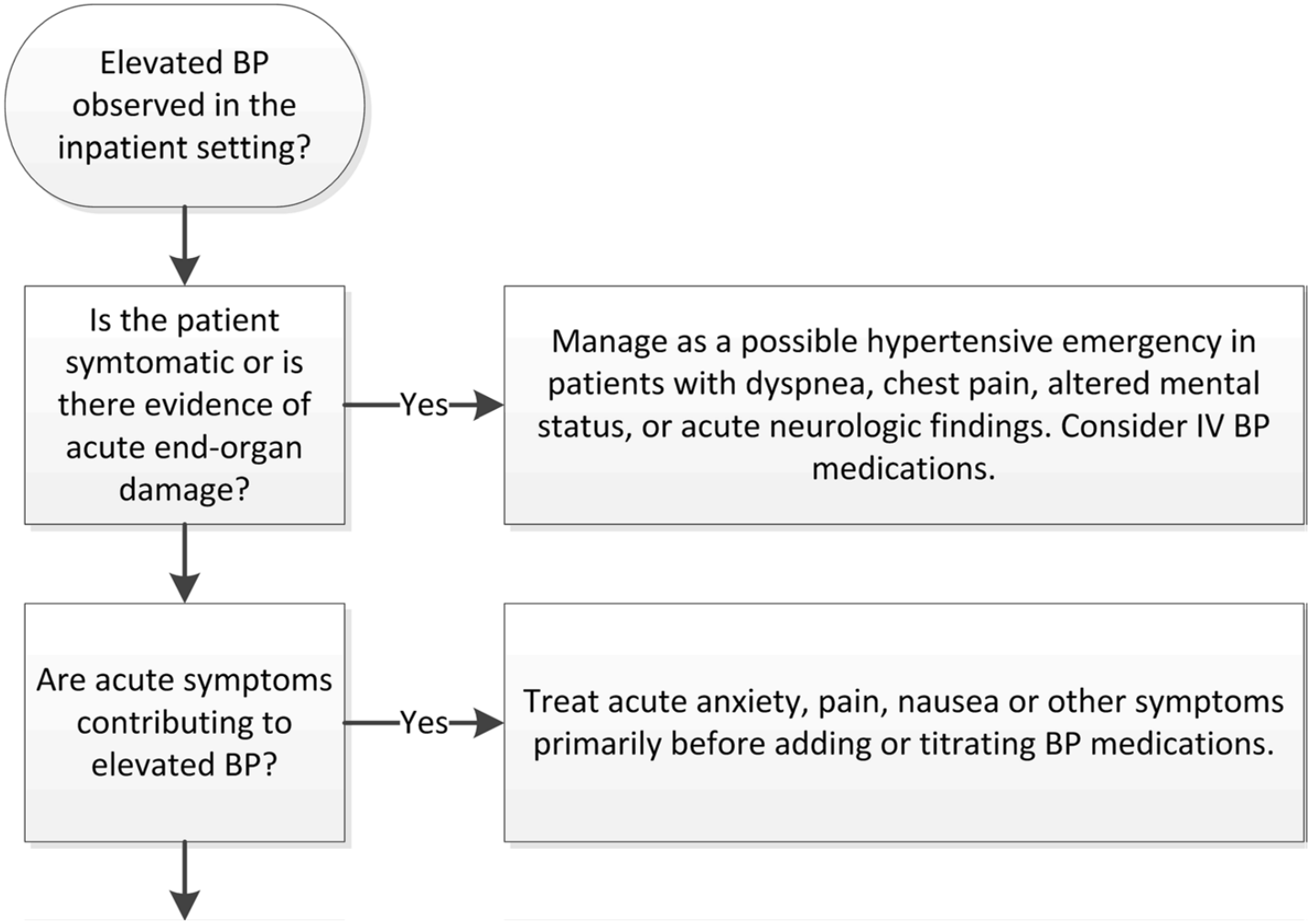
- Uncomplicated inpatient HTN is a prevalent issue but its clinical significance is dubious.
- There are no societal guidelines, diagnostic criteria or high quality RCT data that support aggressive management of uncomplicated HTN in the inpatient setting and to the contrary, emerging evidence predicts that this might lead to worse outcomes for patients.
- Each patient's Blood pressure goal should be considered in relation to their reason for admission. Specific conditions may have established blood pressure goals and warrant specific treatment targets or further consideration.

How Should Uncomplicated HTN in the Hospital be Managed?

Secondary HTN in the inpatient setting

- Many confounders in the inpatient setting
  - Medications such as steroids, NSAIDS, Calcineurin inhibitors
  - Pain
  - Stress/Anxiety
  - Dietary and Lifestyle Differences
  - Unreliable measurement techniques.
  - Non-compliance
  - Drugs of abuse

Axon R, Turner M & Buckley R (2015)



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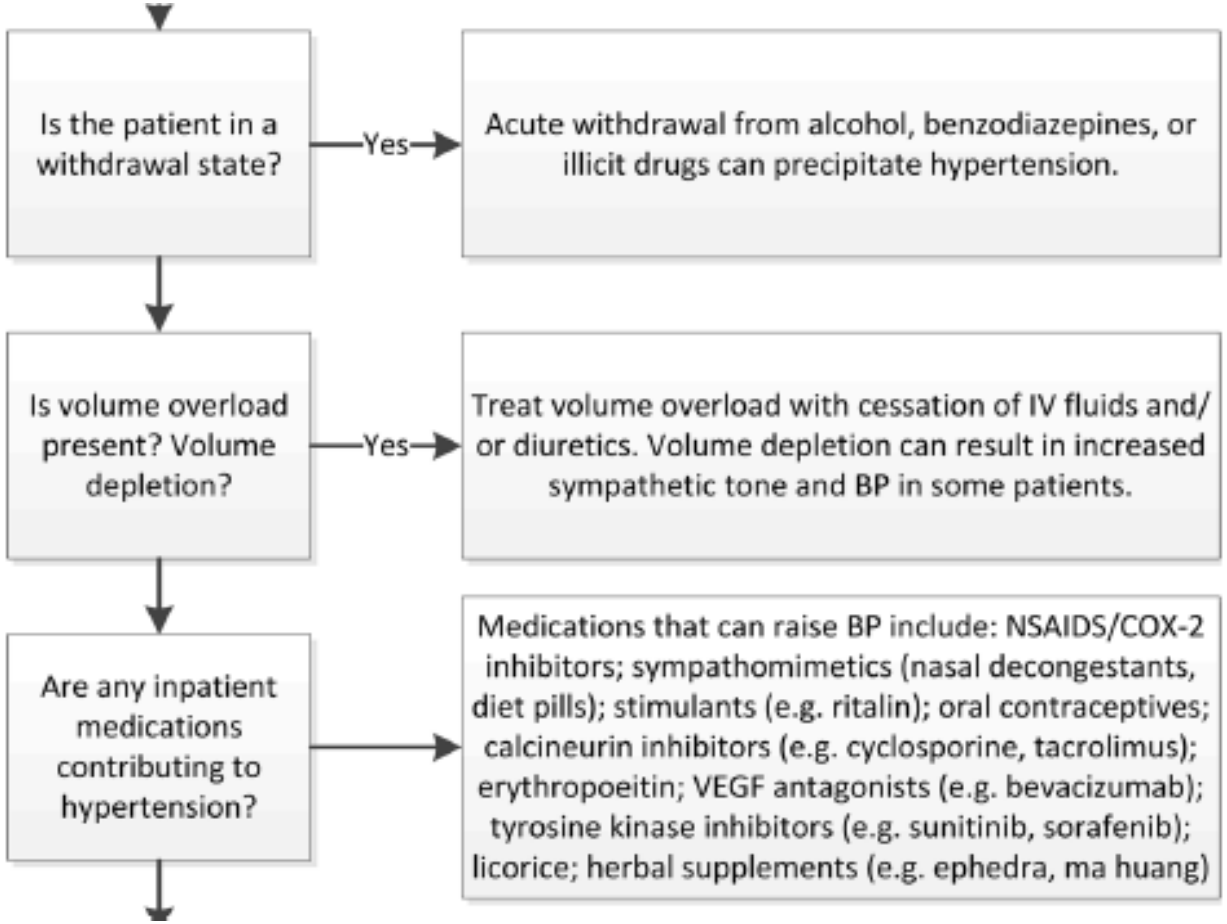

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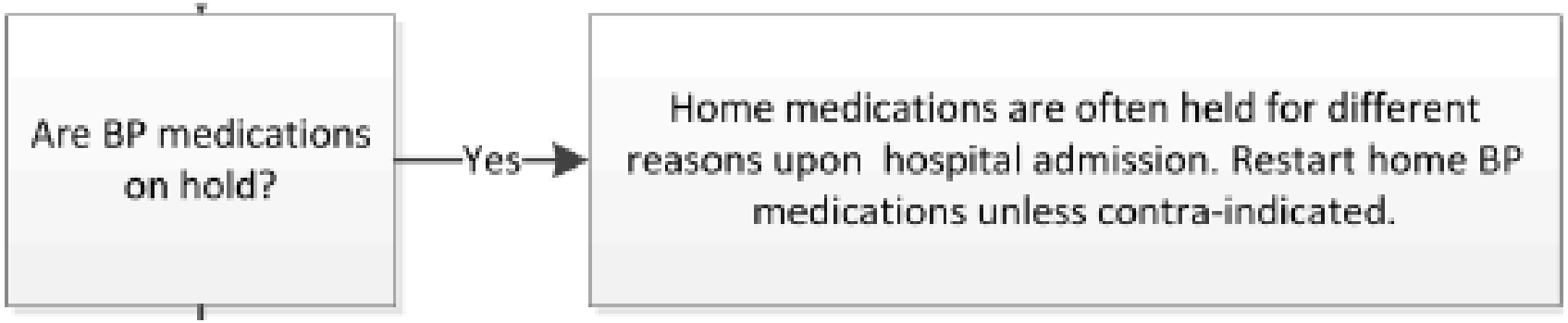

Question 1:

A 56 year old man with a past medical history of Insulin Dependent Type II Diabetes, CKD Stage 3a, and Essential Hypertension presents to the hospital with persistent nausea and vomiting for one day's duration. He was recently caring for his 4 year old granddaughter who was diagnosed with viral gastroenteritis and other members of the household have similar symptoms. Initial workup in the ED with CMP, CBC and Troponin I as well as CT of the Abdomen and Pelvis is largely benign with normal findings apart from a mild metabolic alkalosis and elevated creatinine that is at his chronic baseline. Vitals are WNL other than some low grade sinus tachycardia at 105 and elevated blood pressure at 185/110. When you come to examine the patient, he appears uncomfortable and is having an active episode of emesis when you enter the room. Apart from abdominal pain, nausea and vomiting he denies any other significant symptoms including chest pain, shortness of breath, lower extremity edema, orthopnea, PND, weakness, numbness or other neurological changes. He states that he has been compliant with his home blood pressure medications which include Losartan 50mg QD, Amlodipine 10mg QD and HCTZ 25mg QD. A physical exam apart from obvious discomfort as noted above and mild generalized abdominal pain to palpation is benign and within normal limits. What is the next best step in management?

Question 1:

What is the next best step in management?

- A: Continue home blood pressure medications but increase Losartan to 100mg QD in addition to other supportive care with antiemetics and pain medications.
- B: Continue home blood pressure medications and add Carvedilol 25mg BID in addition to other supportive care with antiemetics and pain medications.
- C: Treat immediately with IV hydralazine 10mg as a one-time push and resume home blood pressure medications in addition to other supportive care with antiemetics and pain medications.
- D: Continue home blood pressure medications without changes and start other supportive care with antiemetics and pain medications.

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Question 2:

Which of the following groups of patients should have consideration for treatment of a blood pressure of 190/122 while in the hospital?

- A: Those with high ASCVD risk but no active symptoms of acute coronary syndrome.
- B: Patients with insulin dependent type II diabetes mellitus.
- C: Patients with CKD stage IV.
- D: Patients with headache but no neurological symptoms/exam findings or present concerns for stroke.
- E: Patients presenting with SOB and pulmonary edema due to acute congestive heart failure.

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