

Diabetes and Hypertension Project ECHO* Clinic

*ECHO: Extension of Community Healthcare Outcomes

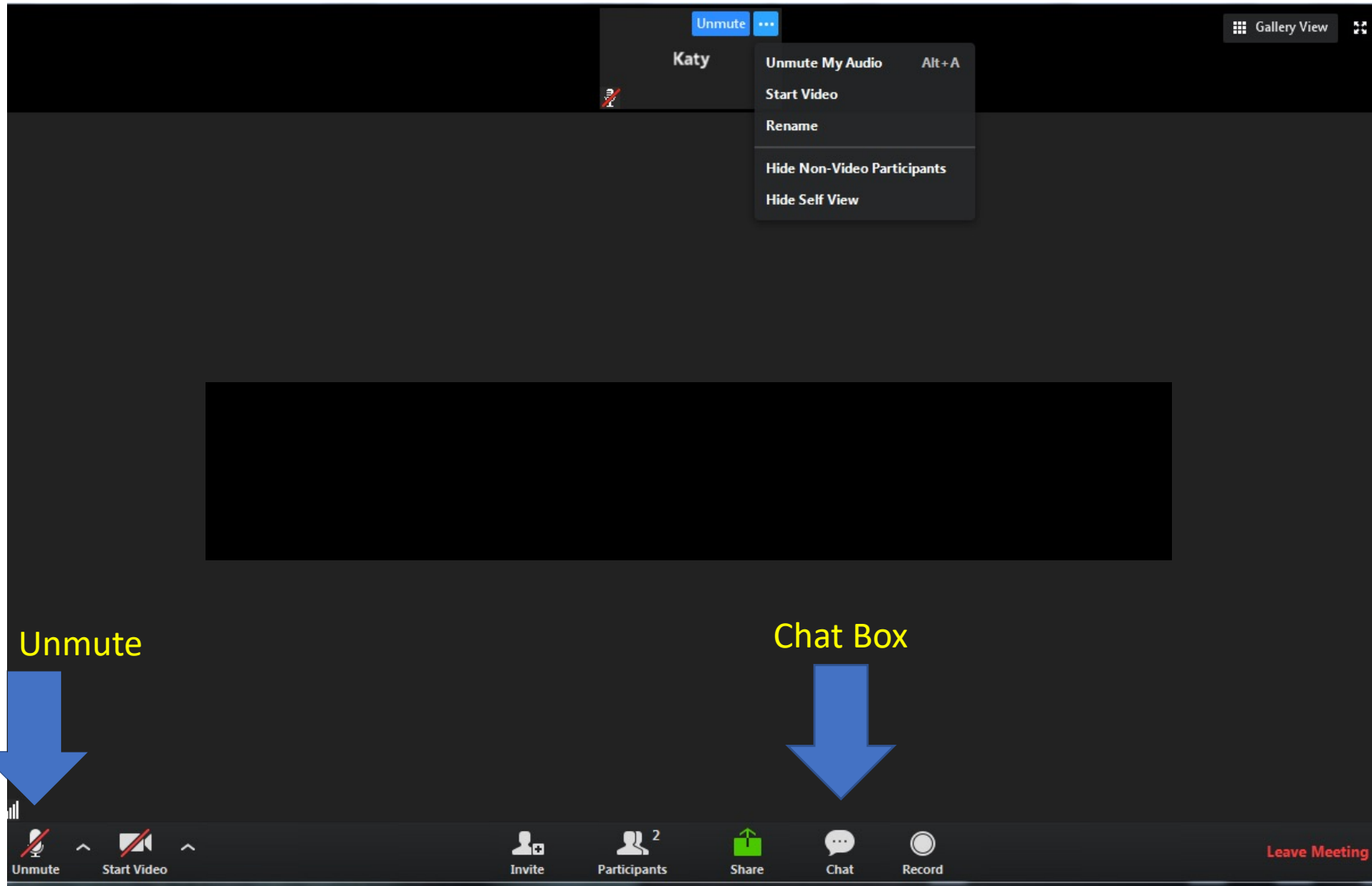
June 10, 2021

Before we begin:

- Rename your Zoom screen with your name and organization
- Claim CE: text 19166-18817 to 804-625-4041
 - Go to vcuhealth.org/echodmhtn for instructions on creating your account

*The Diabetes and Hypertension ECHO is made possible by
funding through CDC Cooperative Agreement
NU58DP006620-InnoVAte.*

Helpful Reminders



- You are all on **mute**. Please **unmute** to talk.
- If joining by telephone audio only, press ***6** to mute and unmute.
- Use the chat function to speak with our team or ask questions.

ECHO is all teach, all learn



Interactive



Co-management
of cases



Peer-to-peer
learning



Collaborative
problem solving

Helpful Reminders

- Please feel free to eat your lunch or step away briefly if needed
- We are recording and can share sessions upon request
 - Each session's slides are available on www.vcuhealth.org/echodmhtn
- Please **do not share any protected health information** in your discussion or the chat box
- 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!



VCU Health Diabetes & Hypertension ECHO Clinics

VCU Hub 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

- 1.5-hour ECHO clinics on 2nd and 4th Thursdays
- Every tele-ECHO clinic includes a 30-minute didactic presentation followed by case discussions
- Website: 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 **19166-18817** to **804-625-4041**

Disclosures

Dave Dixon, Pharm.D., has no financial conflicts of interest to disclose.

Trang Le, M.D., has no financial conflicts of interest to disclose.

Niraj Kothari, M.D., has no financial conflicts of interest to disclose.

There is no commercial or in-kind support for this activity.

“So you think you can
monitor blood pressure?”

Dave Dixon, Pharm.D.

Associate Professor and Vice-Chair of Clinical Services
Director, Center for Pharmacy Practice Innovation

Objectives

- Describe appropriate methods to accurately measure blood pressure.
- Discuss current remote blood pressure monitoring models.

“Houston, we have a problem”

High blood pressure is the leading
cause of cardiovascular disease
and premature death in the
world.

Nature Reviews Nephrology volume 16, pages223–237(2020)



Brief History Lesson

- Stephen Hales (1733)
 - 1st recorded BP
- Scipione Riva-Rocci (1896)
 - mercury-sphygmomanometer
- Nikolai Korotkov (1905)
 - discovered sounds one hears when taking BP using a non-invasive device

USPSTF Recommendations on Screening for HTN in Adults (updated April 2021)

Population	Recommendation	Grade
Adults 18 years or older without known hypertension	The USPSTF recommends screening for hypertension in adults 18 years or older with office blood pressure measurement (OBPM). The USPSTF recommends obtaining blood pressure measurements <u>outside of the clinical setting</u> for diagnostic confirmation before starting treatment.	A

<https://www.uspreventiveservicestaskforce.org/uspstf/recommendation/hypertension-in-adults-screening>

NOTE: This statement was a reaffirmation of the 2015 statement

Blood Pressure Measurement Methods

- Auscultatory Technique

- Relies on listening to Korotkoff sounds
- Prone to human error
- Mercury sphygmomanometer is reference standard



★ Oscillometric Technique

- Based on amplitude of oscillations in the lateral walls of the arm based on an algorithm (can vary between devices)
- Best option for clinic, home, and hospital settings



TABLE 8 Checklist for Accurate Measurement of BP (S4.1-3,S4.1-4)

Key Steps for Proper BP Measurements

Specific Instructions

Step 1: Properly prepare the patient	<ol style="list-style-type: none"> 1. Have the patient relax, sitting in a chair (feet on floor, back supported) for >5 min. 2. The patient should avoid caffeine, exercise, and smoking for at least 30 min before measurement. 3. <u>Ensure patient has emptied his/her bladder.</u> 4. Neither the patient nor the observer should talk during the rest period or during the measurement. 5. Remove all clothing covering the location of cuff placement. 6. Measurements made while the patient is sitting or lying on an examining table do not fulfill these criteria.
Step 2: Use proper technique for BP measurements	<ol style="list-style-type: none"> 1. Use a BP measurement device that has been validated, and ensure that the device is calibrated periodically.* 2. Support the patient's arm (e.g., resting on a desk). 3. Position the middle of the cuff on the patient's upper arm at the level of the right atrium (the midpoint of the sternum). 4. <u>Use the correct cuff size</u>, such that the bladder encircles 80% of the arm, and note if a larger- or smaller-than-normal cuff size is used (Table 9). 5. Either the stethoscope diaphragm or bell may be used for auscultatory readings (S4.1-5,S4.1-6).
Step 3: Take the proper measurements needed for diagnosis and treatment of elevated BP/hypertension	<ol style="list-style-type: none"> 1. <u>At the first visit, record BP in both arms.</u> Use the arm that gives the higher reading for subsequent readings. 2. Separate repeated measurements by 1-2 min. 3. For auscultatory determinations, use a palpated estimate of radial pulse obliteration pressure to estimate SBP. Inflate the cuff 20-30 mm Hg above this level for an auscultatory determination of the BP level. 4. For auscultatory readings, deflate the cuff pressure 2 mm Hg per second, and listen for Korotkoff sounds.
Step 4: Properly document accurate BP readings	<ol style="list-style-type: none"> 1. Record SBP and DBP. If using the auscultatory technique, record SBP and DBP as onset of the first Korotkoff sound and disappearance of all Korotkoff sounds, respectively, using the nearest even number. 2. Note the time of most recent BP medication taken before measurements.
Step 5: Average the readings	<u>Use an average of ≥ 2 readings obtained on ≥ 2 occasions to estimate the individual's level of BP.</u>
Step 6: Provide BP readings to patient	Provide patients the SBP/DBP readings both verbally and in writing.

→ validatebp.org

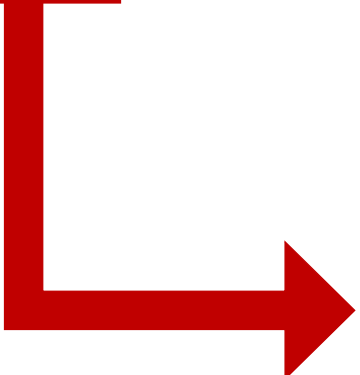
2017 ACC/AHA High Blood Pressure Guidelines

How to Interpret Home BP Readings

TABLE 11 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	135/85	120/70	130/80
160/100	145/90	145/90	140/85	145/90

2017 ACC/AHA High Blood Pressure Guidelines



Make sure your patients self measuring BP at home understand this

Out-of-Office Monitoring: 24-hour ABPM

- Uses a non-invasive, full automated device that records BP every 15-30 minutes throughout a 24-hour period
- Pros
 - BP measured by ABPM has a stronger association with hypertension-related target-organ damage and clinical cardiovascular outcomes compared with office-based BP measurements
 - Best for identifying white coat, masked, and nocturnal hypertension
- Cons
 - Not readily available, requires additional clinic visits, not suitable or well tolerated by some patients, costly compared to HBPM



2017 ACC/AHA High Blood Pressure Guidelines

Out-of-Office Monitoring: HBPM

- Uses an oscillometric device and requires active participation from the patient (or an observer) to record BP at home, work, pharmacy, etc.
- Pros
 - BP measured by HBPM maintains a stronger association with cardiovascular risk than office-based BP measurements
 - Can be used to identify white coat and masked hypertension
 - Readily available, generally affordable, can be performed over long periods of time, well tolerated
- Cons
 - Inability to measure sleep BP, subject to human error, lack of validated monitors, requires a motivated patient who reports data accurately, preoccupation with BP may lead to anxiety



2017 ACC/AHA High Blood Pressure Guidelines

HBPM: Device Selection and Training

1. Recommend a validated monitor
2. Train the patient on how to use the monitor and check cuff size
3. Follow standard accurate BP measurement procedures



AHA Scientific Statement on BP Measurement.
Hypertension. 2019;73:e35–e66.



HBPM: Measurement Frequency/Duration

- Frequency
 - 2 readings ≥ 1 min apart in the morning before taking antihypertensive medications
 - 2 readings ≥ 1 min apart in the evening before going to bed
- Duration
 - Preferred monitoring period is ≥ 7 d; *a minimum period of 3 d may be sufficient*, ideally in the period immediately before the next appointment with provider

AHA Scientific Statement on BP Measurement.
Hypertension. 2019;73:e35–e66.

Wrist Blood Pressure Monitors

- **Pros:** convenient, work well in those with large arm circumferences, easy for older adults
- **Cons:** challenges with precision
 - *Monitor sensor must be correctly placed over radial artery and the wrist must be at heart level*



“Smart” Blood Pressure Monitors

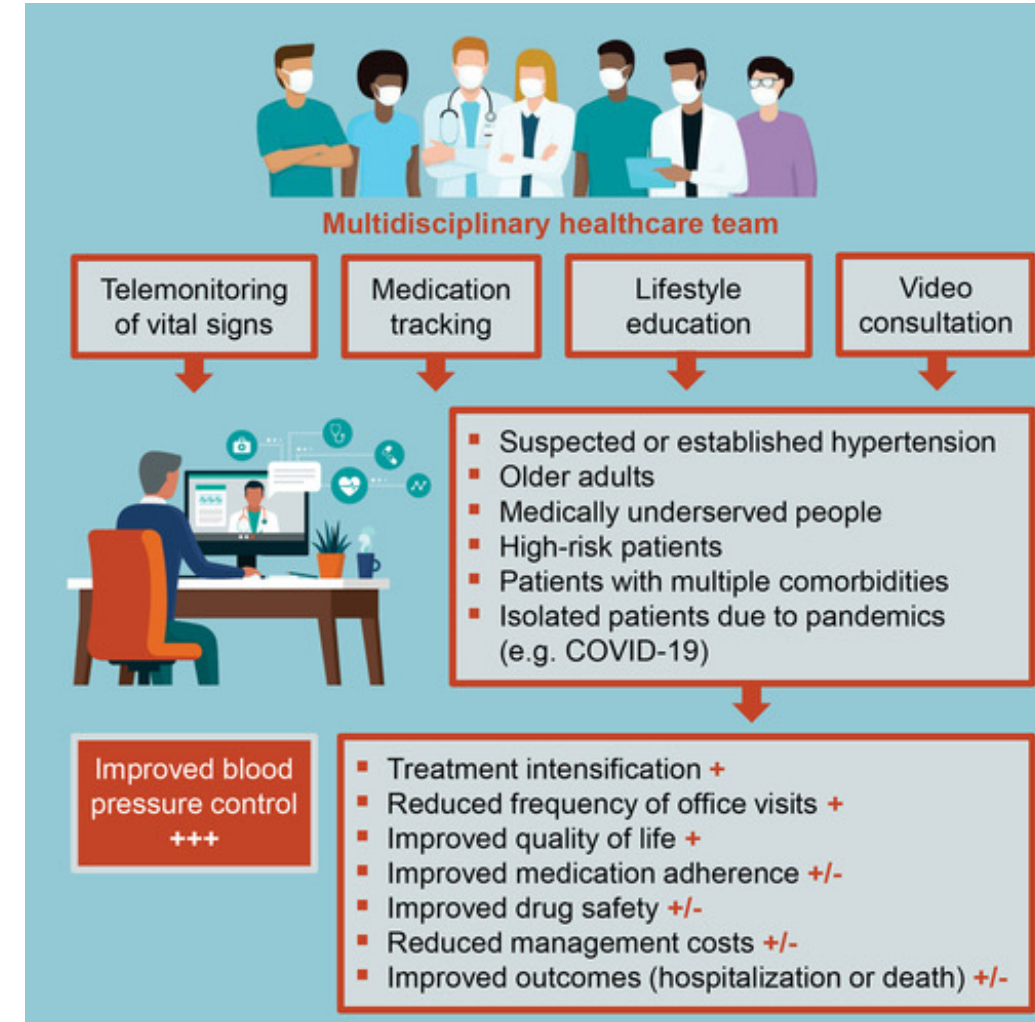
- **Pros:** convenient, work well in those with large arm circumferences
- **Cons:** NO smartphone app has ever been validated for BP measurement
 - *Monitor sensor must be correctly placed over radial artery and the wrist must be at heart level*



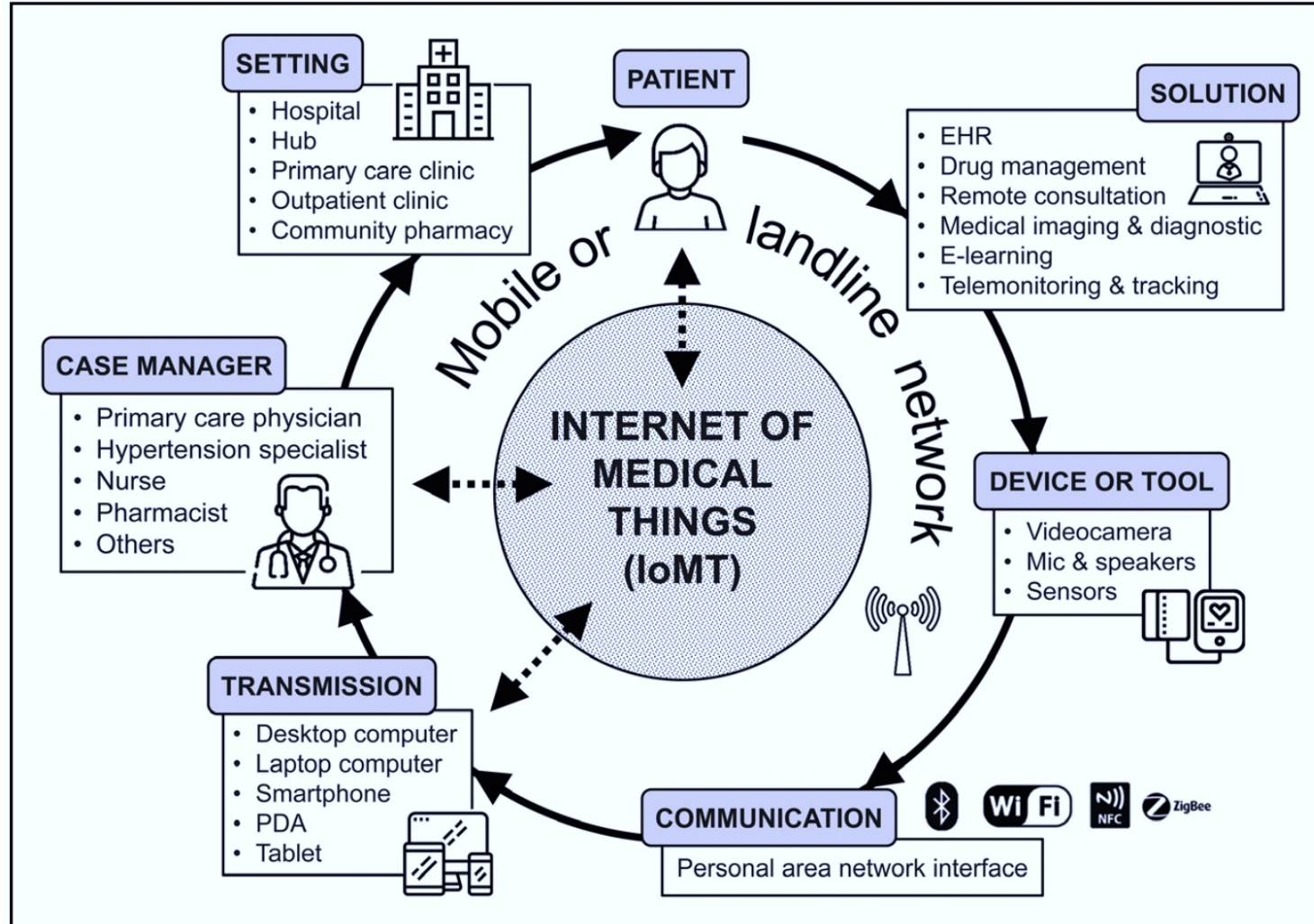
Remote BP Monitoring and Management

- Rationale

- Management largely driven by BP measurements
- Out-of-office BP measurement needed to confirm clinic BP measurements
- Hypertension management lends itself well to protocol-based approach



Telehealth Services and Workflows



Evidence Summary: Telehealth for HTN

Type of Outcome	Effect	Strength of Evidence
BP reduction	Increased	Moderate
BP control	Improved	High
Use of antihypertensive medications	Increased	Low
Adherence to antihypertensive treatment	Improved	Very low
Frequency of office consultations	Reduced	Low
Quality of life or psychosocial well-being	Improved	Low
Drug safety	Improved	Very low
Costs	Reduced	Very low
Deaths or hospitalizations	Reduced	Very low

Hypertension. 2020;76:1368–1383

Effect of home blood pressure telemonitoring and pharmacist management on blood pressure control: a cluster RCT

- Usual care, 8 clinics (n = 222)
 - Primary care clinics; Minnesota
- Intervention, 8 clinics (n=228)
 - Intervention patients received home BP telemonitors and transmitted BP data to *pharmacists* who adjusted antihypertensive therapy.
- 45% women, 82% white, 61 years

Group	6-12 mo	*18 mo	P-value
Intervention	57%	*72%	.001
Usual care	30%	57%	.003

JAMA. 2013 Jul 3;310(1):46-56.

What are we doing at VCU Health?

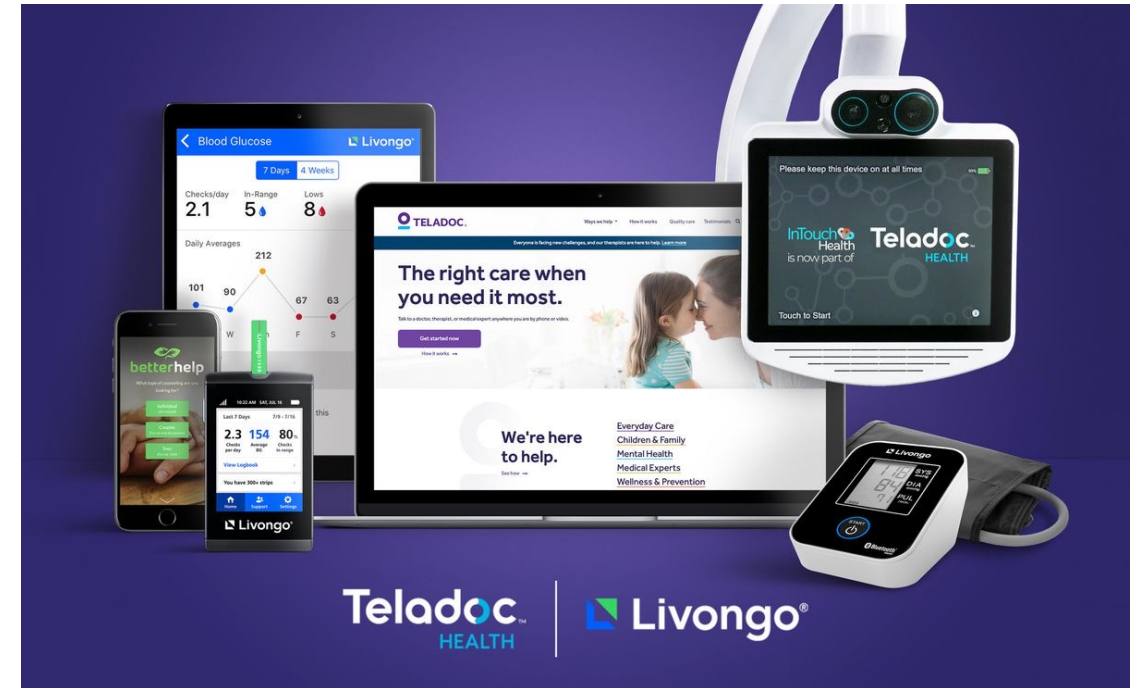
Identify Eligible Adults with
Uncontrolled High Blood Pressure



Pharm.D. Reviews Data Weekly and
Adjusts Therapy



M.D. Available if Patient is Not
Making Progress Toward Goal



Take Home Points

- Out-of-office blood pressure monitoring is essential to ensure an accurate diagnosis and appropriate management of high blood pressure.
- Home blood pressure monitoring is generally preferred due to convenience and low cost but requires a motivated patient.
 - Oscillometric devices with an upper arm cuff are preferred.
- Remote hypertension management models improve blood pressure control but need further study to inform broad implementation.

Case Study #1:

HPI: 61-year-old female presented to establish care at an interdisciplinary safety-net free clinic. In US on travel visa to visit family

PMH: T2DM x 4 years

Meds: - metformin 850 mg BID (since initial diagnosis)

- insulin glargine 10 units SQ HS (last 2 year)

Physical activity: walking and biking several hours weekly

PE: BMI of 20.8 kg/m²

Labs: random plasma glucose of 207 mg/dL, A1c of 11.5%.

Fasting self-monitored blood glucose (SMBG) : 90 to 120 mg/dL, with one symptomatic hypoglycemia episode in the previous week with a blood glucose of 64 mg/dL

Case Study #1 (continued)

Initial Visit: metformin increased to 1,000 mg BID due to elevated hemoglobin A1c, glargine continued at 10 units daily due to the episode of hypoglycemia.

At follow up:

- SMBG data: fasting AM 70 - 130 mg/dL, PM (pre- and post-dinner) 200 to 300 mg/dL
- Recommendations: increase insulin glargine to 12 units daily, and also change from evening to morning injections in order to reduce the high blood glucose values later in the day and to minimize morning hypoglycemia

Case Study #1 (continued)

One month follow up: frequent episodes of hypoglycemia, waking in the middle of the night feeling shaky and confused, glucoses 60 to 70 mg/dL.

The patient confirmed appropriate adherence to insulin glargine 12 units once daily in the morning hypoglycemia

→ insulin glargine was temporarily held and metformin therapy was changed to combination sitagliptin-metformin 50 mg-1,000 mg twice daily.

- Any clarifying questions? Any recommendations?

Case Study #1

- 7 days after this follow up appointment, patient was admitted to ICU in DKA
- Treated with fluids / IV insulin,
- Discharged after 4 days on insulin glargine 15 units once daily and metformin 1,000 mg twice daily with instructions to hold the metformin if she were to experience hypoglycemia
- patient called the clinic to inform them of her hospital admission and surrounding circumstances.
 - she had reduced her insulin glargine dose to 12 units daily due to fear of hypoglycemia.
 - recommended that the patient continue insulin glargine 12 units daily and to hold metformin until further evaluation and management.

- Any clarifying questions? Any recommendations?

Case Study #1

- Insulin antibodies positive
- GAD65 antibodies positive
- IA-2 and ZnT8 negative

- Any clarifying questions? Any recommendations?

Case Studies

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

Provide Feedback

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

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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 Project ECHO Clinics

2nd and 4th Thursdays — 12-1:30 p.m.

Mark Your Calendars — Upcoming Sessions

June 24: Remote diabetes monitoring

Please register at www.vcuhealth.org/echodmhtn

Thank you, and see you in two weeks!



Text **19166-18817** to **804-625-4041** for CE credit

Reminder: **Mute** and **Unmute** to talk
Press ***6** for phone audio
Use **chat** function for questions