

## How to create an account in CloudCME®



**Step 1** - Go to the Attendee Portal and click "Sign In" —————> <https://vcu.cloud-cme.com/cme/>

**Step 2** - Click "Don't have an account?" (circled below)

*If you do not see "Don't have an account" click the button labeled "Sign in with your email and password" then click "Don't have an account?"*

A screenshot of the CloudCME login page. It has a "Log In" header, followed by the instruction "Enter your email and password to login:". Below this are two input fields labeled "Email:" and "Password:". A blue "Login" button is positioned below the password field. At the bottom of the form, there are two links: "Forgot Your Password?" and "Don't have an account?". The "Don't have an account?" link is circled in orange.

**As you enter, go ahead and create a CloudCME account to claim CE credit if you don't already have one.**

**Scan this QR code to claim CE:**

**Or text 19139-18817  
to 804-625-4041**



<https://VCU.cloud-cme.com/WebService/SelfAttendScan.aspx?EventID=19139>

**Step 3** - Complete all the fields on the screen, making sure to make note of your password, then click "Create Account." You will receive a pop-up message indicating your account was created.

**Step 4** - Click "Sign In" again and enter your email address and the password you entered in Step 4 and click "Login"

**Step 5** – To complete the process, please click "My CME" or "My CE," click on "Profile," complete your profile information, and click "Save."

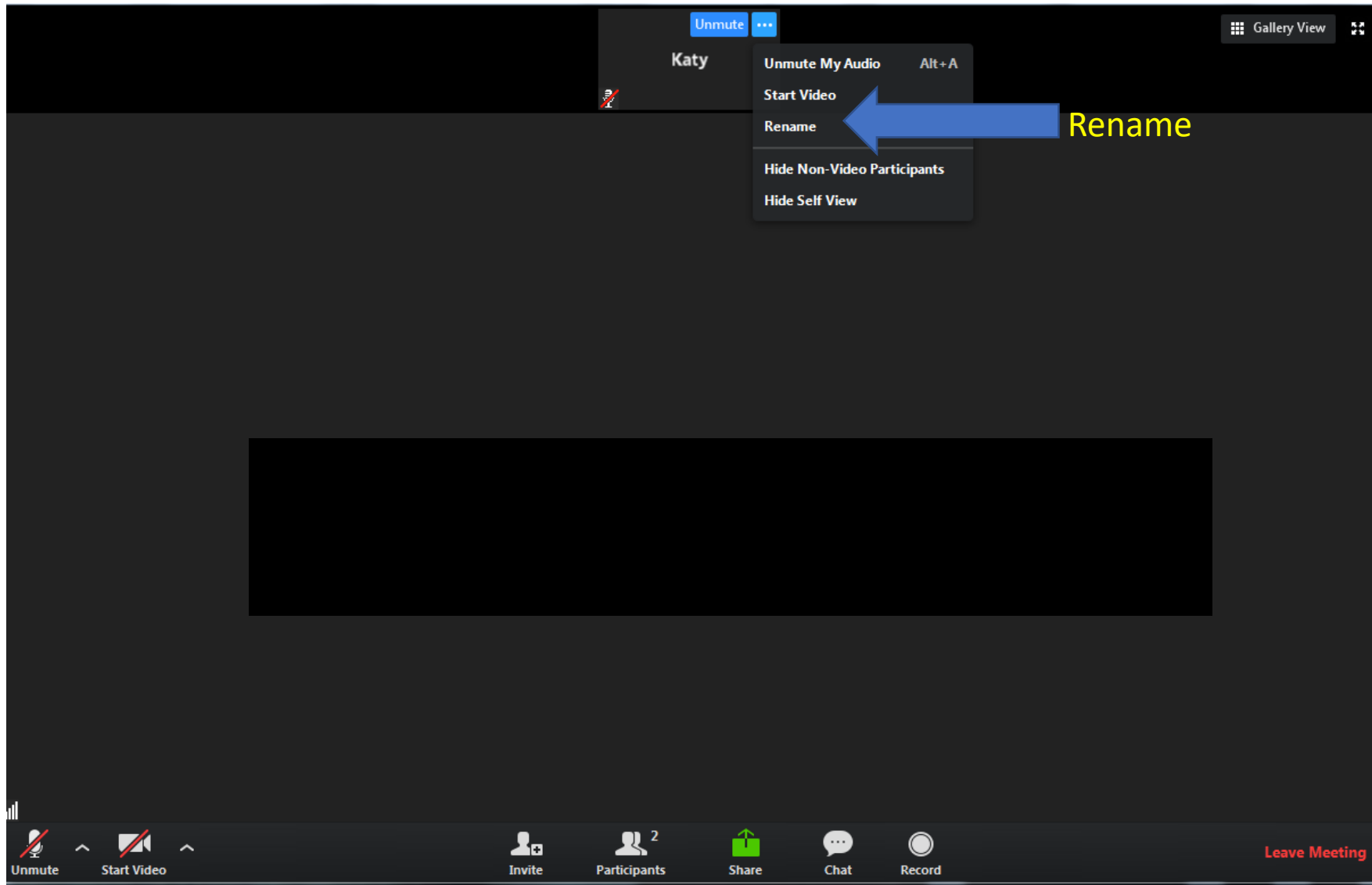
**Pharmacists/Pharmacy Technicians:** Be sure to enter both your NABP number and mm/dd in the Profile to ensure credits can be awarded.

# Diabetes and Hypertension ECHO\* Clinic

**December 18, 2020**

\*ECHO: Extension of Community Healthcare Outcomes

# Helpful Reminders



\*Rename your Zoom screen with your name and organization

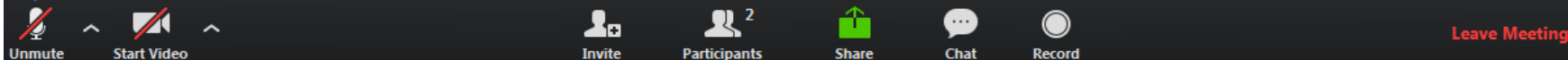
# Helpful Reminders



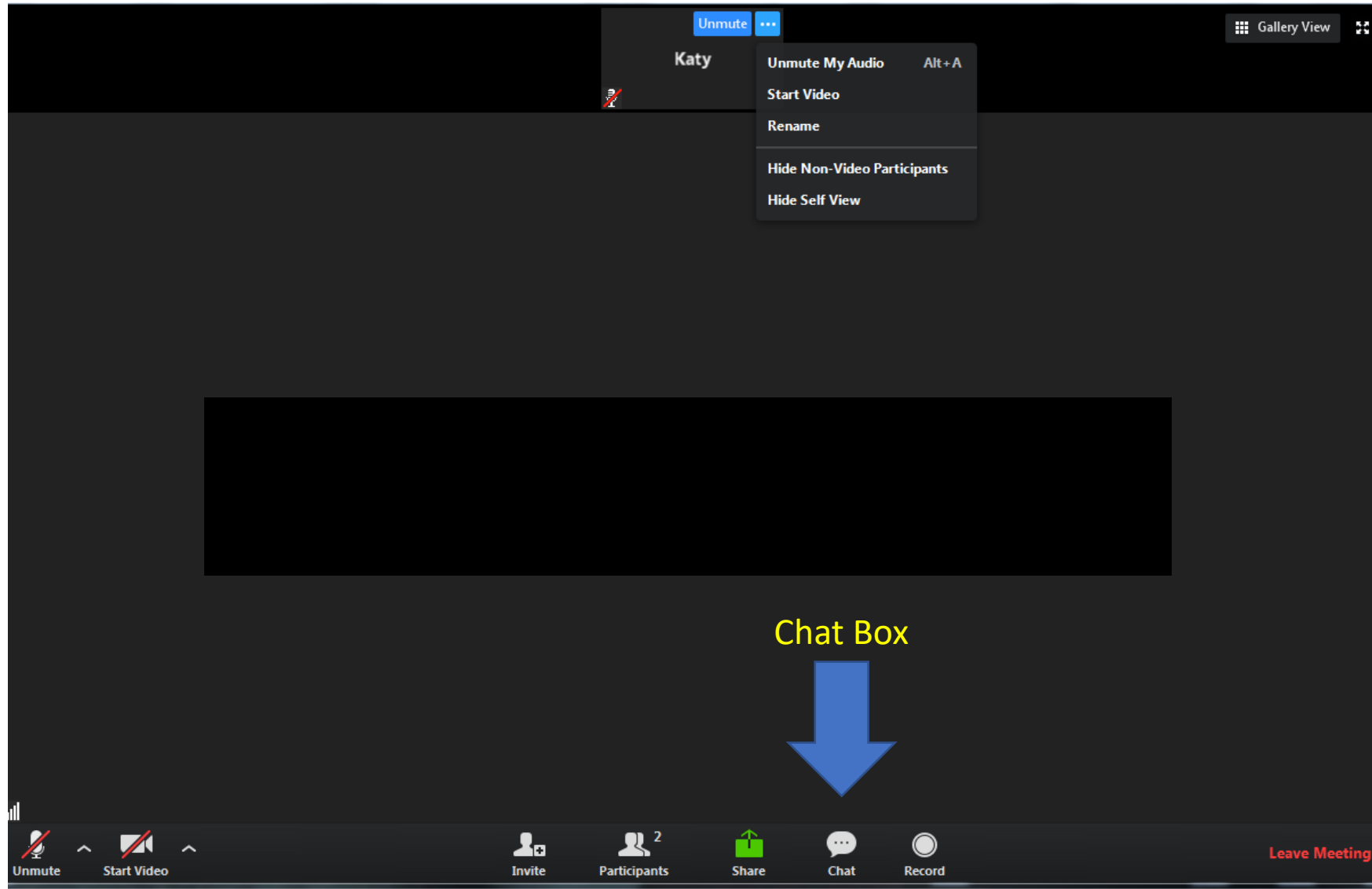
## Diabetes & Hypertension Project Echo

- You are all on **mute**.  
Please **unmute** to talk
- If joining by telephone audio only, press **\*6** to mute and unmute

Unmute



# Helpful Reminders



- Please type your full name and organization in the chat box
- Use the chat function to speak with our team or ask questions

# VCU Diabetes & Hypertension ECHO Clinics

- Bimonthly, 1.5-hour tele-ECHO clinics **moving to 2nd and 4th Thursdays in 2021**
- Every tele-ECHO clinic includes a 30-minute didactic presentation followed by case discussions
- Didactic presentations are developed and delivered by interprofessional experts
- Website: [www.vcuhealth.org/echodmhtn](http://www.vcuhealth.org/echodmhtn)
  - Directions for creating an account and claiming CE can be found here also
  - You have up to six days after our session to claim CE by texting **19139-18817** to **804-625-4041**

# Hub and Participant Introductions



## VCU Team

Principal Investigator	Dave Dixon, PharmD
Administrative Medical Director ECHO Hub	Vimal Mishra, MD, MMCI
Clinical Experts	Niraj Kothari, MD Trang Le, MD
Project Coordinator/IT Support	Madeleine Wagner, BA
Program Manager	Bhakti Dave, MPH

- Use **chat** function for introduction
  - Name
  - Organization

Reminder: **Mute** and **unmute** screen to talk or press **\*6** for phone audio

# ECHO is all teach, all learn

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## Housekeeping items



Interactive



Co-management  
of cases



Peer-to-peer  
learning



Collaborative  
problem solving

- Please feel free to eat your lunch or step away briefly if needed
- We are recording and will post each session to the website
- We encourage you to keep your camera on, but if you are uncomfortable being recorded, feel free to turn it off
- Please **do not share any protected health information** in your discussion
- Project ECHO operates on the “All Teach, All Learn” model
  - Feel free to ask questions in the chat or unmute to ask questions at designated times
  - We’re all here to learn from each other and value each person’s input and expertise!



# What to Expect

- I. Didactic Presentations
  - I. Initial treatment options for HTN
- II. Case presentations
  - I. Case 1
    - I. Case summary
    - II. Clarifying questions
    - III. Recommendations
  - II. Case 2
    - I. Case summary
    - II. Clarifying questions
    - III. Recommendations
- III. Closing and questions



Let's get started!

Didactic Presentation



# Disclosures

Trang Le, MD has no financial conflicts of interest to disclose.  
Niraj Kothari, MD has no financial conflicts of interest to disclose.  
There is no commercial or in-kind support for this activity.

# Learning Objectives

- Apply current best practices for comprehensive diabetes and hypertension care to patient case scenarios.
- Recognize best practices for implementing team-based diabetes and hypertension care.
- Demonstrate awareness of opportunities to improve care provided to patients with diabetes and hypertension.

# Initial Treatment Options for Hypertension

# Learning Objectives

- Review mechanisms of treatments for HTN
- Recognize risks and benefits of various agents for HTN
- Identify comorbidities that may influence selection of initial antihypertensive medications

Category	Office reading (mmHg)	24-hour ambulatory (mmHg)	Self-recorded (mmHg)
Normal	SBP < 120 and DBP < 80		
Elevated BP	SBP 120-129 and DBP < 80		
HTN Stage 1	SBP 130-139 or DBP 80-89		
HTN Stage 2	SBP ≥ 140 or DBP ≥ 90	>130/80	135/85

# Why does HTN treatment matter?

- Significant risk reduction
  - Stroke: 35-40%
  - MI: 20-25%
  - Heart failure: > 50%

# Considerations

- Efficacy
- Cost
- Comorbidities (CKD, HTN, DM, high ASCVD risk, advanced age)
- Contributing factors (pain, stress, salt intake, EtOH, drug use, etc)
- Patient goals and preferences (including pill burden)
- Control of HTN is more important than the choice of drug



# ASCVD risk calculator

- [ASCVD Risk Estimator + \(acc.org\)](https://acc.org)
- Do not use for patients with known ASCVD

# Initial therapy

- Lifestyle changes good for everyone: low sodium/DASH, wt loss, exercise
- Nonpharmacologic therapy: 120-129/<80 or stage 1 with 10 year ASCVD risk < 10%
- Nonpharm ± drugs: BP > 130/80 and CV disease, 10 year ASCVD risk > 10%, BP > 140/90: goal <130/80
- Two first-line drugs in different classes: Stage 2 HTN or BP average 20/10mmHg above target

# Nonpharmacological Interventions

2

COR	LOE	Recommendations for Nonpharmacological Interventions
I	A	Weight loss is recommended to reduce BP in adults with elevated BP or hypertension who are overweight or obese.
I	A	A heart-healthy diet, such as the DASH (Dietary Approaches to Stop Hypertension) diet, that facilitates achieving a desirable weight is recommended for adults with elevated BP or hypertension.
I	A	Sodium reduction is recommended for adults with elevated BP or hypertension.
I	A	Potassium supplementation, preferably in dietary modification, is recommended for adults with elevated BP or hypertension, unless contraindicated by the presence of CKD or use of drugs that reduce potassium excretion.



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CARDIOLOGY

# Nonpharmacological Interventions (cont.)



COR		LOE		Recommendations for Nonpharmacological Interventions
I		A		Increased physical activity with a structured exercise program is recommended for adults with elevated BP or hypertension.
I		A		Adult men and women with elevated BP or hypertension who currently consume alcohol should be advised to drink no more than 2 and 1 standard drinks* per day, respectively.

\*In the United States, 1 “standard” drink contains roughly 14 g of pure alcohol, which is typically found in 12 oz of regular beer (usually about 5% alcohol), 5 oz of wine (usually about 12% alcohol), and 1.5 oz of distilled spirits (usually about 40% alcohol).

## Best Proven Nonpharmacological Interventions for Prevention and Treatment of Hypertension\*

	Nonpharmacological Intervention	Dose	Approximate Impact on SBP	
			Hypertension	Normotension
Weight loss	Weight/body fat	Best goal is ideal body weight, but aim for at least a 1-kg reduction in body weight for most adults who are overweight. Expect about 1 mm Hg for every 1-kg reduction in body weight.	-5 mm Hg	-2/3 mm Hg
Healthy diet	DASH dietary pattern	Consume a diet rich in fruits, vegetables, whole grains, and low-fat dairy products, with reduced content of saturated and total fat.	-11 mm Hg	-3 mm Hg
Reduced intake of dietary sodium	Dietary sodium	Optimal goal is <1500 mg/d, but aim for at least a 1000-mg/d reduction in most adults.	-5/6 mm Hg	-2/3 mm Hg
Enhanced intake of dietary potassium	Dietary potassium	Aim for 3500–5000 mg/d, preferably by consumption of a diet rich in potassium.	-4/5 mm Hg	-2 mm Hg

\*Type, dose, and expected impact on BP in adults with a normal BP and with hypertension.  
DASH indicates Dietary Approaches to Stop Hypertension; and SBP, systolic blood pressure.  
Resources: Your Guide to Lowering Your Blood Pressure With DASH—How Do I Make the DASH?  
Available at: <https://www.nhlbi.nih.gov/health/resources/heart/hbp-dash-how-to>.  
Top 10 Dash Diet Tips. Available at: [http://dashdiet.org/dash\\_diet\\_tips.asp](http://dashdiet.org/dash_diet_tips.asp)

## Best Proven Nonpharmacological Interventions for Prevention and Treatment of Hypertension\* (cont.)

	Nonpharmacological Intervention	Dose	Approximate Impact on SBP	
			Hypertension	Normotension
Physical activity	Aerobic	<ul style="list-style-type: none"> <li>● 90–150 min/wk</li> <li>● 65%–75% heart rate reserve</li> </ul>	-5/8 mm Hg	-2/4 mm Hg
	Dynamic resistance	<ul style="list-style-type: none"> <li>● 90–150 min/wk</li> <li>● 50%–80% 1 rep maximum</li> <li>● 6 exercises, 3 sets/exercise, 10 repetitions/set</li> </ul>	-4 mm Hg	-2 mm Hg
	Isometric resistance	<ul style="list-style-type: none"> <li>● 4 × 2 min (hand grip), 1 min rest between exercises, 30%–40% maximum voluntary contraction, 3 sessions/wk</li> <li>● 8–10 wk</li> </ul>	-5 mm Hg	-4 mm Hg
Moderation in alcohol intake	Alcohol consumption	<p>In individuals who drink alcohol, reduce alcohol<sup>†</sup> to:</p> <ul style="list-style-type: none"> <li>● Men: ≤2 drinks daily</li> <li>● Women: ≤1 drink daily</li> </ul>	-4 mm Hg	-3 mm

\*Type, dose, and expected impact on BP in adults with a normal BP and with hypertension.

<sup>†</sup>In the United States, one “standard” drink contains roughly 14 g of pure alcohol, which is typically found in 12 oz of regular beer (usually about 5% alcohol), 5 oz of wine (usually about 12% alcohol), and 1.5 oz of distilled spirits (usually about 40% alcohol).

Drug class	Example	Site of action	Effect	Adverse events
Carbonic anhydrase inhibitors	Acetazolamide	Carbonic anhydrase in the proximal convoluted tubule	Prevents dehydration of $\text{H}_2\text{CO}_3$ and hydration of $\text{CO}_2$ , leading to reduced reabsorption of $\text{HCO}_3^-$ and subsequent diuresis	Metabolic acidosis Hypokalemia GI upset Tinnitus
Loop diuretics	Furosemide Torsemide	NKCC transporter in the thick ascending loop of Henle	Prevents reabsorption of Na-K-2Cl, leading to diuresis	Hyponatremia Hypokalemia Hypomagnesemia Hypocalcemia
Thiazides	<u>Chlorthalidone</u> <u>HCTZ</u> Metolazone	NCC transporter in the distal convoluted tubule	Prevents reabsorption of Na-Cl, leading to diuresis	Hyponatremia Hypokalemia HyperGLUC (glucose/lipids/uric acid/Ca)
Mineralocorticoid receptor antagonists (K sparing)	Spironolactone Eplerenone	Aldosterone receptor in the collecting tubule	Inhibits function of ENaC and basolateral Na-K ATPase, leading to diuresis	Hyperkalemia Gynecomastia (spironolactone)

Drug class	Example	Site of action	Effect	Adverse events
Direct renin inhibitor	Aliskiren	Renin	Inhibits renin-catalyzed conversion of angiotensinogen to angiotensin I	Hyperkalemia Teratogenicity AKI
Angiotensin converting enzyme inhibitor	<u><b>“-prils”</b></u>	Angiotensin converting enzyme (lungs)	Inhibits conversion of angiotensin I to angiotensin II, as well as degradation of bradykinin	Hyperkalemia Teratogenicity AKI Cough
Angiotensin receptor blocker	<u><b>“-sartans”</b></u>	Angiotensin receptor	Inhibits activity of angiotensin receptor	Hyperkalemia Teratogenicity AKI



# General Principles of Drug Therapy

2

COR	LOE	Recommendation for General Principle of Drug Therapy
<b>III: Harm</b>	<b>A</b>	Simultaneous use of an ACE inhibitor, ARB, and/or renin inhibitor is potentially harmful and is not recommended to treat adults with hypertension.

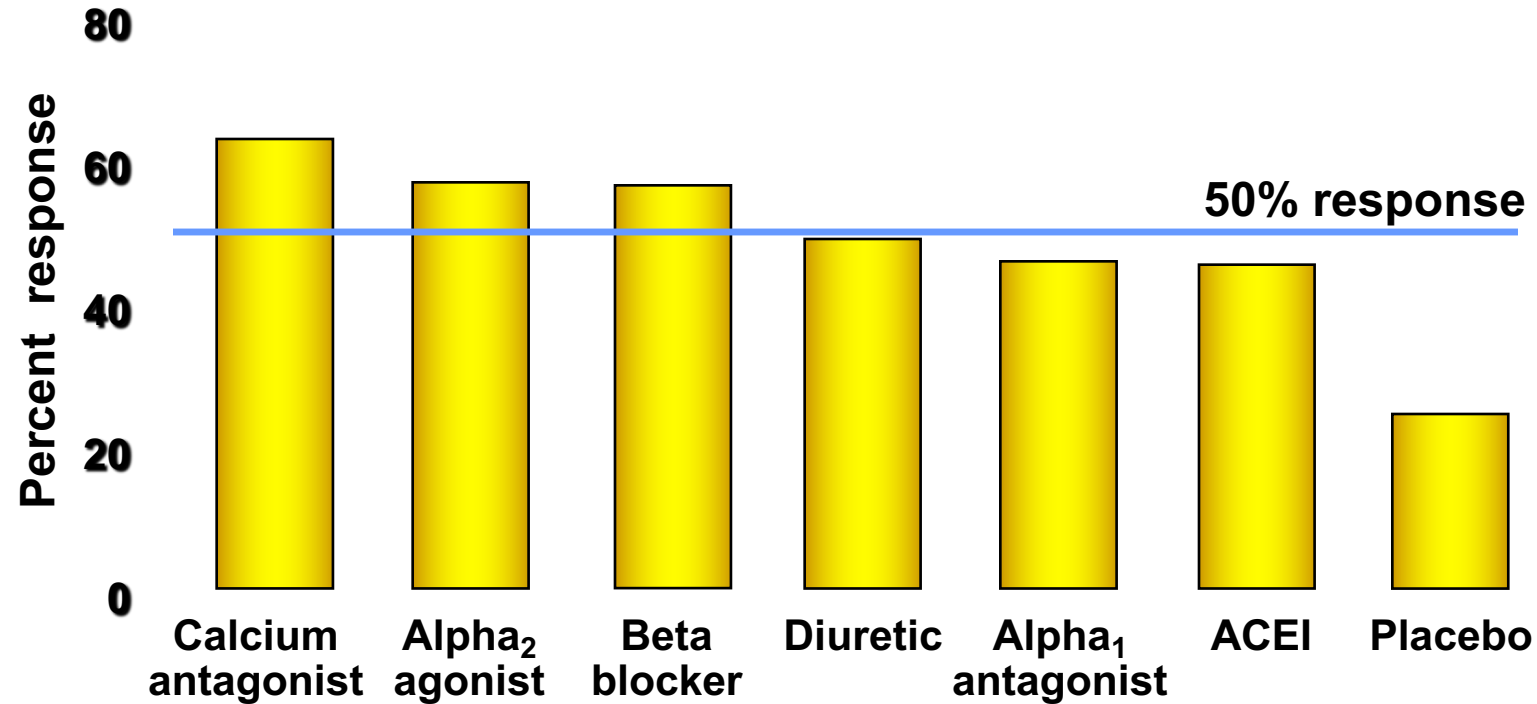
Drug class	Example	Site of action	Effect	Adverse events
$\alpha$ -1 antagonists	“-azosins” Phenoxybenzamine Phentolamine	Vascular smooth muscle ( $\alpha$ -1 receptors) Some $\alpha$ -2 blocking activity (phenoxybenzamine and phentolamine)	Vasodilation	-azosins: postural hypotension, salt/water retention Phenoxybenzamine: postural hypotension, reflex tachycardia Phentolamine: reflex tachycardia
$\alpha$ -2 agonists	Clonidine Methyldopa	Presynaptic $\alpha$ -2 receptors in CNS	Inhibit release of norepinephrine and decrease centrally mediated sympathetic tone	Clonidine: drowsiness, rebound HTN
$\beta$ -blockers	“-olols” Carvedilol Labetalol	$\beta$ -receptors in kidney (juxtaglomerular cells) and heart	Reduce activity of RAAS and cardiac output	Heart block, bradycardia, bronchospasm (esp. in nonselective agents such as propranolol). Don't use in patients who abuse cocaine!

Drug class	Example	Site of action	Effect	Adverse events
Arterial vasodilators	Hydralazine Minoxidil	Vascular smooth muscle	Vasodilation	Hydralazine: headache, reflex tachycardia, lupus-like syndrome Minoxidil: reflex tachycardia, edema, hypertrichosis
Nondihydropyridine calcium channel blockers	Verapamil Diltiazem	Mostly heart: L-type calcium channels	Reduced HR, myocardial contractility, and cardiac output, reduced BP	Bradycardia
Dihydropyridine calcium channel blockers	<u><b>"-dipines"</b></u>	Vascular smooth muscle L-type calcium channels	Vasodilation	Edema, gingival hyperplasia, constipation

# What if the initial therapy doesn't work?

- Increase dose
- Add another drug
- Consider evaluation for secondary causes of HTN (especially if resistant HTN present)
  - Uncontrolled despite 3 or more antihypertensives (including a diuretic) or controlled on 4 antihypertensive agents (including a diuretic)

# Monotherapy Is Inadequate in 40%–60% of Hypertensive Patients



Response defined as DBP <95 mm Hg after one year of treatment

# General contraindications

History of:	Avoid these antihypertensive drugs
Angioedema	ACE inhibitor, ARB
Bronchospastic disease	Beta blocker
Depression	Reserpine
Liver Disease	Methyldopa
Pregnancy	ACE inhibitor, ARB (includes women likely to become pregnant), renin inhibitor
Second or third degree heart block	Beta blocker, nondihydropyridine calcium channel blocker

# Other considerations

History of:	Consider avoiding:
Depression	Beta blocker, central alpha agonist
Gout	Diuretic
Hyperkalemia	Aldosterone antagonist, ACE inhibitor, ARB
Hyponatremia	Thiazide diuretic
Renovascular disease	ACE inhibitor or ARB

*Adapted from The Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure, JAMA 2003;289:2560*

# Special circumstances

- Avoid RAAS blockade or aldosterone antagonists in pregnant women or women likely to become pregnant
- Diabetes: ADA goal BP 140/90, ACC/AHA guidelines 130/80
  - RAAS blockade first line in patients with albuminuria
- Thiazides/CCBs first line in African-Americans with or without DM
- Older patients: isolated systolic HTN, orthostasis, falls more common
  - ACP/AAFP guidelines for patients  $\geq 60$  :
    - target SBP  $< 150$ mmHg
    - SBP  $< 140$ mmHg in patients with hx stroke/TIA or high cardiovascular risk
  - ACC/AHA guidelines for patients  $\geq 65$ :
    - Target SBP  $< 130$ mmHg
  - Thiazides/CCBs may be more effective
  - Avoid  $\alpha$ -blockade, vasodilators, centrally acting agents if possible
  - Frail patients: risk of lowering BP may exceed benefits



# Pregnancy

- Discontinue ACEi/ARB/direct renin inhibitor prior to conception!
- HTN may be masked in 1<sup>st</sup> trimester
- HTN after 20 weeks without preexisting HTN/proteinuria/end organ damage is gestational HTN
  - Should resolve within 12 weeks of delivery—if not, chronic HTN
  - 15-25% -> preeclampsia (low dose ASA at end of first trimester may prevent)
- Pre-eclampsia: new onset HTN after 20wks with  $\geq 300\text{mg}$  proteinuria OR other end-organ damage

# How do we treat HTN in pregnancy and preeclampsia?

- Methyldopa and labetalol are thought to be safe
- CCBs
- Don't use diuretics! May induce oligohydramnios
- Nitroprusside -> fetal cyanide toxicity
- ACOG: treat BP > 160/105 in chronic HTN, > 160/110 in preeclampsia
  - Goal BP in chronic HTN: 120-160/80-105
  - No target in preeclampsia
- Definitive tx of preeclampsia: delivery
  - Severe preeclampsia (BP >160/110 + thrombocytopenia, renal dysfunction, liver dysfunction, pulmonary edema, cerebral or visual symptoms): consider delivery (regardless of gestational age) vs MgSO<sub>4</sub>

# Cost matters

- Many commonly used antihypertensive medications are affordable but vast differences in price exist within classes
- Losartan 100mg \$9/month vs. candesartan 32mg \$35/month

# Questions?



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# Case presentation #1

- 53yo AAF with resistant HTN
- PMH: ESKD (does not produce urine), chronic pain
- Meds: carvedilol 25mg BID, clonidine 0.2mg BID, felodipine 10mg daily
- HR 60
- Adverse reactions with hydralazine (dyspnea) and ACEi (angioedema)
- Limited education
- Challenge: what other treatment options are available for this patient? What other factors need to be considered?

# Case presentation #2

- 76yo AAF with HTN
- PMH: CKD 3b (eGFR ~35mL/min/1.73m<sup>2</sup>), DM2, chronic pain
- Meds: amlodipine 10mg, diclofenac, hydralazine 25mg TID, HCTZ 25mg, lisinopril 5mg
- BP well controlled for age, 130s/70s at home and in office. Pt complains of pill burden.
- Challenge: can we simplify this regimen? What else is affecting her BP? How else can we optimize her regimen given her comorbidities?

# Case Studies

- Anyone can submit cases: [www.vcuhealth.org/echodmhtn](http://www.vcuhealth.org/echodmhtn)
- Receive feedback from participants and content experts
- Earn **\$150** for submitting and presenting

# Provide Feedback

[www.vcuhealth.org/echodmhtn](http://www.vcuhealth.org/echodmhtn)

- Feedback
  - Overall feedback related to session content and flow?
  - Ideas for guest speakers?



# Access Your Evaluation

vcuhealth.org/services/telehealth/for-providers/education/diabetes-and-hypertension-project-echo



## For Providers

Education -

**Diabetes and Hypertension Project ECHO** -

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Curriculum

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VCU Nursing Home ECHO +

VCU Health Palliative Care ECHO +

Virginia Opioid Addiction ECHO +

Virginia Sickle Cell Disease ECHO +

# Diabetes and Hypertension Project ECHO

Welcome to the Diabetes and Hypertension Extension for Community Health Outcomes or ECHO, a virtual network of multidisciplinary diabetes and hypertension experts. An ECHO model connects professionals with each other in real-time collaborative virtual sessions on Zoom. Participants present de-identified cases to one another, share resources, connect to each other, and grow in their expertise. This ECHO will address practice level issues and solutions related to managing complex patients with difficult to control diabetes and hypertension. [Register now for an ECHO Session!](#)

## Network, Participate and Present

- Engage in a collaborative community with your peers.
- Listen, learn and discuss informational and case presentations in real-time.
- Take the opportunity to [submit your de-identified case study](#) for feedback from a team of specialists for diabetes and hypertension.
- [Provide valuable feedback.](#)
- Claim CE credit by [texting in attendance](#).

## Benefits



## VCU Diabetes & Hypertension ECHO Clinics

2<sup>nd</sup> and 4<sup>th</sup> Thursdays — 12-1:30 p.m. (2021)

### **Mark Your Calendar — Upcoming Sessions**

Moving to 2<sup>nd</sup> and 4<sup>th</sup> THURSDAYS

Jan. 14: Teaching patients diabetes self-management skills

Jan. 28: Chronic Kidney Disease

Please register at [www.vcuhealth.org/echodmhtn](http://www.vcuhealth.org/echodmhtn)

THANK YOU!



<https://VCU.cloud-cme.com/WebService/SelfAttendScan.aspx?EventID=19139>

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