

Implementation Strategies to Improve Blood Pressure Control in the United States

Marwah Abdalla, MD, MPH
Columbia University Irving Medical Center



Division of Cardiology



American
Heart
Association.



Disclosures/Acknowledgement

Disclosures: None

Funding Sources

NIH R01 HL46636

NIH K23 HL141682

AHA 18AMFDP34380732

The recommendations and opinions presented by our guest speakers may not represent the official position of the American Heart Association. The materials are for educational purposes only, and do not constitute an endorsement or instruction by AHA/ASA. The AHA/ASA does not endorse any product or device.



Implementation Strategies to Improve Blood Pressure Control in the United States: A Scientific Statement From the American Heart Association and American Medical Association

AHA/AMA SCIENTIFIC STATEMENT

Implementation Strategies to Improve Blood Pressure Control in the United States: A Scientific Statement From the American Heart Association and American Medical Association

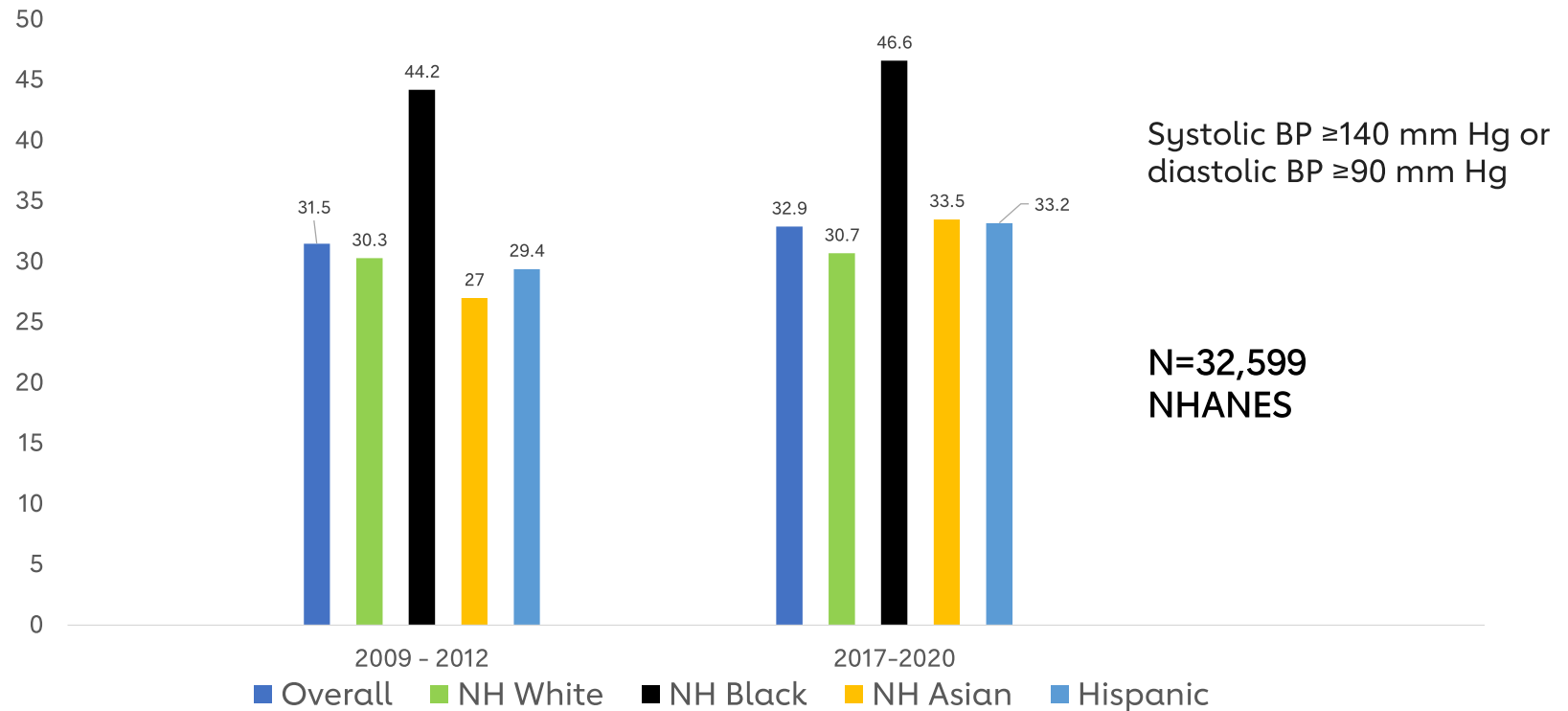
Marwah Abdalla, MD, MPH, Vice Chair, Shari D. Bolen, MD, MPH, Jeffrey Brettler, MD, Brent M. Egan, MD, Keith C. Ferdinand, MD, Cassandra D. Ford, PhD, Daniel T. Lackland, DrPH, Hilary K. Wall, MPH, Daichi Shimbo, MD, Chair, and on behalf of the American Heart Association and American Medical Association

Outline & Learning Objectives

- Review Trends in Hypertension & BP Control in the US
- Review Key Approaches and Implementation Strategies to Improve BP Control Using the Socioecological Framework
- Priorities/Gaps



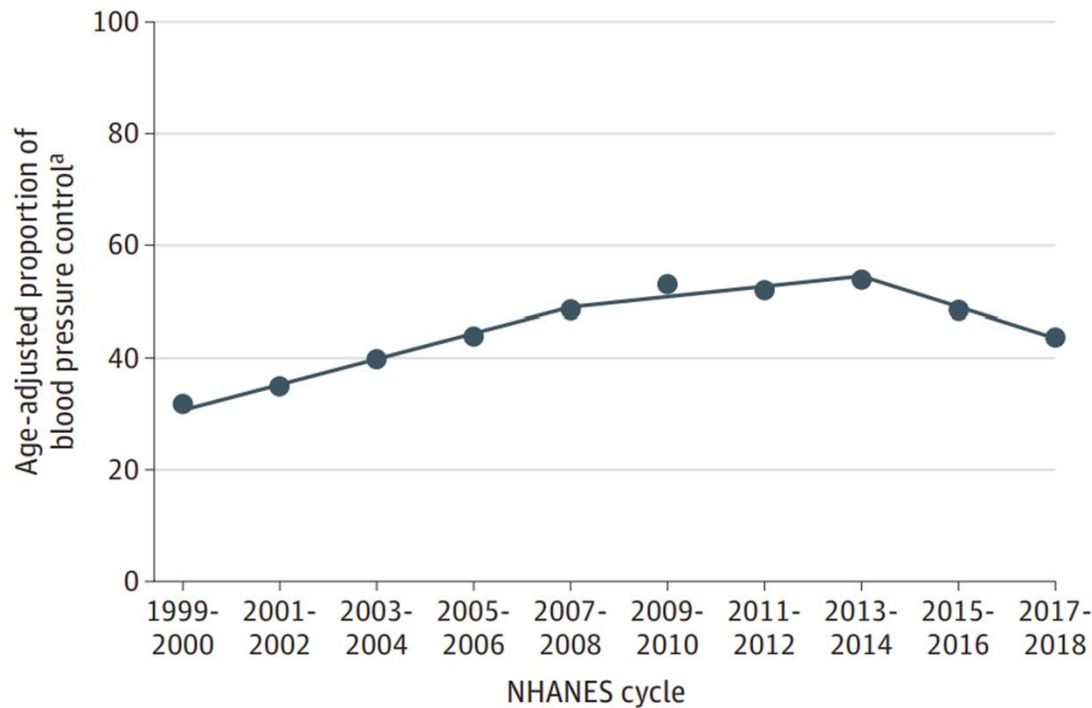
Trends in Prevalence of Hypertension



Muntner P, Miles MA, Jaeger BC, Hannon L, Hardy ST, Ostchega Y, Wozniak G, Schwartz JE. Blood pressure control among US adults, 2009 to 2012 through 2017 to 2020. *Hypertension*. 2022; 79:1971-1980

Trends in BP Control in the US

A Blood pressure control among all adults with hypertension



Systolic BP ≥ 140 mm Hg or
diastolic BP ≥ 90 mm Hg

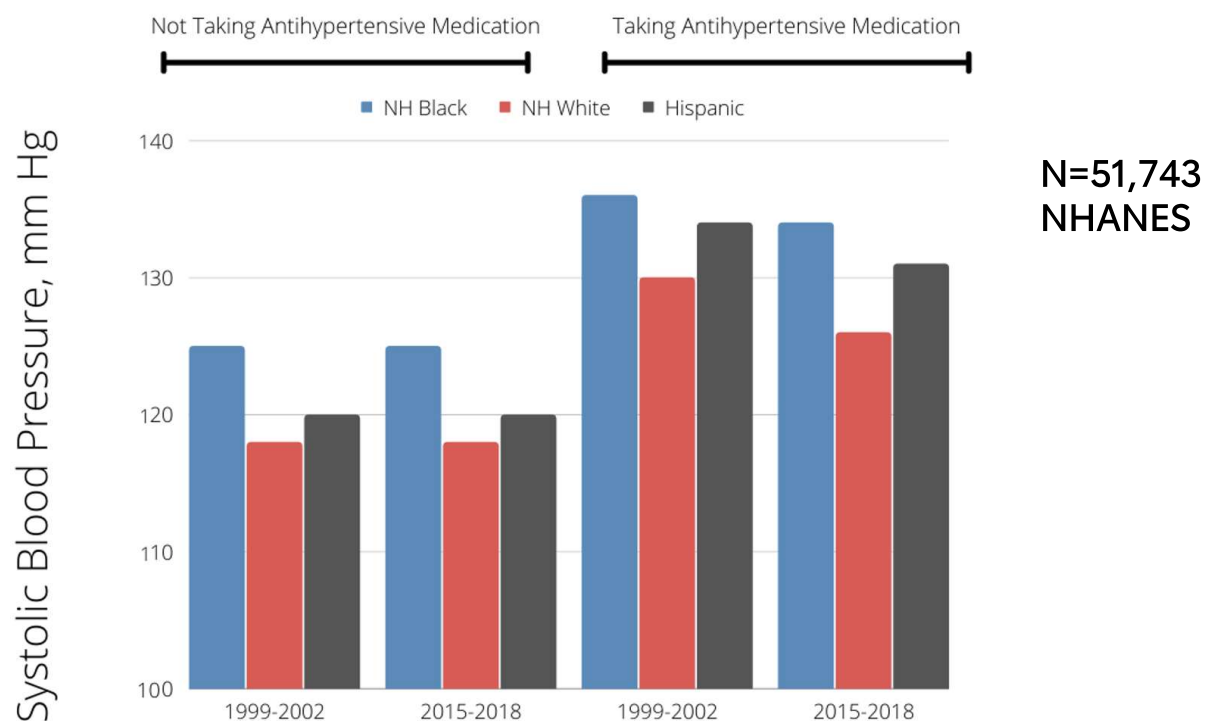
N=18,268
NHANES

Muntner P, Hardy ST, Fine LJ, Jaeger BC, Wozniak G, Levitan EB, Colantonio LD. Trends in blood pressure control among US adults with hypertension, 1999-2000 to 2017-2018. *JAMA*. 2020; 324:1190-1200.



Black and Hispanic adults have higher systolic blood pressure compared to White adults

NHANES: 1999-2002 and 2015-2018



Hardy ST, Chen L, Cherrington AL, Moise N, Jaeger BC, Foti K, Sakhuja S, Wozniak G, Abdalla M, Muntner P. Racial and Ethnic Differences in Blood Pressure Among US Adults, 1999-2018. Hypertension. 2021 Dec;78(6):1730-1741

Slide 7

EPO Recommend specifying systolic pressure in the title.

While the systolic pressure may be higher in Hispanic adults per this article, the prevalence per the CDC is lower in this population than in White adults:

High blood pressure is more common in non-Hispanic black adults (56%) than in non-Hispanic white adults (48%), non-Hispanic Asian adults (46%), or Hispanic adults (39%)
<https://www.cdc.gov/bloodpressure/facts.htm>

Eddie Pan, 2023-10-25T22:16:06.066



Health Disparities in BP Control have Historic Roots

AHA PRESIDENTIAL ADVISORY

Call to Action: Structural Racism as a Fundamental Driver of Health Disparities: A Presidential Advisory From the American Heart Association

Keith Churchwell, MD, FAHA, Chair, Mitchell S.V. Elkind, MD, MS, FAHA, Regina M. Benjamin, MD, MBA, April P. Carson, PhD, MSPH, FAHA, Edward K. Chang, BS, Willie Lawrence, MD, FAHA, Andrew Mills, MPH, Tanya M. Odom, EdM, Carlos J. Rodriguez, MD, MPH, FAHA, Fatima Rodriguez, MD, MPH, FAHA, Eduardo Sanchez, MD, MPH, Anjail Z. Sharrief, MD, MPH, FAHA, Mario Sims, PhD, MS, FAHA, Olajide Williams, MD, MS, and On behalf of the American Heart Association



Barriers to BP Control Occur at Multiple Levels

- System
- Policy
- Community
- Organization
- Individual



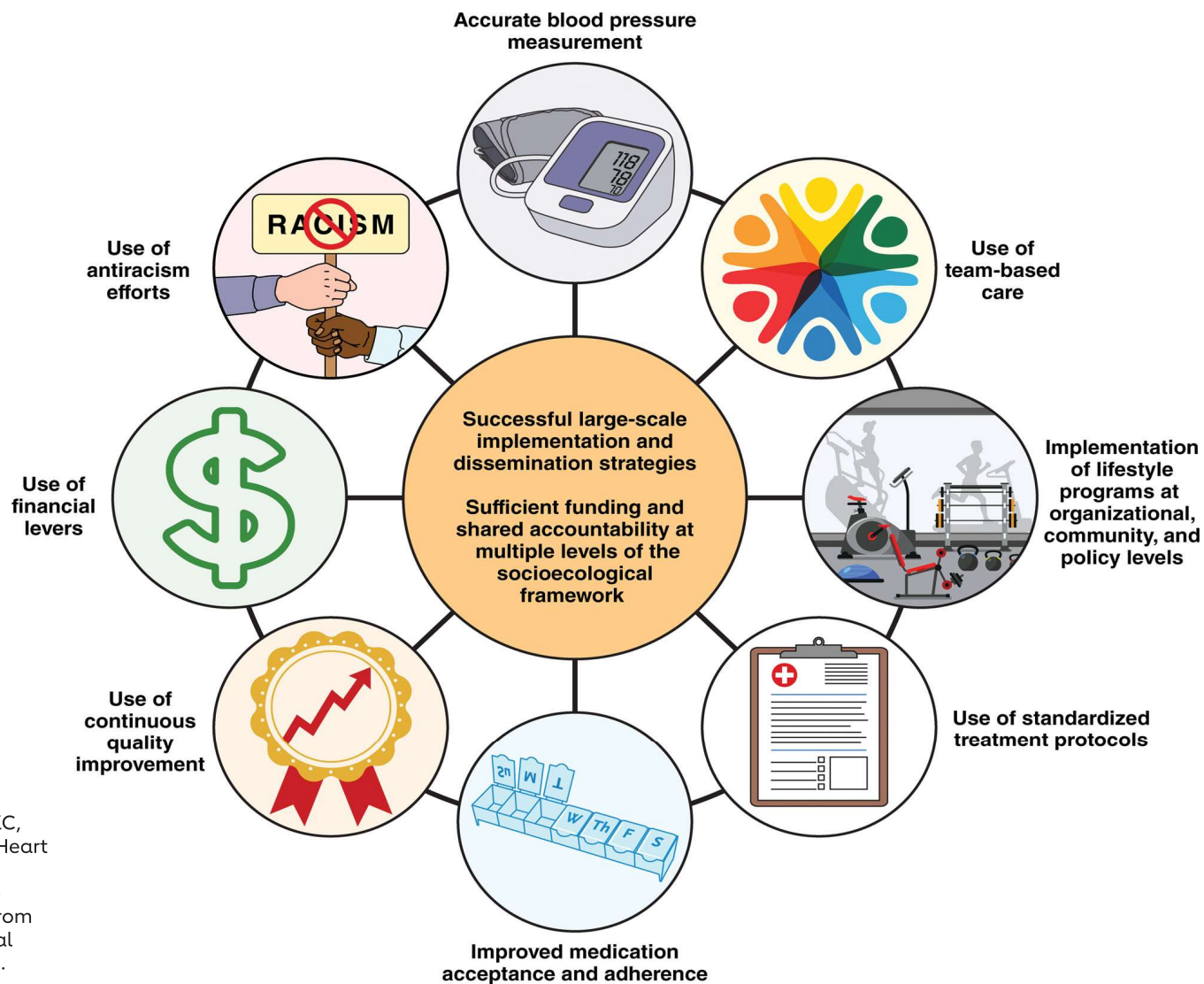
Purpose of the Scientific Statement

- Most guidelines and scientific statements have not focused on implementation strategies for BP control.

KEY BARRIER

- Provide information on implementation strategies to optimize treatment, and improve BP control among US adults
- Focuses on strategies at multiple levels of the socio-ecological framework.

Cross-Cutting Strategies to Improve BP Control



Abdalla M, Bolen SD, Brettler J, Egan BM, Ferdinand KC, Ford CD, Lackland DT, Wall HK, Shimbo D; American Heart Association and American Medical Association. Implementation Strategies to Improve Blood Pressure Control in the United States: A Scientific Statement From the American Heart Association and American Medical Association. Hypertension. 2023 Oct;80(10):e143-e157.

Table 3. Implementation strategies for improving blood pressure control and the socio-ecological framework level that each approach targets

	Socioecological Framework			
<u>Strategy</u>	<u>Individual</u>	<u>Organization</u>	<u>Community</u>	<u>Policy</u>
Antiracism Efforts	X	X	X	X
Accurate BP measurement and increasing adoption of self-measured BP monitoring	X	X		X
Team-based care		X	X	X
Lifestyle modification strategies	X	X	X	X
Antihypertensive medication treatment protocols	X	X		
Improving acceptance and adherence to antihypertensive medications	X	X		X
Continuous quality improvement	X	X		X
Financial	X	X	X	X
Large-scale implementation and dissemination	X	X	X	X



Accurate Blood Pressure Measurement

Office BP

Automated oscillometric devices preferred

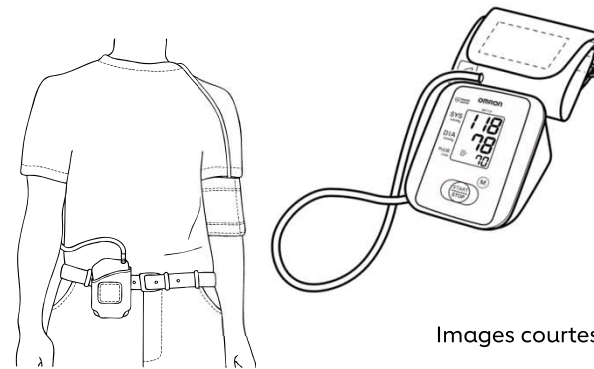
<https://www.validatebp.org/>

<https://www.stridebp.org/>

Out-of-office BP

Ambulatory Blood Pressure Monitoring (ABPM) or Home Blood Pressure Monitoring (HBPM): to confirm the diagnosis of hypertension and for titration of BP-lowering medication.

Self-measured BP (SMBP) in conjunction with telehealth counseling or clinical interventions



Images courtesy of Dr. Abdalla



SMBP – Home Blood Pressure Monitoring

HBPM testing protocol

- 7 consecutive days (3 days of readings acceptable)
- 2 readings each morning, 2 readings before bed for 1 week
- Ensure using a validated device
- Feasible and more available compared to ABPM



Image courtesy of Dr. Abdalla

Muntner P, Shimbo D, Carey RM, Charleston JB, Gaillard T, Misra S, Myers MG, Ogedegbe G, Schwartz JE, Townsend RR, Urbina EM, Viera AJ, White WB, Wright JT Jr. Measurement of Blood Pressure in Humans: A Scientific Statement From the American Heart Association. Hypertension. 2019 May;73(5):e35-e66.

Bello NA, Schwartz JE, Kronish IM, Oparil S, Anstey DE, Wei Y, Cheung YKK, Muntner P, Shimbo D. Number of Measurements Needed to Obtain a Reliable Estimate of Home Blood Pressure: Results From the Improving the Detection of Hypertension Study. J Am Heart Assoc. 2018 Oct 16;7(20):e008658



Limitations of SMBP

- OTC devices not often validated & not always covered by insurance
- Wrong cuff sizes
- Automatic recording not always available, telehealth integration is limited
- Long-term patient adherence challenging
- CPT codes 99473 and 99474 for SBMP monitoring but currently underused
- Reimbursement low: \$9-15, can only be billed once/device and every 30 days

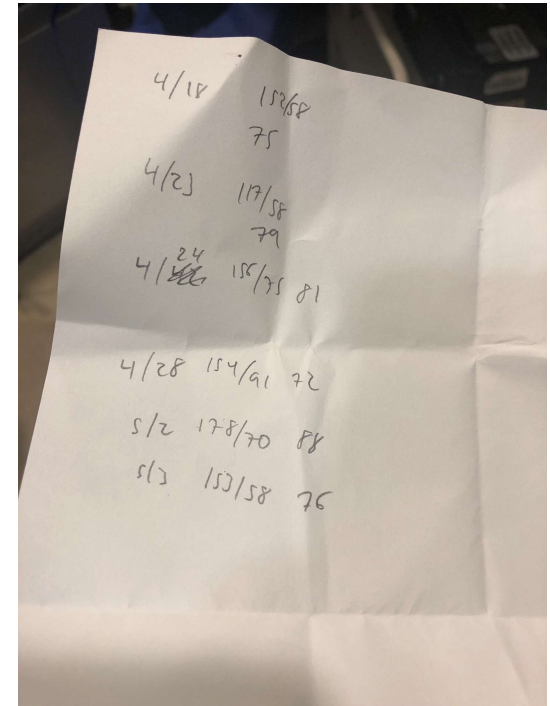


Photo courtesy of Dr. Edmund Anstey



Which is “superior”: ABPM or HBPM?

- Systematic Review of 1,007 articles, 9 articles with 7 cohorts examining whether BP on ABPM or HBPM is more strongly associated with cardiovascular disease events and/or mortality.
- ABPM adjusted for HBPM: systolic BP on ABPM was associated with outcomes in 2 of 4 cohorts and 2 of 3 cohorts for diastolic BP
- HBPM adjusted for ABPM: systolic BP on HBPM was associated with outcomes in 0 of 3 cohorts; and 1 of 2 cohorts for diastolic BP.

2017 ACC/AHA Blood Pressure Guidelines	
<u>Untreated</u>	<u>Treated</u>
Daytime ABPM (preferred)	HBPM (preferred)
HBPM (alternative)	Daytime ABPM (done if HBPM +)



HBPM may be more reliable and more strongly correlated with left ventricular mass

Systolic BP	Office BP	Home BP	Awake BP on 24-hour ABPM
Reliability (ICC)	0.89	<u>0.94</u>	0.83

Systolic BP	Model 1	Model 2	Model 3
Office, Omron	5.08 (0.61) P<0.001	3.32 (0.75) P<0.001	-0.26 (1.40) P=0.85
Home BP	5.68 (0.54) P<0.001	4.04 (0.64) P<0.001	4.88 (1.59) P=0.002
Awake Ambulatory BP	5.93 (0.73) P<0.001	3.71 (0.81) P<0.001	-0.91 (1.71) P=0.60

IDH
N = 340
Mean Age 41yr

Model 1 is unadjusted and regresses LVMI on each BP measure separately.

Model 2 regresses LVMI on each BP measure separately, adjusting for age, sex, black race, Hispanic ethnicity, body mass index, and diabetes status.

Model 3 regresses LVMI on office, home and awake ABP simultaneously, adjusting for covariates in Model 2.

Schwartz JE, Muntner P, Kronish IM, Burg MM, Pickering TG, Bigger JT, Shimbo D. Reliability of Office, Home, and Ambulatory Blood Pressure Measurements and Correlation With Left Ventricular Mass. J Am Coll Cardiol. 2020 Dec 22;76(25):2911-2922.



SMBP vs Usual Care: Meta-Analysis of 26 Studies

N= 6300

Primary outcome = office SBP at 12 months

- SMBP alone
- SMBP + web-based/phone support,
- SMBP + web-based/phone support with patient education
- SMBP + individualized counseling or telecounseling.

Overall, self-monitoring was associated with reduced office SBP at 12 months compared to usual care (systolic -3.2 mmHg, 95% CI -4.9 to -1.6 mmHg)

Moderate or high levels of support had statistically significant greater mean reductions in SBP (4.4 – 6.1 mm Hg) and DBP (1.5 – 2.3 mm Hg) and substantial improvements in BP control (43% – 56%) compared with usual care.

Tucker KL, Sheppard JP, Stevens R, Bosworth HB, Bove A, Bray EP, Earle K, George J, Godwin M, Green BB, Hebert P, Hobbs FDR, Kantola I, Kerry SM, Leiva A, Magid DJ, Mant J, Margolis KL, McKinstry B, McLaughlin MA, Omboni S, Ogedegbe O, Parati G, Qamar N, Tabaei BP, Varis J, Verberk WJ, Wakefield BJ, McManus RJ. Self-monitoring of blood pressure in hypertension: A systematic review and individual patient data meta-analysis. PLoS Med. 2017 Sep 19;14(9):e1002389



Team-Based Care

- Provision of health services by at least 2 health care professionals working collaboratively with patient
- Systematic review of 54 studies (2012–2020) conducted by Community Preventive Services Task Force
- 21 studies: SMBP was part of the team-based care intervention
- **SBP:** Median decrease of 3.5 mmHg, **DBP:** Median decrease of 2.1 mmHg
- The median cost per QALY gained was \$15,202 (IQI: \$3,569 to \$34,509)
- Care in community settings is effective—faith based organizations, pharmacies, home out-reach visits: task-shifting
- Wider availability of SMBP monitoring in settings where individuals “sleep, work, and play”



Standardized Antihypertensive Treatment Protocols / Improving Medication Acceptance & Adherence

- 12% of patients with hypertension never fill initial prescriptions
- Multicomponent approach is needed to improve acceptance & adherence
- Once daily inexpensive single dose combination pills; blister/dose packs
- Use of standardized protocols facilitate team-based medication titration and improve clinician inertia
- Refill reminders, financial incentives for patients/care teams

AHA SCIENTIFIC STATEMENTS

Medication Adherence and Blood Pressure Control: A Scientific Statement From the American Heart Association

Niteesh K. Choudhry, MD, PhD, Chair, Ian M. Kronish, MD, MPH, FAHA, Wanpen Vongpatanasin, MD, Keith C. Ferdinand, MD, FAHA, Valory N. Pavlik, PhD, Brent M. Egan, MD, FAHA, Antoinette Schoenthaler, EdD, Nancy Houston Miller, BSN, David J. Hyman, MD, MPH, and on behalf of the American Heart Association Council on Hypertension; Council on Cardiovascular and Stroke Nursing; and Council on Clinical Cardiology

Hypertension. 2022 Jan;79(1):e1-e14.



Team Based Care + Treatment Protocols

A Cluster-Randomized Trial of Blood-Pressure Reduction in Black Barbershops

Ronald G. Victor, M.D., Kathleen Lynch, Pharm.D., Ning Li, Ph.D., Ciantel Blyler, Pharm.D., Eric Muhammad, B.A., Joel Handler, M.D., Jeffrey Brettler, M.D., Mohamad Rashid, M.B., Ch.B., Brent Hsu, B.S., Davontae Foxx-Drew, B.A., Norma Moy, B.A., Anthony E. Reid, M.D., et al.

N Engl J Med 2018; 378:1291-1301

Sustainability of Blood Pressure Reduction in Black Barbershops

Ronald G. Victor, Ciantel A. Blyler , Ning Li, Kathleen Lynch, Norma B. Moy, Mohamad Rashid, L. Cindy Chang, Joel Handler, Jeffrey Brettler, Florian Rader and Robert M. Elashoff

Originally published 17 Dec 2018 | <https://doi.org/10.1161/CIRCULATIONAHA.118.038165> | Circulation. 2019;139:10–19



Barbershop Study: NEJM 2018

- Community engagement and partnership with 52 Black-owned barbershops
- 319 Black males with HTN
- Collaborative agreement created, Cluster-randomized trial
- Pharmacist-led intervention –BP measured by both pharmacists and some barbers. Pharmacists used protocols to achieve BP control and transmitted information electronically to hypertension specialists.
- Control group: Barbers encouraged lifestyle modification and doctor follow up.
- Primary outcome: Change in systolic blood pressure from baseline to 6 months.



Barbershop Study Results

- NEJM 2018: 6-month study: Mean fall in systolic blood pressure was 27.0 mm Hg (to 125.8 mm Hg) in the intervention group; 63.6% achieved BP < 130/80 mmHg ($p < 0.001$)
- Mean fall in SBP was 9.3 mm Hg (to 145.4 mm Hg) in the control group
- Circulation 2019: 12-month study follow up: Mean fall in systolic BP was 28.6 mm Hg (to 123.8 mm Hg) in the intervention group; 68.0% achieved BP < 130/80 mmHg ($p < 0.02$)
- Mean fall in SBP was 7.2 mm Hg (to 147.4 mm Hg) in the control group.
- Cohort retention at 12 months was 90% in both groups.



Financial Levers

- Core to all key strategies
- Individual: Reducing patient out-of-pocket costs for antihypertensive medications including combination pills & SMBP monitoring
- Inadequate coverage limits wider implementation of SMBP monitoring
- Clinical: Device SMBP loaner programs
- Policy: increase reimbursement rates for CPT codes 99473, 99474 for clinician SMBP monitoring



Lifestyle Modification Strategies

- Individual behavior change is hard
- Clinicians often untrained in counseling-nutrition, physical activity, sleep
- Task shifting to other members with behavioral modification expertise would be more impactful
- Salt reduction at population level—NYC National Salt and Sugar Reduction Initiative: voluntary targets for packaged and restaurant food items
- FDA guidance on voluntary targets for sodium reduction in processed, packaged, and prepared foods



Built Environment

- Built environment affected by historic redlining, climate change affects built environment
- Increasing access to green spaces & improving neighborhood walkability
- REGARDS study: Walkability was measured using Street Smart Walk Score based on Black/White participants' residential information (n=6,894)
- Score ≥ 70 —More walkable, Score < 70 less walkable.
- Primary outcome: incident hypertension
- Score ≥ 70 was associated with a lower risk of incident hypertension (RR [95%CI]: 0.85 [0.74, 0.98], $P = 0.02$), similar across racial/ethnic groups



Continuous Quality Improvement

- At clinician and health systems levels
- Combo of patient education, team-based care, facilitated relay of clinical data, audit and feedback improve processes of care and improvement in BP control
- Meta-analysis of 44 articles: Are QI programs effective in producing clinically meaningful reductions in blood pressure? Which QI strategies?
- Mean effects across all interventions: reductions in SBP of 4.2 mm Hg (95% CI 1.8, 6.6) and DBP of 1.9 mm Hg (95% CI 0.7, 3.1).
- Interventions that included team-based care as a QI strategy were associated with the largest reductions in blood pressure outcomes.



Antiracism efforts

- Racism occurs at multiple levels: individual, interpersonal, internalized, institutional, structural.
- Higher vs lower lifetime discrimination associated with higher HTN incidence for Black adults from JHS Hazard ratio, 1.34 [95% CI, 1.07-1.68]).
- Organization, community, level policies systems need to be restructured

AHA PRESIDENTIAL ADVISORY

Call to Action: Structural Racism as a Fundamental Driver of Health Disparities: A Presidential Advisory From the American Heart Association

Keith Churchwell, MD, FAHA, Chair, Mitchell S.V. Elkind, MD, MS, FAHA, Regina M. Benjamin, MD, MBA, April P. Carson, PhD, MSPH, FAHA, Edward K. Chang, BS, Willie Lawrence, MD, FAHA, Andrew Mills, MPH, Tanya M. Odom, EdM, Carlos J. Rodriguez, MD, MPH, FAHA, Fatima Rodriguez, MD, MPH, FAHA, Eduardo Sanchez, MD, MPH, Anjail Z. Sharrief, MD, MPH, FAHA, Mario Sims, PhD, MS, FAHA, Olajide Williams, MD, MS, and On behalf of the American Heart Association

Circulation. 2020 Dec 15;142(24):e454-e468.



Multicomponent approach: **AMA MAP BP**

- Measure accurately, Act rapidly, Partner with patients
- 6-month hypertension quality improvement program
- Initially conducted as a pilot program in 1 clinic: N=714, in South Carolina. 49.9% Medicaid, 50.2% Black adults, 18-85 yo
- Utilized existing team care. Focused on improving BP measurement and decreasing therapeutic inertia using protocol guided therapy.
- Clinicians received a monthly “score card” that included BP control for their panel of adults with hypertension, therapeutic inertia score, and the change of SBP with each therapeutic intensification.
- BP control improved from 61.2% to 89.9% at 6 months ($P < .0001$)



MAP BP at 12 months

- MAP framework tested in 16 Family Medicine clinics.
- Practice facilitation withdrawn after 6 months to determine BP control rates at 6 and 12 months
- 16,787 adults, BP control improved from 64.4% at baseline to 74.3% ($P<0.001$) at 6 months and 73.6% ($P<0.001$) at 12 months.
- Total cost/1,000 patients: $\approx$ \$3600
- Practical evidence-based program that works and improves BP control
- 3,700 health care organizations
- Typical timeline from start to implementation in organizations: 6-12 months



IMPLEMENT SMBP

Ready to launch a self-measured blood pressure (SMBP) monitoring program within your medical practice?

Getting Prepared

These recommendations will help you prepare for a successful SMBP program.

Getting Prepared

[Loaning Out Devices](#)

<https://targetbp.org/patient-measured-bp/implementing/>



Getting Prepared

These recommendations will help you prepare for a successful SMBP program.

Staffing

Team-based Care: identify a champion

- Include at least 1 physician and health care team at your office.
- If multiple physicians will participate, designate a **physician champion** to learn about the program and help colleagues succeed.

Budgeting

Financial Levers

- For each physician participating, budget for 2 to 3 [SMBP loaner devices](#) (approximately \$75 each) for patients who are unable or unwilling to purchase one themselves.

Scheduling

- Plan for an hour to train your staff on implementing the program in your practice.
- Each patient identified for SMBP will need 5 to 6 minutes of education and training by an MA or RN.
- After each patient completes a week of SMBP for either diagnosis of hypertension or assessment of blood pressure control, allow 5 minutes for staff to calculate the SMBP average and enter the data into the patient's medical record. Add an additional 5 minutes if a loaner device needs to be prepared for another patient.

[Use the device inventory and management guide](#)

Up Next: Loaning Out Devices

Getting Prepared

Loaning Out Devices

Selecting a Cuff Size

Training Patients

**Accurate BP
measurement**

Collecting Data

Managing Your Devices



[SMBP Loaner Device Agreement](#)



[SMBP Loaner Device Inventory
Management](#)



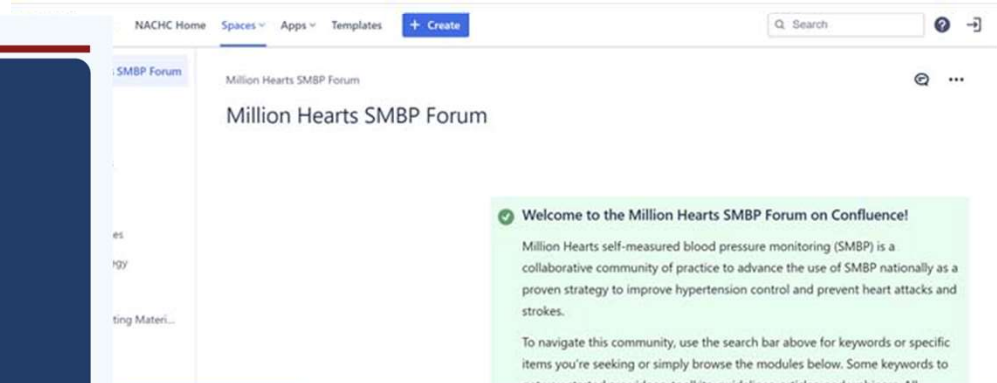
SMBP Monitoring

Self-Measured Blood Pressure Monitoring (SMBP) Implementation Toolkit

☐ Determine how outreach support will be provided to patients	☐ Electronic patient communication (text or email programs) ☐ Home visit ☐ Scheduled telehealth check-in ☐ Unscheduled telephone call
☐ Determine encounter type for initial follow-up appointment	☐ Face-to-face visit with: ☐ Nurse ☐ Pharmacist ☐ Physician/PA/NP ☐ Telehealth visit with: ☐ Nurse ☐ Pharmacist ☐ Physician/PA/NP ☐ Home visits ☐ Other
☐ Develop any collaborative practice agreements needed	☐ Nurse visits ☐ Pharmacists: ☐ Medication titration ☐ Refill authorization

SMBP DATA MANAGEMENT	
☐ Determine how patients will record/share data with the care team	Our protocol:
☐ Determine what types of SMBP measurements clinicians want to see	☐ 7-day SMBP averages ☐ All individual home BP readings ☐ Outlier BP readings (very high or very low)

2023



KEY SMBP STAFF

☐ SMBP Coordinator (has authority, time, and skills to coordinate all aspects SMBP implementation)	SMBP Coordinator:		
☐ SMBP Trainers (at least one per site; educates patient on how to use the home BP monitor, how to get home BP readings back to the care team, how often to do measurements, and proper technique)	Site	SMBP Trainer	Available Daily for Warm Handoff ☐ Yes ☐ No ☐ Yes ☐ No ☐ Yes ☐ No
☐ SMBP Device Manager (tracks, inventories, cleans, calibrates, stores home BP monitors)	Site	SMBP Device Manager	
☐ SMBP Clinical Champion (has time to facilitate implementation success, key influencer)	Site	SMBP Clinical Champion	
☐ SMBP Outreach Coordinator (coordinates contacting patients to recommend SMBP and after they initiate SMBP to ensure understanding of proper measurement technique, etc.)	Site	SMBP Outreach Coordinator	
☐ SMBP Data Manager (receives, possibly enters, prepares, and manages SMBP data)			

https://www.nachc.org/wp-content/uploads/2023/07/Self-Measured-Blood-Pressure-Toolkit_3.9.2023_FINAL.pdf
<https://nachc.atlassian.net/wiki/spaces/SMBP/overview>

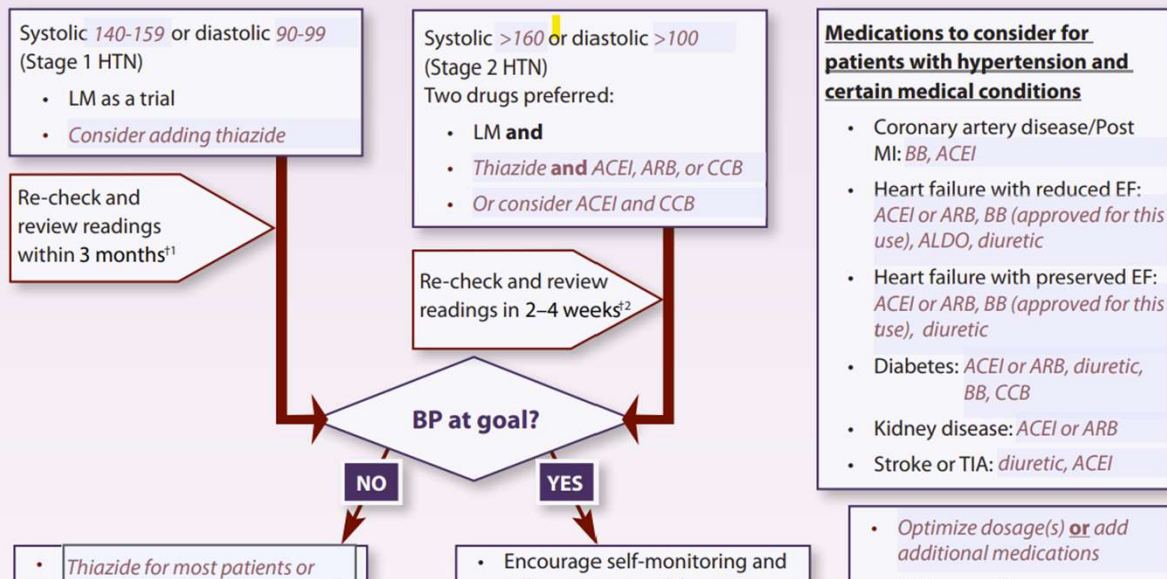
The red, italicized text may be modified by the user to provide specific drug names.

Reset Form

Name of Practice

Protocol for Controlling Hypertension in Adults¹

The blood pressure (BP) goal is set by a combination of factors including scientific evidence, clinical judgment, and patient tolerance. For most people, the goal is <140 and <90; however some individuals may be better served by other BP goals. Lifestyle modifications (LM)* should be initiated in all patients with hypertension (HTN) and patients should be assessed for target organ damage and existing cardiovascular disease. Self-monitoring is encouraged for most patients throughout their care and requesting and reviewing readings from home and community settings can help in achieving and maintaining good control. For patients with hypertension and certain medical conditions, specific medications should be considered, as listed in the box on the right below.





Priorities & Critical Gaps

- Large scale dissemination is lagging – current implementation toolkits exist for some strategies such as SMBP monitoring, team-based care, and antihypertensive medication protocols
- Coordinated multilevel interventions are needed including across organizations (silos exist)
- Scaling up interventions – while tackling adverse social determinants of health and adopting antiracism strategies
- Increasing financial strategies at all levels: organizations/community/clinician/patient



Priorities & Critical Gaps cont'd

- Improving health systems data infrastructure to rapidly identify and act upon key BP control process measures
- Training of clinicians and multidisciplinary team on protocols & SMBP monitoring
- Large-scale implementation of lifestyle programs across health systems and communities
- Evaluating antiracism, health equity implementation strategies on BP control within communities

Questions?

Please submit your questions
through the questions pane



Thank You

Marwah Abdalla, MD MPH



COLUMBIA

COLUMBIA UNIVERSITY
IRVING MEDICAL CENTER



@marwahabdalla