



# CARDI•OH

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# Project ECHO<sup>®</sup>: Creating a Virtual Community of Practice

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Patricia Wigle, PharmD  
Daniel Hargraves, MSW



# Disclosures



The following planners, speakers, moderators, and/or panelists of the CME activity have no financial relationships with commercial interests to disclose:

- Goutham Rao, MD, FAHA
- Michael B. Holliday, MD
- Chris White, MD, JD, MHA
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- Daniel Hargraves, MSW

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# Objectives



- Understand how ECHO learning sessions can be used to disseminate best practices regarding hypertension care
- Recall the model structure of an ECHO session
- Describe the roles of different participants in an ECHO learning session

# What is Project ECHO?

- Extension for Community Health Outcomes (ECHO)
- Originated in New Mexico (Sanjeev Arora, MD)
- The purpose of Project ECHO was to educate, train, and support rural general practitioners or other available healthcare representatives on the best practice treatment protocols for complex diseases they encounter in their communities. This model focused on the principles of case-based learning and disease management using the telemedicine infrastructure and internet-based technologies to co-manage patients in community-based practices. The ultimate goal of Project ECHO was to provide the same level of healthcare to rural patients with chronic diseases as can be obtained in an urban setting.

# What is Project ECHO?

- ***Moving Knowledge,  
Not People***

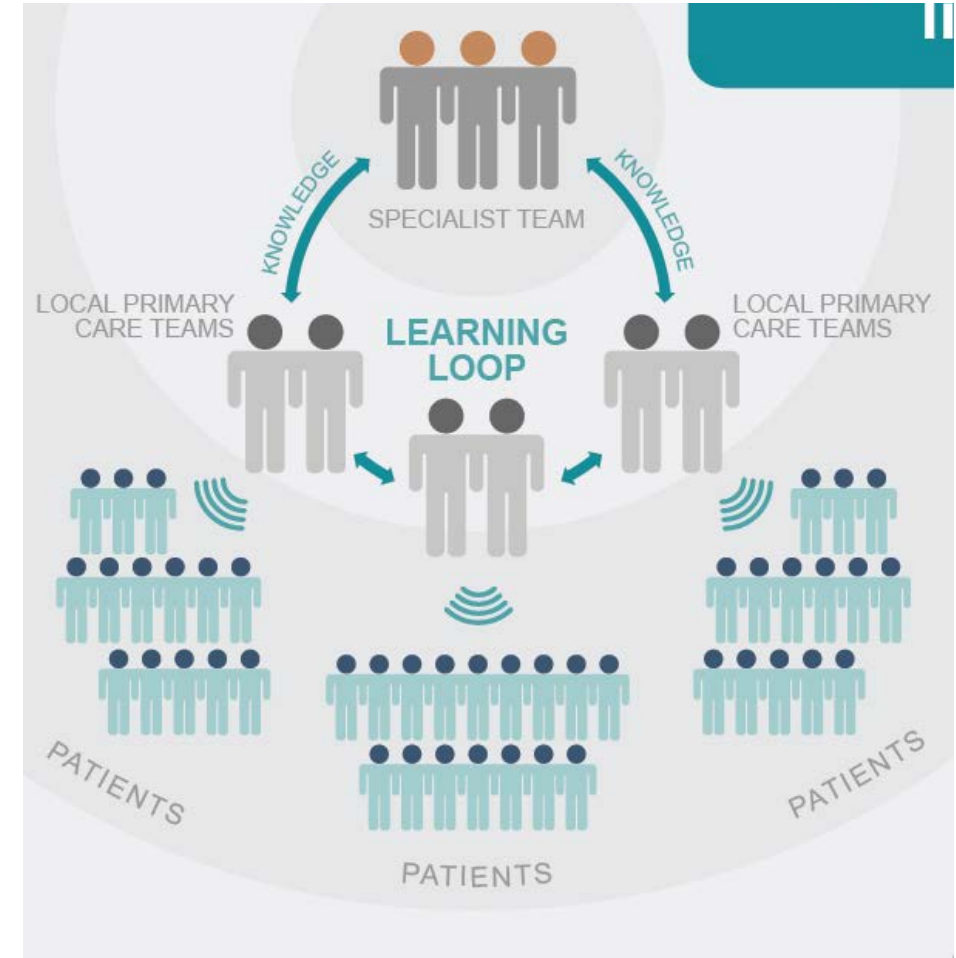
## Changing the World, Fast

Replicating the ECHO model across the U.S. dramatically increases the number of community partners participating in ECHO, enabling more people in rural and underserved communities to get the care they need.

- 80+ U.S. Sites
- 50+ Global Partners
- 23+ Countries

**GOAL**

touch the lives of  
**1 Billion by 2025**



# What is Project ECHO?



*The NEW ENGLAND JOURNAL of MEDICINE*

ORIGINAL ARTICLE

## Outcomes of Treatment for Hepatitis C Virus Infection by Primary Care Providers

Sanjeev Arora, M.D., Karla Thornton, M.D., Glen Murata, M.D.,  
Paulina Deming, Pharm.D., Summers Kalishman, Ph.D., Denise Dion, Ph.D.,  
Brooke Parish, M.D., Thomas Burke, B.S., Wesley Pak, M.B.A.,  
Jeffrey Dunkelberg, M.D., Martin Kistin, M.D., John Brown, M.A.,  
Steven Jenkusky, M.D., Miriam Komaromy, M.D., and Clifford Qualls, Ph.D.

# Cardi-OH's ECHO Hypertension



- 12 week pilot program from February 7, 2019-May 2, 2019
- Didactic sessions, or pearls, were led by physicians from CWRU and partnering institutions

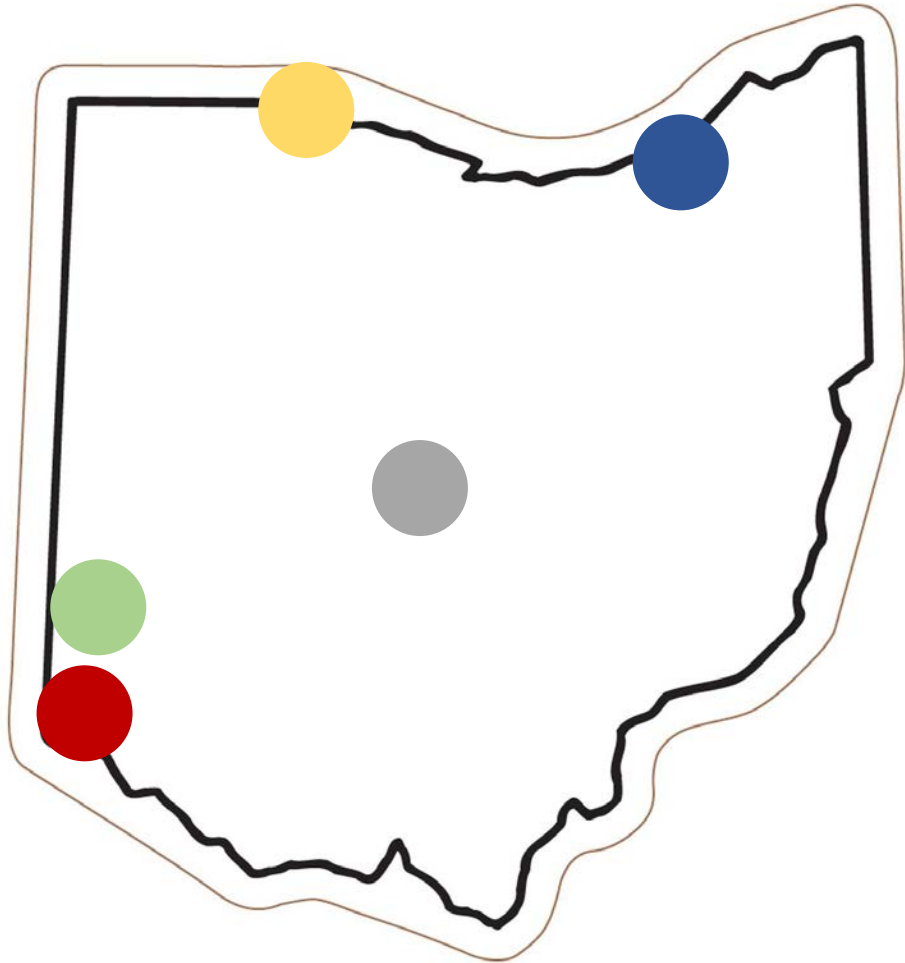
Week	Course Title
1	Update on Blood Pressure Guidelines: With a Focus on Social Determinants of Health
2	What's new in measurement?
3	Unrecognized hypertension – Strategies to improve diagnosis
4	Team-based approaches to hypertension management
5	What's new in recommendations for pharmacotherapy?
6	Update on lifestyle changes for blood pressure control
7	Integrated approach to cardiovascular risk management
8	Treatment of hypertension in special populations
9	Overview and treatment of resistant hypertension
10	Diagnosis and evaluation of secondary hypertension
11	Shared decision making in hypertension management
12	Wrap-up/Questions



# ECHO Hypertension: Health Center Participants



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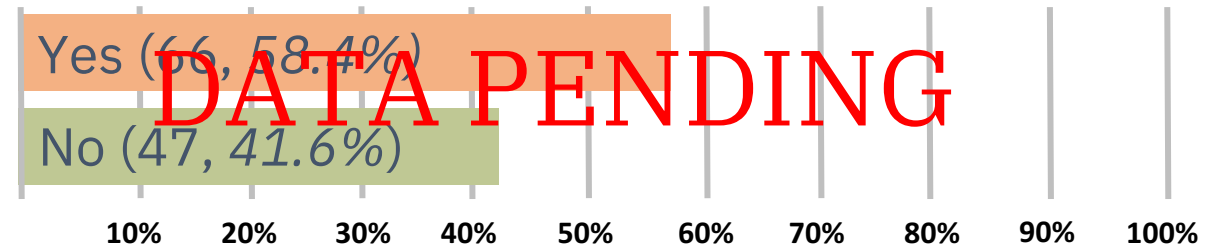
1. Wright State Physicians Geriatrics, Fairborn (Dayton)
2. Five Rivers Medical Surgical Health Center, Dayton
3. Neighborhood Family Practice, Cleveland
4. MetroHealth Bedford Family Medicine, Bedford
5. Cincinnati Health Department Community Health Center, Cincinnati
6. Crossroad Health Center, Cincinnati
7. Healthcare for the Homeless, Cincinnati
8. Total Health and Wellness, Columbus
9. Community Health Services, Fremont

# ECHO Hypertension: Evaluation



- Participants were administered a 5-item survey after each session
- Sessions had an average attendance of **DATA PENDING**
- Average survey response rate was **DATA PENDING**
- Results are aggregate from all post-session surveys

1. Prior to this clinic, did you have a knowledge gap on this topic?  
(n=XXX)

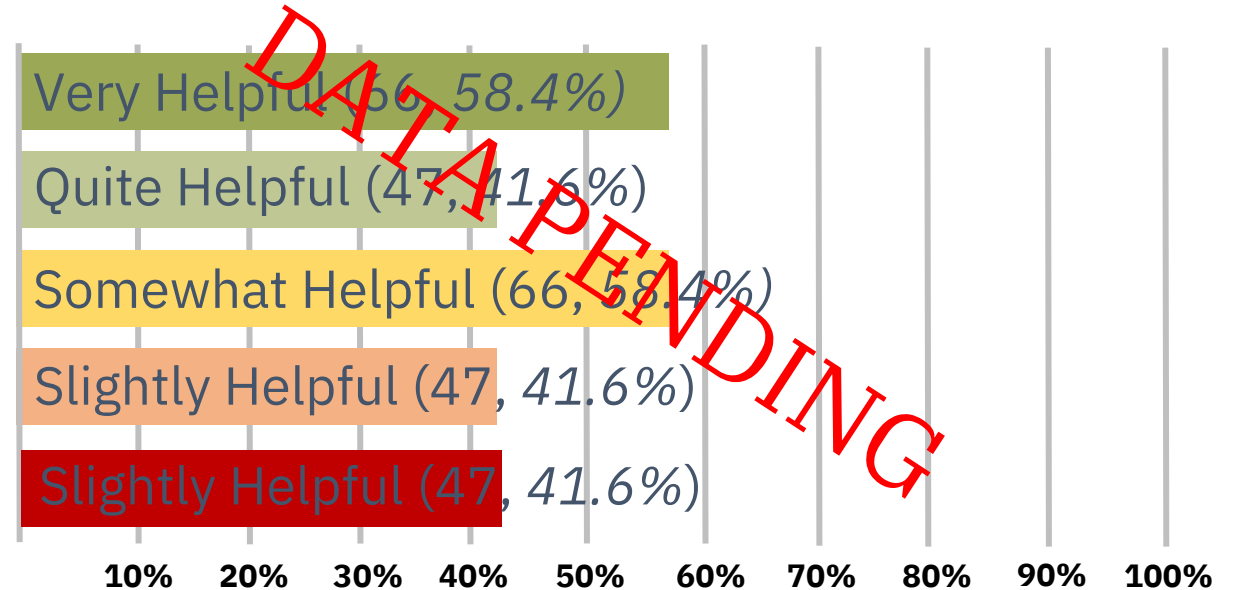


2. Briefly describe this gap.

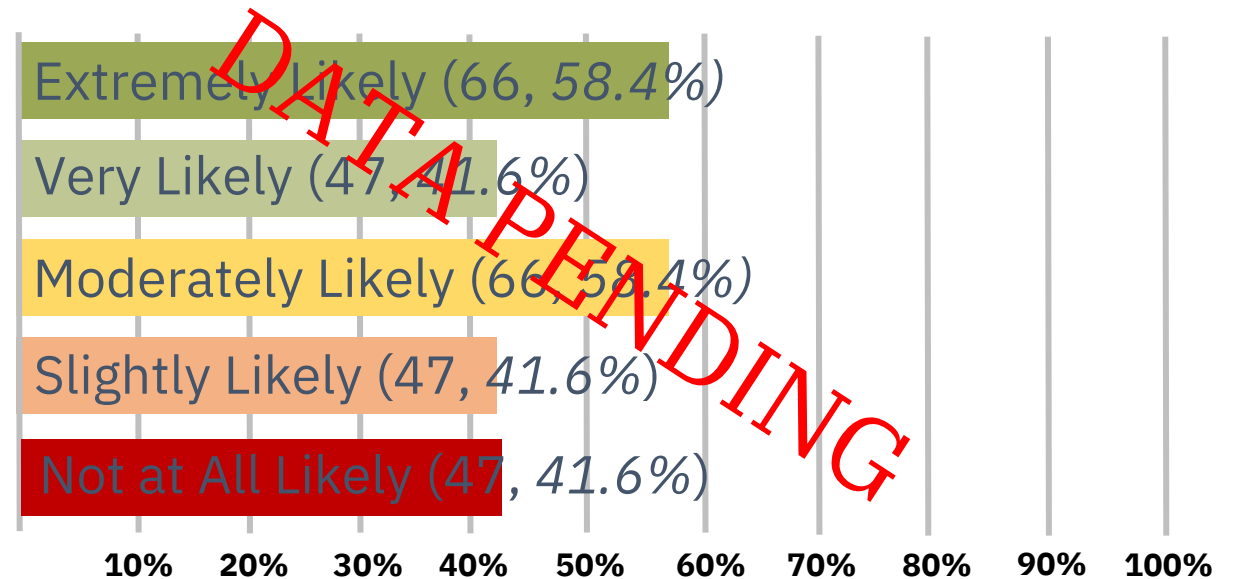


# ECHO Hypertension: Evaluation

3. How helpful was this clinic in addressing this gap? (n=XX)



4. What is the likelihood that you will incorporate new information from today's clinic into your clinical practice? (n=XX)



# Advances in Hypertension Pharmacotherapy

Michael B. Holliday, MD

Associate Professor

Department of Family and Community  
Medicine

University of Cincinnati





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# Objectives

- Identify BP targets for hypertension pharmacologic treatment
- Use a patient-centered approach to arrive at more effective anti-hypertensive regimens
- Prescribe potentially underutilized medications to achieve blood pressure treatment goals

# Determinants of Patient-centered Pharmacotherapy

- Measure BP accurately
- Diagnosis threshold and treatment targets
- Effective drug combinations
- Integration with non-pharmacologic treatment
- Interventions that increase adherence to therapy





# 7 SIMPLE TIPS TO GET AN ACCURATE BLOOD PRESSURE READING

The common positioning errors can result in inaccurate blood pressure measurement. Figures shown are estimates of how improper positioning can potentially impact blood pressure readings.

Sources:

1. Pickering, et al. Recommendations for Blood Pressure Measurement in Humans and Experimental Animals Part 1: Blood Pressure Measurement in Humans. *Circulation*. 2005;111: 697-716.
2. Handler J. The importance of accurate blood pressure measurement. *The Permanente Journal/Summer 2009/Volume 13 No. 3* 51

This 7 simple tips to get an accurate blood pressure reading was adapted with permission of the American Medical Association and The Johns Hopkins University. The original copyrighted content can be found at <https://www.ama-assn.org/ama-johns-hopkins-blood-pressure-resources>.

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TARGET: **BP**



# Accurate Diagnosis of Hypertension



- Accurate office measurement
  - Automated cuff preferred<sup>1</sup>
  - Proper technique<sup>2</sup>
  - Repeat if reading is elevated<sup>3</sup>
- Measurement outside the office<sup>4</sup>
  - Home Blood Pressure Monitoring (HMBP)
  - Ambulatory Blood Pressure Monitoring (ABPM)

1. Myers MG, Godwin M, Dawes M, et al. Conventional versus automated measurement of blood pressure in primary care patients with systolic hypertension: Randomized parallel design controlled trial. *BMJ*. 2011. doi:10.1136/bmj.d286

2. Johnson KC, Whelton PK, Cushman WC, et al. Blood pressure measurement in SPRINT (Systolic Blood Pressure Intervention Trial). *Hypertension*. 2018;71(5):848-857. doi:10.1161/HYPERTENSIONAHA.117.10479

3. Windover AK, Martinez K, Mercer MB, Neuendorf K, Boissy A, Rothberg MB. Association of Repeated Measurements With Blood Pressure Control in Primary Care. *JAMA Intern Med*. 2018;178(6):857-858. doi:10.1001/jamainternmed.2018.0019

4. Melville S, Byrd JB. Out-of-Office Blood Pressure Monitoring in 2018. *JAMA*. 2018;320(17):1805-1806. doi:10.1001/jama.2018.14865



# Accurate Diagnosis of Hypertension



Corresponding Values of SBP/DBP for Clinic, HBPM, Daytime, Nighttime and 24-Hour ABPM Measurements

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

**ABPM** = ambulatory blood pressure monitoring; **BP** = blood pressure;  
**DBP** = diastolic blood pressure; **SBP** = systolic blood pressure;  
**HBPM** = home blood pressure monitoring



# Accurate Diagnosis of Hypertension

## Categories of BP in Adults\*

BP Category	SBP		DBP
Normal	<120 mm Hg	and	<80 mm Hg
Elevated	120–129 mm Hg	and	<80 mm Hg
<b>Hypertension</b>			
Stage 1	130–139 mm Hg	or	80–89 mm Hg
Stage 2	≥140 mm Hg	or	≥90 mm Hg

\*Individuals with SBP and DBP in 2 categories should be designated to the higher BP category.

Table 6

# BP Rx Thresholds and Goals

## When to start pharmacotherapy

### **≥140/90**

- No clinical CVD and 10 year ASCVD risk <10%
- Secondary stroke prevention

### **≥130/80**

*Everyone else!*

**<130/80 for everyone**



Whelton PK, Carey RM, Aronow WS, et al. 2017 ACC/AHA/AAPA/ABC/ACPM/AGS/APhA/ASH/ASPC/NMA/PCNA Guideline for the Prevention, Detection, Evaluation, and Management of High Blood Pressure in Adults. *J Am Coll Cardiol.* 2017. doi:10.1016/j.jacc.2017.11.006

# The Elderly

- Some controversy
- 2017 AHA/ACC Guidelines recommend systolic BP of 130 as the threshold for treatment and <130 as the target.
- New data from a broader population over a longer period of time
- Tighter control associated with increase in mortality in those >80 and with higher baseline CV risk.
- Tighter control more likely to benefit those 70-79

# Adherence

- Urine studies show partial nonadherence in over 1/2 of patients and no drug in 1/3<sup>1</sup>
- Promising interventions
  - Regimen simplification
  - Reduction of out-of-pocket costs
  - Team-based collaborative care
  - Self-monitoring of BP<sup>2</sup>



1. Cai A, Calhoun DA. Resistant Hypertension: An Update of Experimental and Clinical Findings. *Hypertension*. 2017;70(1):5-9. doi:10.1161/HYPERTENSIONAHA.117.08929

2. Vrijens B, Antoniou S, Burnier M, de la Sierra A, Volpe M. Current Situation of Medication Adherence in Hypertension. *Front Pharmacol*. 2017;8. doi:10.3389/fphar.2017.00100

## Cardi-OH ECHO Hypertension - Case Study Form

Please enter your de-identified patient case information on this Case Study Form. This will be shared with the Cardi-OH ECHO Facilitator and shown as a part of your presentation of the case.

Presenter Last Name \_\_\_\_\_

Presenter First Name \_\_\_\_\_

Presenter Clinical Role

- Physician
- Nurse Practitioner
- Physician Assistant
- RN
- LPN
- Medical Assistant
- Dietitian
- Social Work
- Psychologist
- Pharmacist
- Other

Presenter Clinical Role - Other \_\_\_\_\_

Presenter Phone Number \_\_\_\_\_

Presenter Email \_\_\_\_\_

Clinical Institution

- Cincinnati Health Department Community Health Center
- Community Health Services
- Crossroad Health Center
- Five Rivers Medical Surgical Health Center
- Healthcare for the Homeless Health Center
- Neighborhood Family Practice
- OhioHealth Family Medicine Residency Clinic
- Total Health and Wellness
- Wright State Physicians Geriatrics
- MetroHealth Medical Center

Case Type

- New
- Follow-up

Patient Age \_\_\_\_\_

Patient Gender

- Male
- Female
- Neutral
- Transgender
- Other

Patient Gender - Other \_\_\_\_\_

# Patient Case Discussion



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Patient Race  American Indian or Alaska Native  
 Asian  
 Black or African American  
 Native Hawaiian or Other Pacific Islander  
 White  
 Other

Patient Race - Other \_\_\_\_\_

Patient Ethnicity  Hispanic or Latino  
 Not Hispanic or Latino

What do you want to discuss about this case?  
 \_\_\_\_\_

History of Present Illness  
 \_\_\_\_\_

Past Medical History  
 \_\_\_\_\_

Medications  
 \_\_\_\_\_

Vital Signs and Focused Exam  
 \_\_\_\_\_

Recent blood pressure reading 1  
 \_\_\_\_\_

Date of blood pressure reading 1  
 \_\_\_\_\_

Where was blood pressure reading 1 taken?  Home  
 Office  
 Other

Location of reading 1 - other  
 \_\_\_\_\_

Recent blood pressure reading 2  
 \_\_\_\_\_

Date of blood pressure reading 2  
 \_\_\_\_\_

Where was blood pressure reading 2 taken?  Home  
 Office  
 Other

# Patient Case Discussion



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Location of reading 2 - other \_\_\_\_\_

Recent blood pressure reading 3 \_\_\_\_\_

Date of blood pressure reading 3 \_\_\_\_\_

Where was blood pressure 3 reading taken?  Home  
 Office  
 Other

Location of reading 3 - other \_\_\_\_\_

Most Recent Pertinent Labs and Date (HDL, LDL, Triglycerides, Sodium, Potassium, Creatinine, any others) \_\_\_\_\_

Relevant Co-Morbidities (Including: Mental Illness, Cognitive, Sensory, or Functional Impairment) \_\_\_\_\_

Relevant Social History (e.g. Alcohol/Tobacco/Substance Use, Financial Stress, Housing Issues, Occupation, or Other Burdens) \_\_\_\_\_

Insurance Status  Private Insurance  
 Public Insurance  
 Uninsured

Do you have any questions regarding assessment/diagnosis of this patient? \_\_\_\_\_

Do you have any questions regarding management/symptom complaint for this patient? \_\_\_\_\_

Do you have any questions regarding treatment/medication for this patient? \_\_\_\_\_

Do you have any questions regarding patient adherence? \_\_\_\_\_

Do you have any other questions? \_\_\_\_\_

# Patient Case Discussion



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- **Gender:** Male
- **Age:** 55 years
- **Race/Ethnicity:** African-American, Not Hispanic
- **Key question(s):** How to effectively partner with specialists in co-managing HTN
- **History of present illness: 1/17/19:**

-Presented from recovery program or alcohol abuse x 1 month, sober x 3 months, here to establish care.

-Reports hx HTN previously on lisinopril, HCTZ, amlodipine

-No meds in 6 mos, "doctors started to wean me off, then I just stopped." Thought exercise & diet would allow him to be off meds.

-+dizziness, SOB w/ exertion, intermittent ankle edema, blurred vision L eye x 1 wk. Denies cp, urinary complaints, confusion, severe headaches, syncope.

-Sent to ER.

### **1/23/19:**

-Hospital follow-up after 3-day admit for NSTEMI & hypertensive urgency.

-Ophthal: mild hypertensive retinopathy, no need for acute intervention, f/u 2/25.

-TTE with mod-severe LVH, EF 60-65%, stage 1-2 diastolic dysfunction. Rec'd inpt stress test but pt opted to leave.

-CXR normal

-A1C 6.7%, pt endorsed prior treatment w/ metformin but not restarted

-Felt better on discharge, but worse each day since, now R sided weakness & tingling; R occipital HA 4/10; CP & pressure x 3 episodes in past 2 days x 1 min each, 3/10, occurring at rest; SOB w/ climbing 2 steps, B/L foot cramping.

-Again sent to ER.

## History of present illness:

**1/30/19:** Hospital follow-up.

-Cath with 70% stenosis of medium sized mid D1; non-obstructive CAD elsewhere; multiple small coronary artery fistulae emptying into RA --> rec'd medical mgt.

-Stress test w/ transient ischemic dilation, L ventricular regional wall motion abnormal at stress w/ mild hypokinesis, no reversible perfusion defect.

-CT angio w/ contrast mild atherosclerosis of aortic arch, mod biventricular hypertrophy, B/L likely renal cysts, no hydronephrosis or hydroureter

-Cards f/u scheduled 2/13.

-Still w/ chest pain but never severe, unable to name associated symptoms, aggravating or alleviating factors.

-Still w/ R occipital headache with pain radiating down R trapezius, sore/throbbing, aggravated by crossing R arm over chest.

**2/19/19:** Cards and ophthal follow-up.

-Cards adjusted meds, ordered 48-hr holter monitor and cardiac CT

-Home BP checks 140s-190s/70s-90s

-BP in office 175/87, 171/89

-Ophthal ordered testing for May 2019

-Endorses lethargy, malaise, but chest pain has resolved. No dyspnea, edema, dizziness, syncope.

## Past Medical History:

- HTN
- Obesity
- Alcohol use disorder in early remission Tobacco dependence
- 1/23/19:
  - Diastolic dysfunction Type 2 DM (A1C 6.7%)
  - Acute NSTEMI
  - Increased serum creat (baseline ~1.5) HLD
  - Mild hypertensive retinopathy

## Medications:

-1/17/19: None

-1/23/19: amlodipine 10mg daily, aspirin 81mg daily, atorvastatin 40mg daily, hydralazine 25mg 3 x daily, HCTZ 25mg daily, lisinopril 40mg daily

-1/30/19: no new meds; provider started Nicorette gum + patches during this visit

-2/19/19: cardiology stopped lisinopril due to angioedema, increased hydralazine to 50mg 3 x daily and HCTZ to 50mg daily

## **Vital Signs and Focused Exam:**

-1/17/19: No facial droop or slurred speech, alert & oriented, CV/lung exam benign, no edema.

-1/23/19: Same as above but 4+/5 strength BLE and BUE.

-1/30/19: Same as above but with 5/5 strength BLE and BUE, TTP along R trapezius, R shoulder normal active ROM.

-2/19/19: Same as above but R neck/trapezius TTP resolved

## **Recent blood pressure reading 1:**

-1/17/19: 220/103, recheck after 5 mins 218/110, taken at office

## **Recent blood pressure reading 2:**

-1/23/19: 195/97, recheck after 5 mins 200/102, taken at office

## **Recent blood pressure reading 3:**

-1/30/19: 151/79, recheck after 5 mins 156/96, taken at office

## **Most Recent Pertinent Labs and Date (HDL, LDL, Triglycerides, Sodium, Potassium, Creatinine, any others):**

-1/17/19: Urine dip +30 proteinuria.

-1/23/19: A1C 6.7% (new diagnosis), lipids total 185/ trig 106/ HDL 39/ LDL 125, creat 1.5-1.7,renin 3.98, aldosterone 16.4, Na 140, K 4.0

-2/19: creat 1.7, eGFR 57, mag 2.1, HIV/STD panel negative

## **Relevant Co-Morbidities (Including: Mental Illness, Cognitive, Sensory, or Functional Impairment):**

-Depression per hospital records - at 3rd visit,pt endorsed history of depression but states mood is stable without meds

-Otherwise no cognitive, sensory, functional impairments

## **Relevant Social History (e.g. Alcohol/Tobacco/Substance Use, Financial Stress, Housing Issues, Occupation, or Other Burdens):**

-Smokes 7-8 cigs/day x 20 yrs--> down to 1-2 cigs/day by 2/19 despite stopping patches and using gum less than once daily

-Alcohol abuse disorder in early remission

-No other substance abuse

-All meals prepared for him at recovery program, gave pt letter to culinary staff 2/19

## **Insurance Status: Public Insurance**

-1/17/19: Urine dip +30 proteinuria.

-1/23/19: A1C 6.7% (new diagnosis), lipids total 185/ trig 106/ HDL 39/ LDL 125, creat 1.5-1.7,renin 3.98, aldosterone 16.4, Na 140, K 4.0

-2/19: creat 1.7, eGFR 57, mag 2.1, HIV/STD panel negative

## **Do you have any questions regarding management/symptom complaint for this patient?**

Should I refer to nephrology now or continue to monitor creat (and if so, how often)?

## **Do you have any questions regarding treatment/medication for this patient?**

By 2/19/19, he has seen cardiology who adjusted meds, ordered 48-hr holter monitor and cardiac CT. Home BP checks 140s-190s/70s-90s. BP in office 175/87, 171/89 with no alarm symptoms. Next cardio not until 3/20. Do I make med changes today, notify cards of BPs, have pt continue to monitor home BPs with weekly phone call or nurse visit?

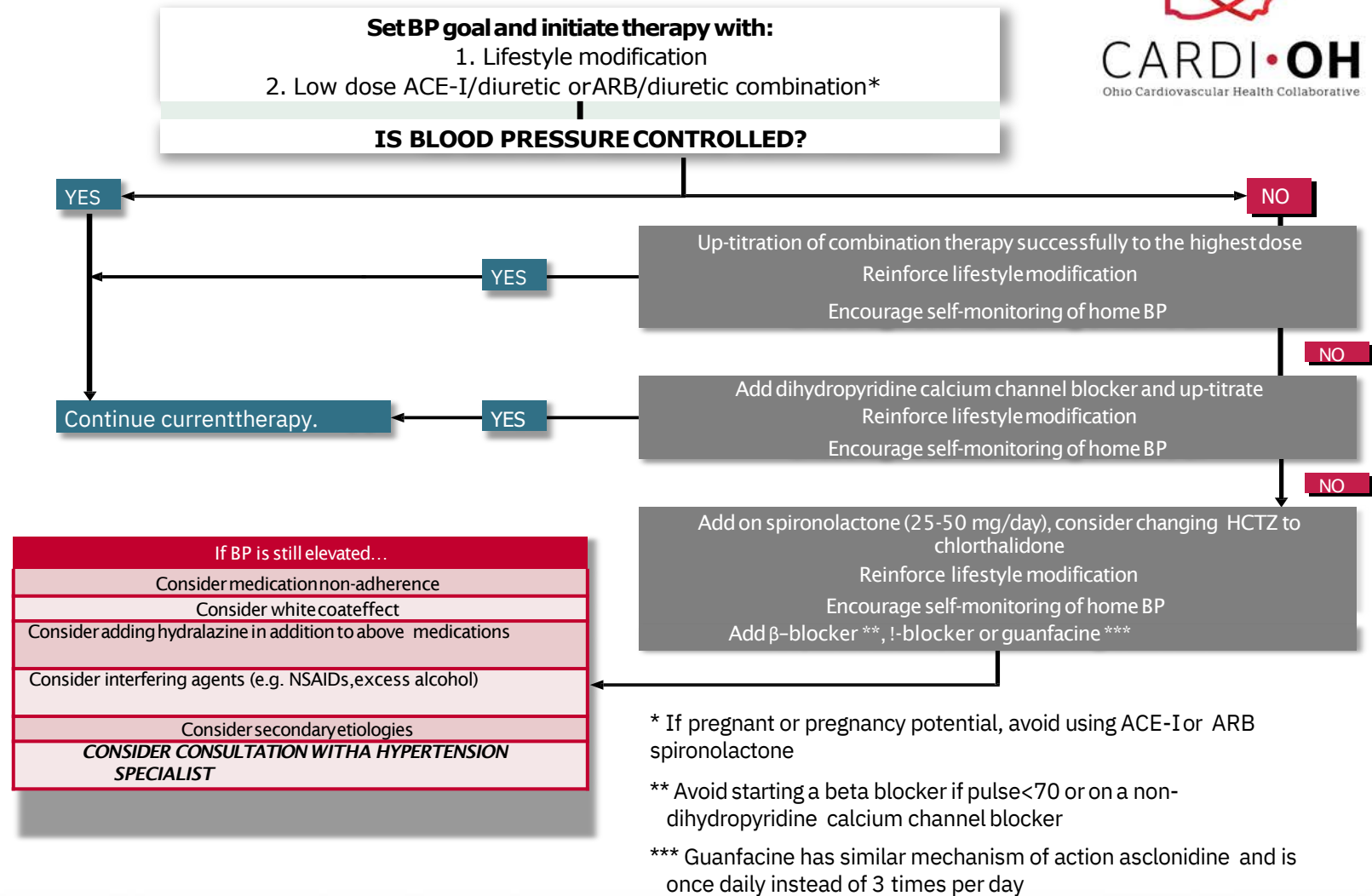
## **Do you have any questions regarding patient adherence?**

No -- he reports excellent compliance and appears capable with good literacy, memory, motivation.

# Hypertension Change Package Algorithm



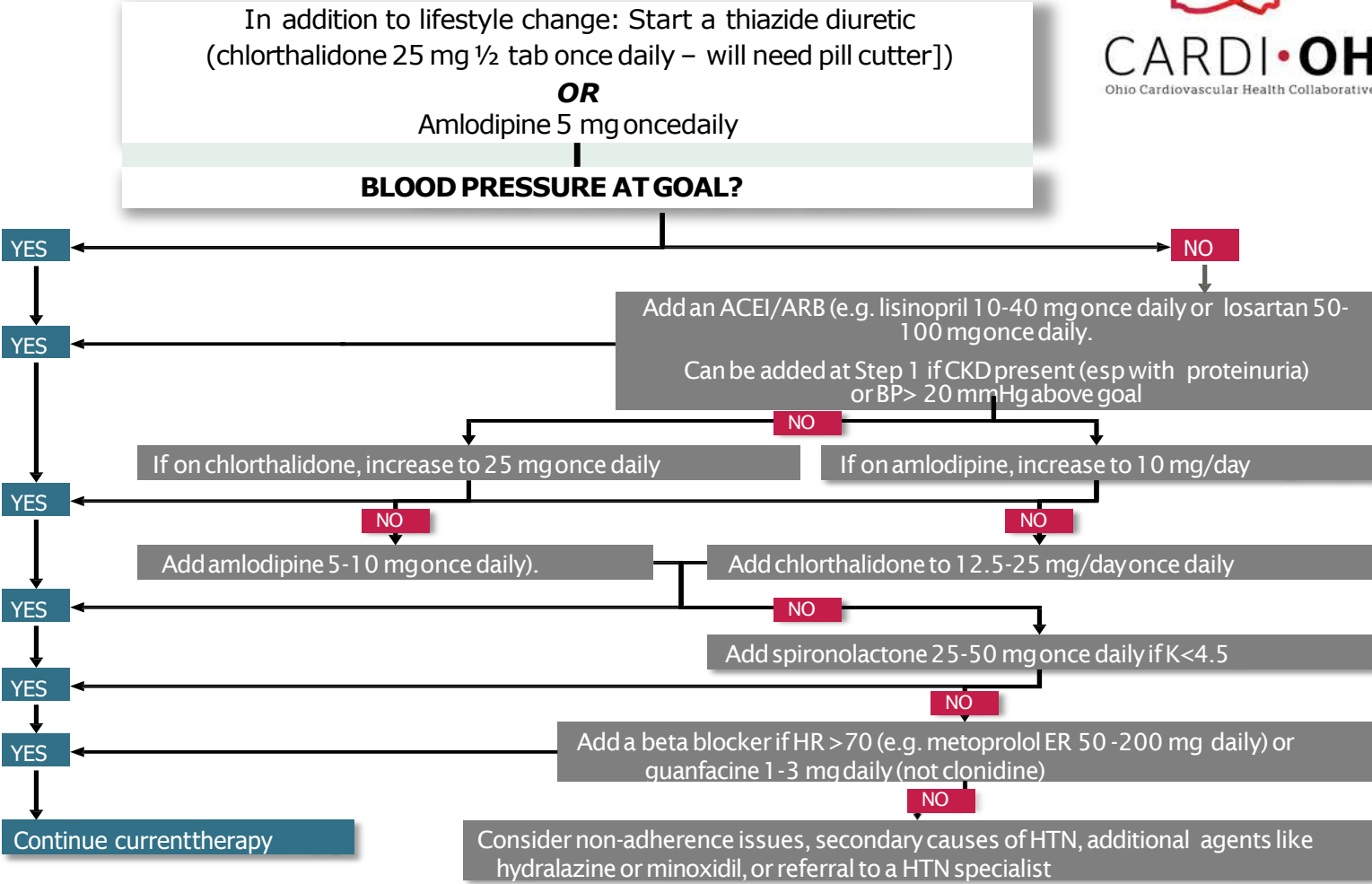
PROS	CONS
Simple	Potentially subtherapeutic (12.5-25) HCTZ dose
Low cost	BP gap between African Americans and non-African Americans
Evidence of improved BP control	
Embraces fixed-dose combination therapy	



# Hypertension Drug Treatment Algorithm



- SPRINT trial algorithm
- Chlorthalidone as the preferred thiazide
- Non-African-American patients could also start with ACEI or ARB
- Very effective in achieving even SBPs < 120 mmHg
- No significant disparities in outcomes stratified by race





# The Impact of Underdosing Thiazides



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ACCOMPLISH trial is an outlier

1. The only trial with low dose HCTZ as the thiazide
2. The only trial showing Inferior outcomes with thiazide compared to other antihypertensives

Trial	Drug	Dose of Thiazide (mg/d)
VA CSP M&M	HCTZ	100
HDFP	chlorthalidone	25-100
MRCI	bendroflumethiazide	10
HAPPHY	bendroflumethiazide HCTZ	5-10 50-100
EWPHE	HCTZ/triamterine	25-50
MRC Elderly	HCTZ/amiloride	25-50
SHEP	chlorthalidone	12.5-25
ALLHAT	chlorthalidone	12.5-25
<b>ACCOMPLISH</b>	<b>HCTZ</b>	<b>12.5-25</b>
SPRINT	chlorthalidone	12.5-25

# Chlorthalidone vs HCTZ

- 1.5-2 times potent as HCTZ
- Longer  $\frac{1}{2}$  life
  - More forgiving if dose missed
  - Less urinary urgency due to gradual onset of effect

# Calcium Channel Blocker Half-Life

- Amlodipine:  $t_{1/2}$  =40-60 hr
- It has a significant evidence base demonstrating reduction of CVD events, and thus can be prescribed as an initial or add-on agent
- It is effective regardless of age, race, or renal function
- In patients with kidney dysfunction, it should be combined with either an ACEI or ARB (but not both)

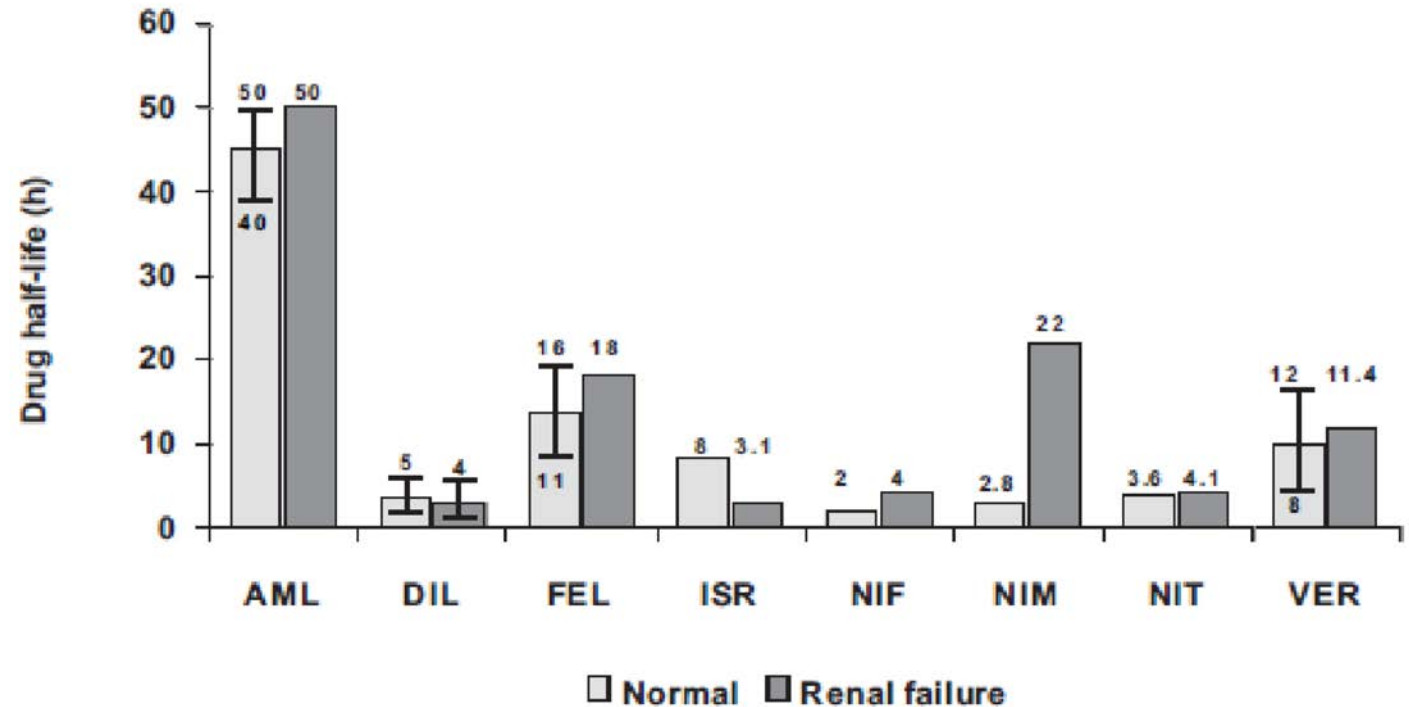


Figure 1. Drug half-life for calcium channel blockers in the presence of renal failure. AML= amlodipine; DIL = dilazem; FEL = felodipine; ISR = isradipine; NIF = nifedipine; NIM = nimodipine; VER =verapamil

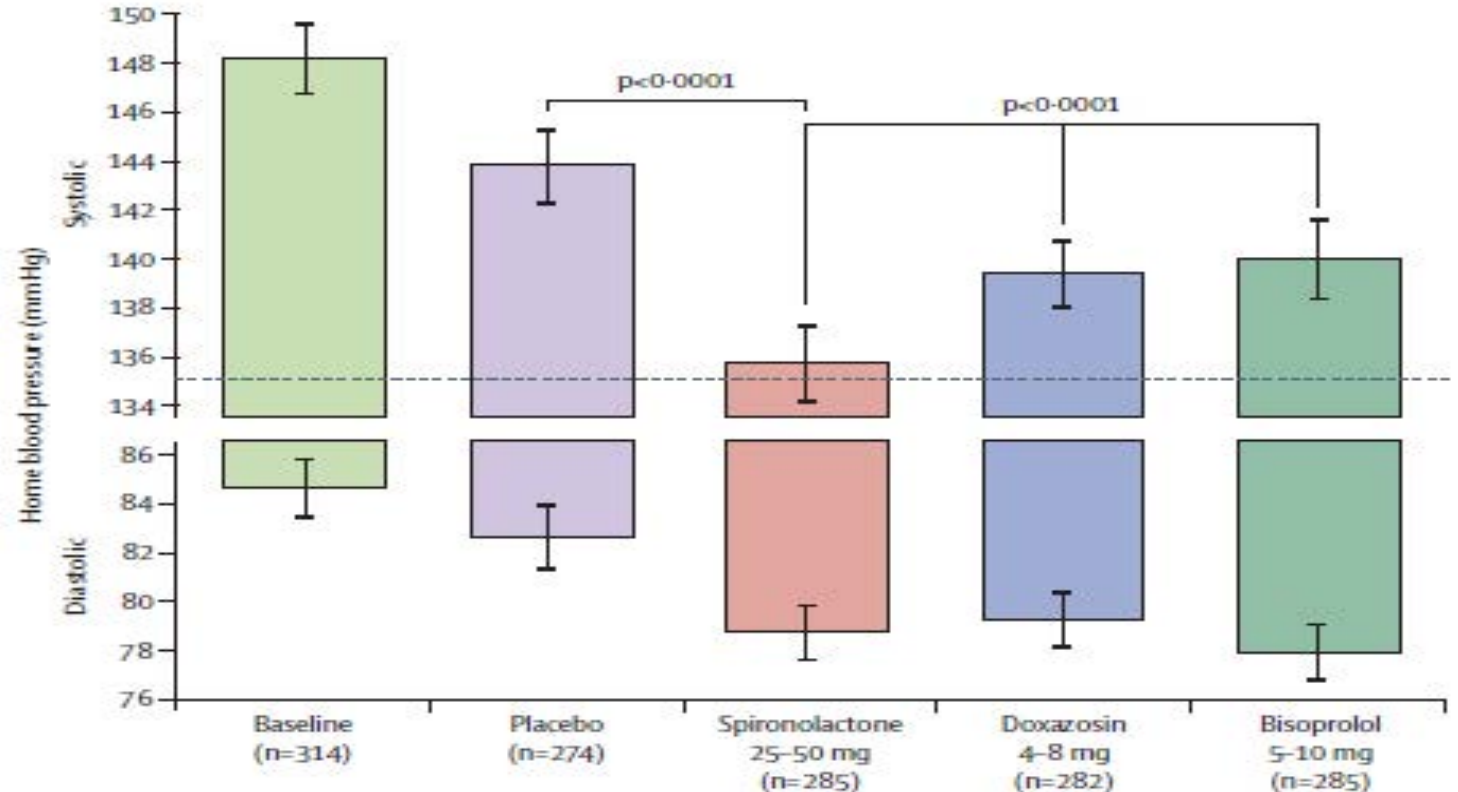
Sica DA. J Clin Hypertens 2005; 7(4)  
Supp 1:21-26

# Use of Spironolactone

- Potassium sparing/mineralocorticoid receptor inhibitor diuretic
- Preferred agent for treatment of primary aldosteronism
- Shown effective as add-on in patients with resistant hypertension, obesity, and sleep apnea
- Great complement in treatment of hypokalemia associated with chlorthalidone
- Risk of gynecomastia and impotence, but this is dose dependent

# Spironolactone Compared to Doxazosin and Bisoprolol in the Treatment of Resistant HTN – Pathway 2 Trial

- Spironolactone is effective in the treatment of resistant hypertension, including in tolerable doses  $\leq 50$  mg/day.



Williams B et al. Lancet 2015; 386: 2059-68

**Figure 2: Home systolic and diastolic blood pressures comparing spironolactone with each of the other cycles**

The top and bottom of each column represents the unadjusted home systolic and diastolic blood pressures, respectively, averaged across the mid-cycle (low-dose) and end-of-cycle (high-dose) visits (6 weeks and 12 weeks) in which patients received the drug. Error bars represent 95% CI. Comparisons are as described under methods for the primary endpoint.

# Next Steps



- Launch of Project ECHO Hypertension statewide next year (planning currently underway)
- Sign up for more information!



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Thank you!

Questions /  
Discussion