



A MAP for Improving Blood Pressure Control

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Disclosures

Commercial Interest: None

Objectives

- Describe why prioritizing blood pressure (BP) control is critical
- Explain an evidence-based, practical solution to improve BP control
 - Review the evolution of the AMA's M.A.P. BP Improvement Program and Target: BP[®]
 - Apply concepts of M.A.P. in clinical practice
- Q & A

The Importance of Prioritizing BP Control

Improving BP control is critical

2003 JNC 7 definition hypertension (HTN): BP \geq 140/90 mm Hg

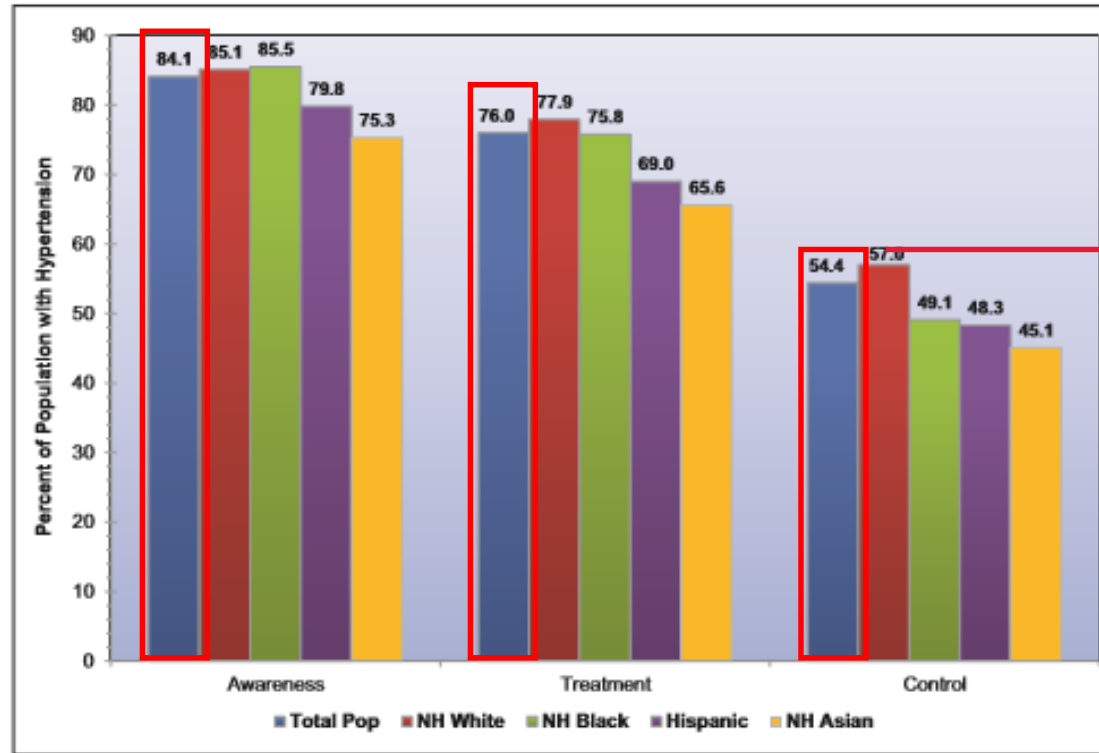
- Prevalence in US adults estimated 34%
- 85.7 million U.S. adults have HTN

2017 ACC/AHA definition HTN: BP \geq 130/80 mm Hg

- Prevalence in US adults estimated 46%
- 116 million U.S. adults have HTN

Awareness, treatment and control of HTN: NHANES 2011-14

HTN = BP \geq 140/90 mm Hg or on antihypertensive medication



Control is 48.3%
using NHANES
2015-2016

Chart 8-3. Extent of awareness, treatment, and control of high blood pressure by race/ethnicity (NHANES 2011–2014).

Hypertension is defined as systolic blood pressure \geq 140 mm Hg or diastolic blood pressure \geq 90 mm Hg, or if the subject said “yes” to taking antihypertensive medication.

NH indicates non-Hispanic; and NHANES, National Health and Nutrition Examination Survey.

Source: National Center for Health Statistics and National Heart, Lung, and Blood Institute.

Awareness, treatment and control: NHANES 2013-16

HTN = BP \geq 130/80 mm Hg or on antihypertensive medication

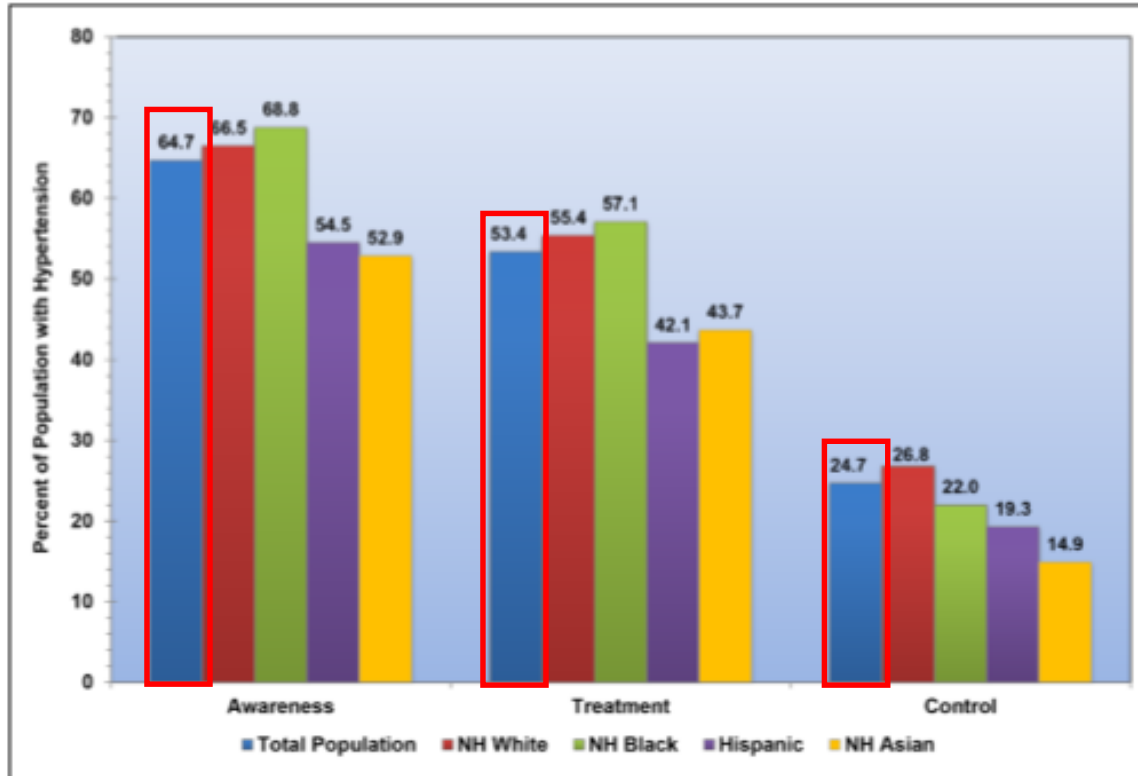


Chart 8-3. Extent of awareness, treatment, and control of high blood pressure by race/ethnicity (NHANES, 2013–2016).

Hypertension is defined in terms of NHANES blood pressure measurements and health interviews. A person was considered to have hypertension if he or she had systolic blood pressure \geq 130 mmHg or diastolic blood pressure \geq 80 mmHg, if he or she said “yes” to taking antihypertensive medication, or if the person was told on 2 occasions that he or she had hypertension.

NH indicates non-Hispanic; and NHANES, National Health and Nutrition Examination Survey.

Source: National Center for Health Statistics and National Heart, Lung, and Blood Institute.

The AMA Improving Health Outcomes team prioritizes BP Control

- CDC estimates 16 million preventable cardiovascular events will occur from 2017-2022
- The most common modifiable risk factor for cardiovascular events is HTN
- Less than half of all patients with HTN have their BP controlled to goal

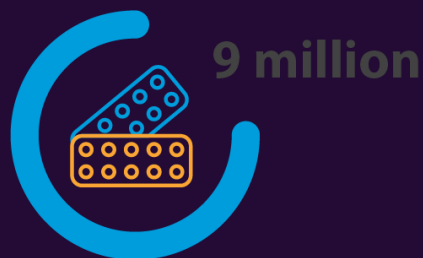
Gaps in key interventions to prevent heart disease in U.S. adults



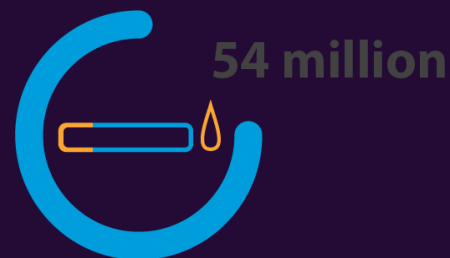
Adults not using statins when indicated



People with uncontrolled BP



People not taking aspirin as recommended

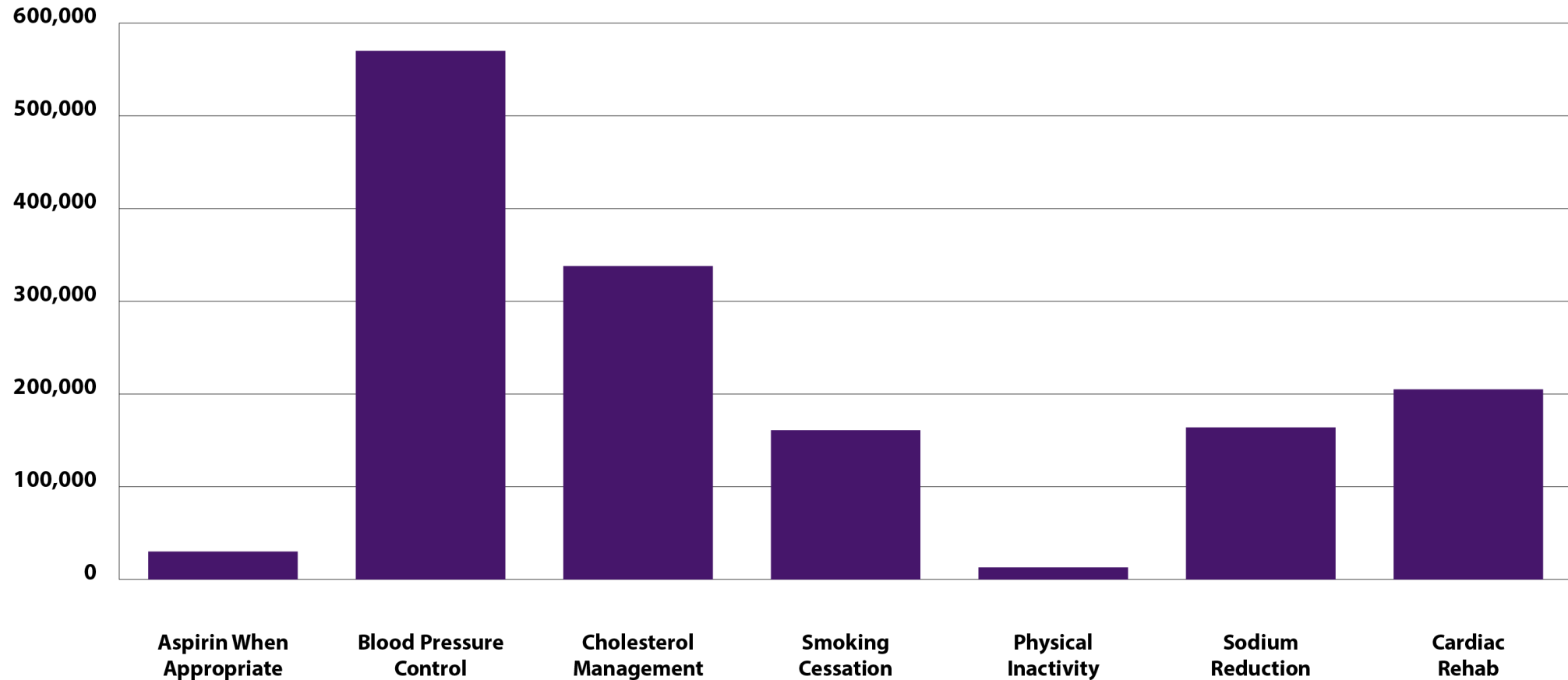


Adult smokers



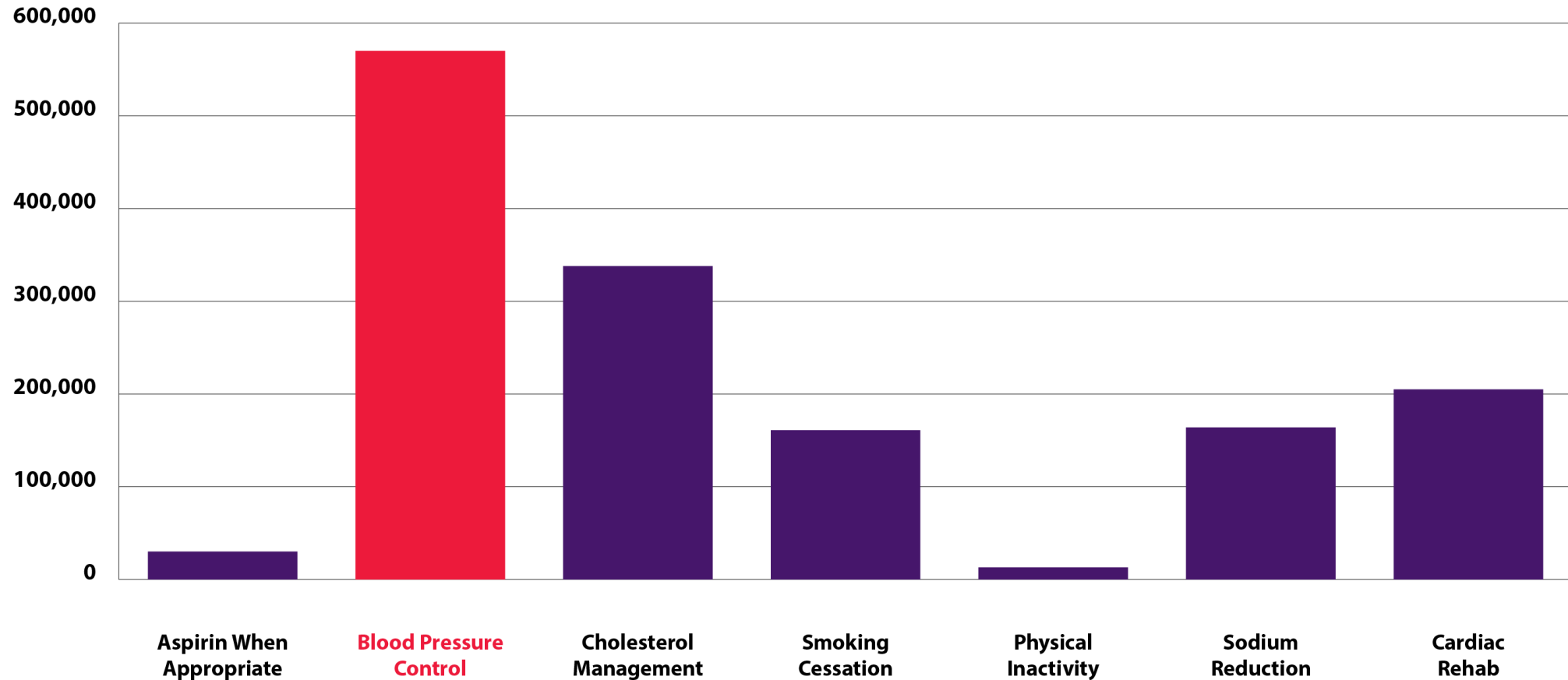
Adults who are physically inactive

Relative event contributions to preventing a million heart attacks and strokes*



***Notes:** Aspirin when appropriate reflects aspirin use for secondary prevention only; total does not equal sum of events prevented by risk factor type as those totals are not mutually exclusive; applies ratios obtained from PRISM and ModelHealth:CVD to estimate the number of total events, to more closely align with the Million Hearts event definition. **Data sources:** Aspirin when appropriate – 2013-14 NHANES; blood pressure control and cholesterol management – 2011-14 NHANES; smoking cessation and physical inactivity – 2015 NHIS, cardiac rehabilitation – Aedes P, et al. Increasing Cardiac Rehabilitation Participation From 20% to 70%: A Road Map From the Million Hearts Cardiac Rehabilitation Collaboration. Mayo Clin Proc. 2017;92(2):234-242., sodium reduction – 2011-12 NHANES.

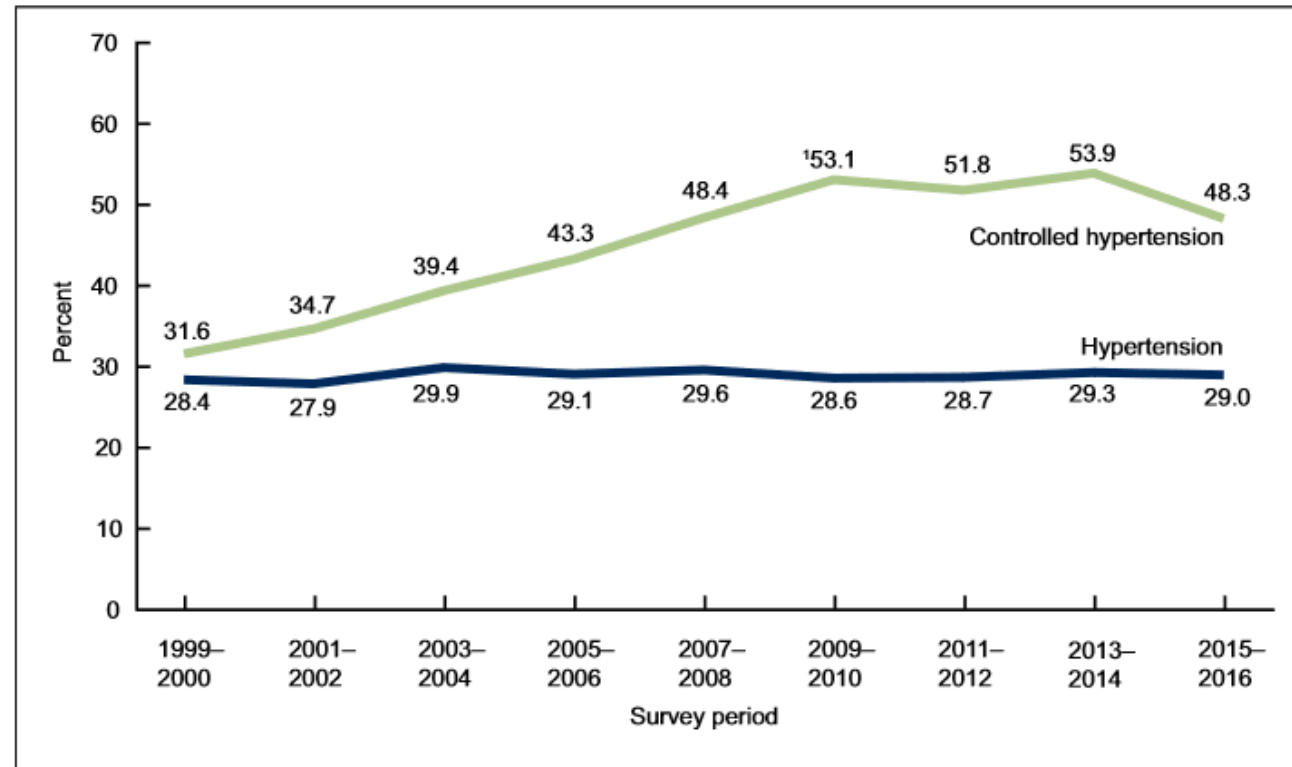
Relative event contributions to preventing a million heart attacks and strokes*



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Why prioritizing BP control is critical

Figure 5. Age-adjusted trends in hypertension and controlled hypertension among adults aged 18 and over: United States, 1999–2016



¹Significant increasing trend for 1999–2010, $p < 0.001$.

NOTES: Hypertension estimates are age adjusted by the direct method to the 2000 U.S. Census population using age groups 18–39, 40–59, and 60 and over. Estimates of controlled hypertension are age adjusted by the direct method using computed weights based on the subpopulation of persons with hypertension in the 2007–2008 National Health and Nutrition Examination Survey, using age groups 18–39, 40–59, and 60 and over. Access data table for Figure 5 at: https://www.cdc.gov/nchs/data/databriefs/db289_table.pdf#5.

SOURCE: NCHS, National Health and Nutrition Examination Survey, 1999–2016.

The M.A.P. BP Improvement Program

Factors impacting blood pressure control



Patient factors

- Non-adherence to treatment
- Lifestyle / Habits
- Lack of support for patients to self-manage HTN
- Social Determinants of Health



Physician factors

- Competing priorities/time
 - Guideline confusion/complexity
 - Don't use evidence-based treatment protocol
 - Diagnostic Inertia
 - Therapeutic Inertia
- } Clinical Inertia



System factors

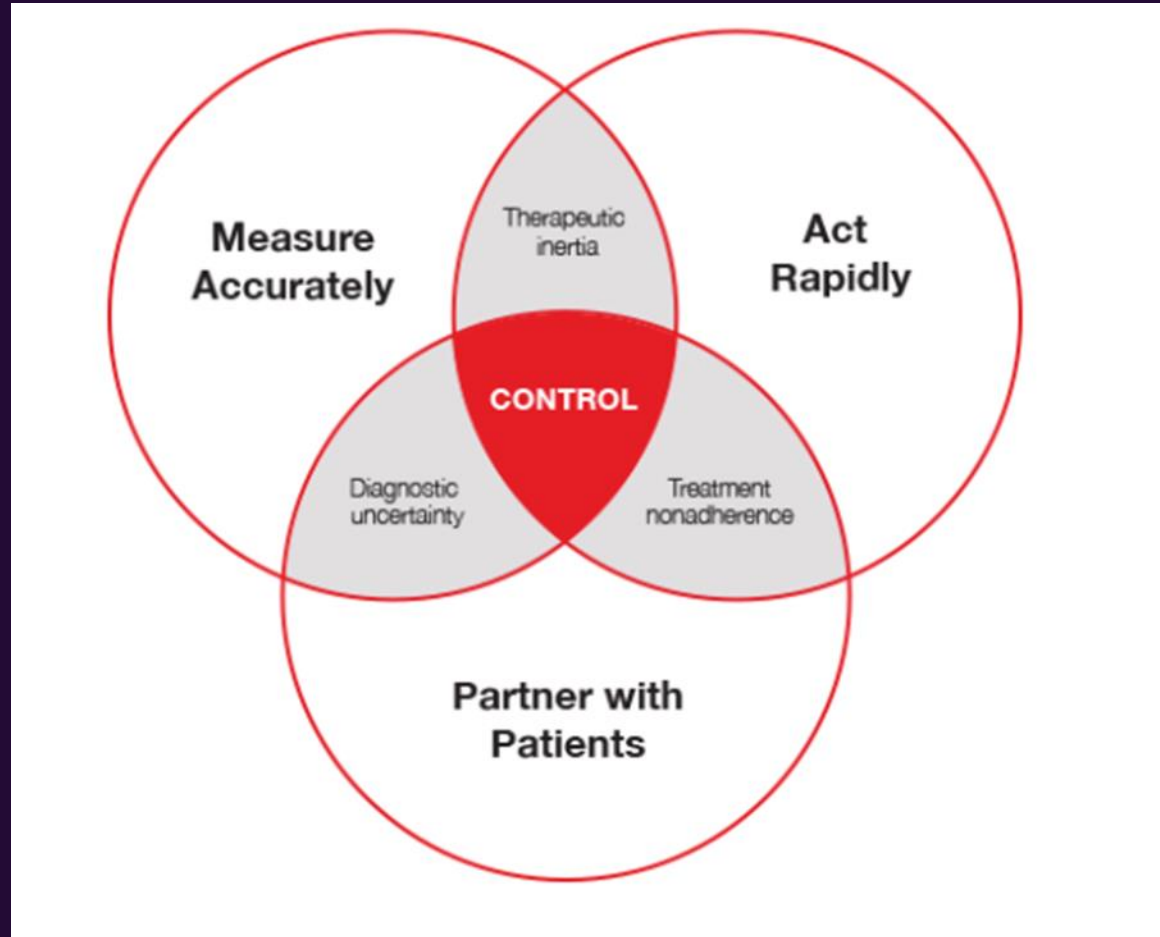
Inaccurate Blood Pressure (BP) Measurements

- Lack of standardized measurement protocols, competency testing and retraining
- Creates uncertainty about reliability of BP

Not an organizational priority / lack of buy-in

The M.A.P. quality improvement framework

All three are critical for control



We operationalized M.A.P. into a series of easy to follow checklists...



Increase BP measurement accuracy

- ✓ Incorporate standardized patient positioning
- ✓ Use upper arm BP automated measurement devices validated for clinical accuracy and calibrated regularly
- ✓ Implement standardized measurement protocol (screen and confirm approach)



Adopt standardized, evidence-based protocols for treating hypertension

- ✓ Use an evidence-based treatment protocol
- ✓ Frequent, follow-up visits until blood pressure is controlled
- ✓ Single-pill combination therapy to treat when possible



Promote patient self-management

- ✓ Incorporate self-measured blood pressure (SMBP) education, tools and resources for patients
- ✓ Encourage healthy lifestyle changes to improve BP control
- ✓ Assess and address medication and treatment non-adherence
- ✓ Use collaborative communication

...and used the checklists to create The M.A.P. BP Improvement Program, a six-month continuous quality improvement program



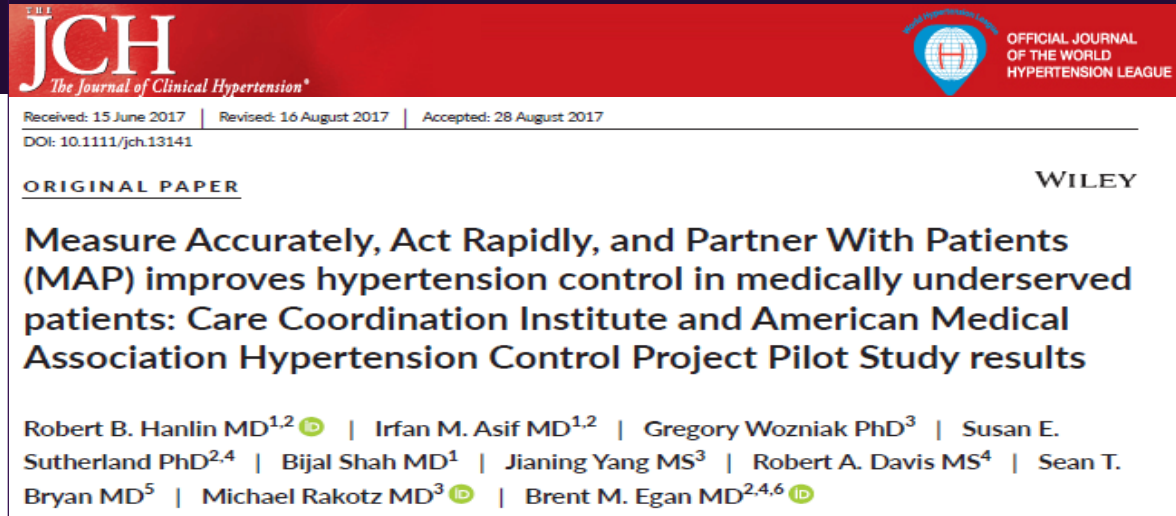
Each M.A.P. component is implemented for 2 months and includes:

- *An evidence-based strategy and action steps*
- *Supporting tools and resources*
- *Practice coaching (practice change facilitation)*
- *Performance metrics, dashboards / monthly reports*
- *Peer-to-peer learning*

1. Brent M. Egan, Susan E. Sutherland, Michael Rakotz, Jianing Yang, R. Bruce Hanlin, Robert A. Davis, Gregory Wozniak. Improving Hypertension Control in Primary Care with the Measure Accurately, Act Rapidly and Partner with Patients (MAP) Protocol: Results at 6 and 12 Months. *Hypertension*. 2018;72:1320–1327 <https://doi.org/10.1161/HYPERTENSIONAHA.118.11558>

2. Hanlin RB, Asif IM, Wozniak G, Sutherland SE, Shah B, Yang J, Davis RA, Bryan ST, Rakotz M, Egan BT. Measure Accurately, Act Rapidly, and Partner With Patients (MAP) improves hypertension control in medically underserved patients: Care Coordination Institute and American Medical Association Hypertension Control Project Pilot Study results. *J Clin Hypertens*. January 2018;20:79–87. <https://doi.org/10.1111/jch.13141>

M.A.P. Blood Pressure Quality Improvement Program: Positive results



Results summary:

- MAP implemented in a residency clinic, 900 hypertensive patients
- Between baseline and the last study visit, BP control to <140/<90 mm Hg increased from 61.2% to 89.9% ($p < .0001$)
- MAP rapidly and significantly improved hypertension control in medically underserved patients, largely as a result of measuring BP accurately and partnering with patients

<https://doi.org/10.1111/jch.13141>

Hanlin RB, Asif IM, Wozniak G, Sutherland SE, Shah B, Yang J, Davis RA, Bryan ST, Rakotz M, Egan BT. Measure Accurately, Act Rapidly, and Partner With Patients (MAP) improves hypertension control in medically underserved patients: Care Coordination Institute and American Medical Association Hypertension Control Project Pilot Study results. *J Clin Hypertens*. January 2018;20:79–87. <https://doi.org/10.1111/jch.13141>

M.A.P. Blood Pressure Quality Improvement Program: Positive results

Hypertension

Original Article

OPEN

Improving Hypertension Control in Primary Care With the Measure Accurately, Act Rapidly, and Partner With Patients Protocol

Results at 6 and 12 Months

Brent M. Egan, Susan E. Sutherland, Michael Rakotz, Jianing Yang, R. Bruce Hanlin,
Robert A. Davis, Gregory Wozniak

Brent M. Egan, Susan E. Sutherland, Michael Rakotz, Jianing Yang, R. Bruce Hanlin, Robert A. Davis, Gregory Wozniak. Improving Hypertension Control in Primary Care with the Measure Accurately, Act Rapidly and Partner with Patients (MAP) Protocol: Results at 6 and 12 Months. *Hypertension*. 2018;72:1320–1327 <https://doi.org/10.1161/HYPERTENSIONAHA.118.11558>

Results summary:

- MAP implemented in 16 practices, 16,000+ hypertensive patients
- BP control improved from 64.4% at baseline to 74.3% (P<0.001) at 6 and 73.6% (P<0.001) at 12 months
- Among adults with uncontrolled baseline BP and no medication changes (n=3654), measure accurately resulted in 11.1/5.1 mm Hg lower BP
- During the first 6 months of MAP, therapeutic inertia fell (52.0% versus 49.5%; P=0.01)
- Systolic BP decreased more per therapeutic intensification (−5.4 to −12.7; P<0.001).

What is Target: BP?

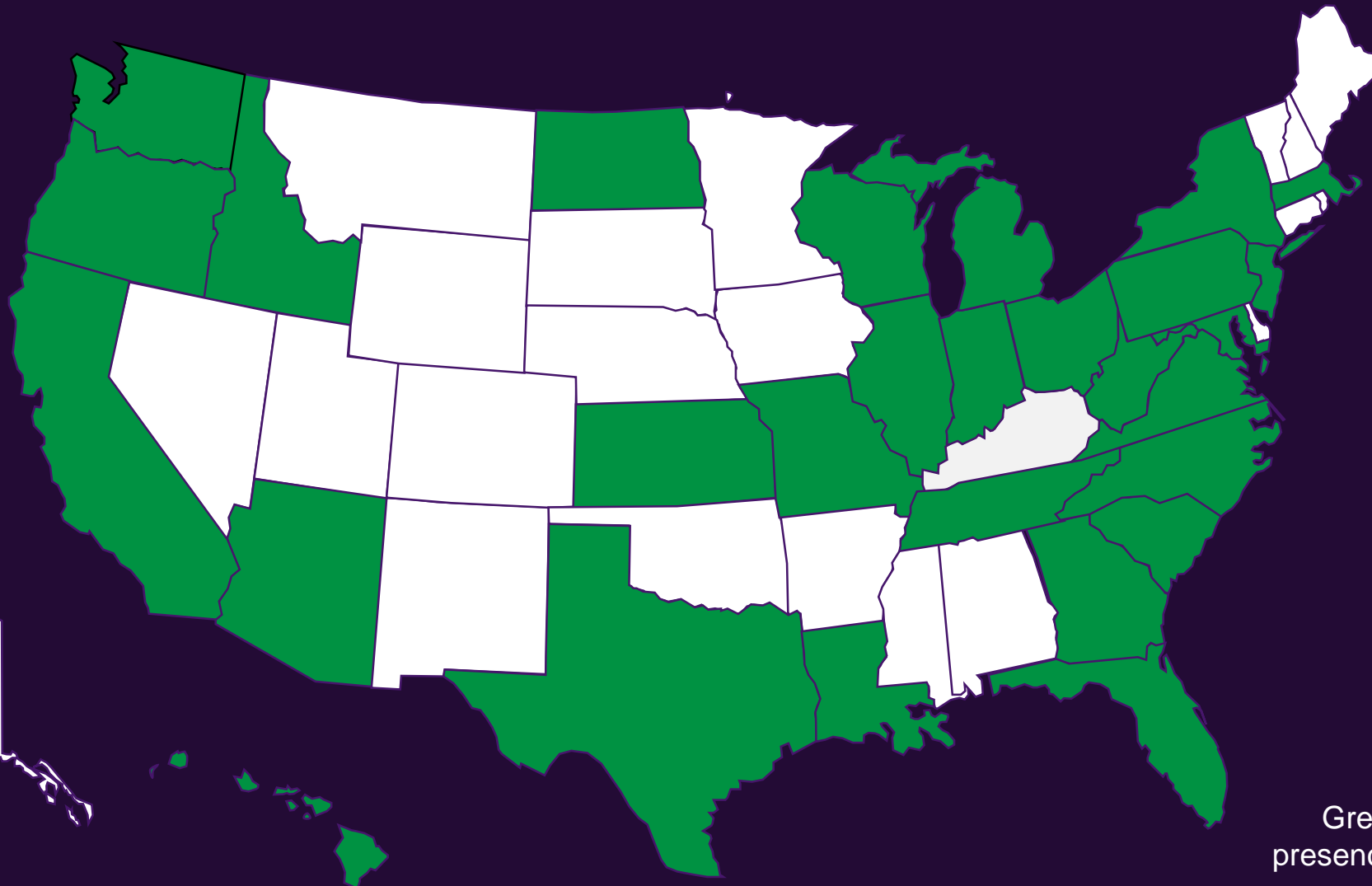
TARGET: **BP**



targetbp.org

- ✓ A **call to action** to prioritize blood pressure control
- ✓ **Recognition** for healthcare organizations that who attain high levels of blood pressure control in their patient
- ✓ A source for **tools and resources** to use in practice to **improve BP control**

Engaging Healthcare Organizations (HCOs) across the United States



Green states indicate our active presence in hypertension engagement.

Components of the M.A.P. BP Program

Measure Accurately

“Accurate and reliable BP measurements are essential for the diagnosis and management of hypertension”

Measure accurately

EVIDENCE-BASED STRATEGY

Obtain accurate representative BP measurements

ACTION STEPS

Perform confirmatory BPs

Repeat high office BP measurements

- Preferably using AOBP
- Correct measurement technique
- Proper number of BP measurements and documentation
- Use validated BP measurement device calibrated regularly
- ABPM/SMBP for out-of-office

KEY

AVAILABLE RESOURCES

- Positioning poster
- Care team BP measurement training tools
- Care team competency tools
- BP measurement audit tool
- SMBP training videos

METRICS

Confirmatory

- % of patients with high initial BP who have repeat BP documented

Terminal digit preference zero

- % of Systolic and Diastolic BP measurements ending in zero

Blood Pressure Control

- % adults with hypertension who have BP controlled to less than 140/90 mm Hg (NQF 0018)

Methods of BP Measurement

Manual	<ul style="list-style-type: none">• Aneroid devices• Auscultation	In Office
Semi-automated	<ul style="list-style-type: none">• Semi-automated device takes a single reading• Oscillometry	
AOBP*	<ul style="list-style-type: none">• Fully automated device takes multiple readings at a set interval, average reading is used for decision-making• Oscillometry	
ABPM*	<ul style="list-style-type: none">• Ambulatory device worn for 24 hours (or other specified duration), repeated measurements taken – requires interpretation of results• Oscillometry	Out of Office
SMBP	<ul style="list-style-type: none">• Typically semi-automatic device used to measure BP outside of the office, SMBP is a form of SMBP• Oscillometry	

* Preferred method

Semi-automated devices

Automated devices can be an accurate and reliable

Minimize the potential for technique-related errors



Allow for more time to be spent on patient preparation, cuff selection and positioning

Semi-automated devices do not solve the problem of inaccurate BP measurements

Sources of BP Measurement Error

PATIENT RELATED

1. Meal ingestion
2. Alcohol use
3. Caffeine use
4. Nicotine exposure
5. Bladder distension
6. Cold Exposure
7. Paretic arm
8. White-coat effect

DEVICE RELATED

9. Device Model Inaccuracy
10. Device integrity and calibration

PROCEDURE RELATED

11. Insufficient rest
12. Body position
13. Legs crossed
14. Unsupported back
15. Unsupported arm
16. Arm lower than heart
17. Wrong cuff size
18. Cuff over clothing
19. Stethoscope under cuff
20. Talking
21. Using bell of stethoscope
22. Pressure on stethoscope head
23. Rapid cuff deflation
24. Short interval b/w measurements
25. Reliance on single BP
26. Interarm variability
27. Observer hearing deficit
28. Korotkoff sound interpretation
29. Terminal digit preference

Inaccurate measurement technique is common: a large bias was associated with 27 out of the 29 potential sources

Impact of seven common errors of BP measurement

When the patient has	Blood pressure can change by an estimated* ...
Crossed Legs	2–8 mm Hg ¹
Cuff over clothing	5–50 mm Hg ²
Cuff too small	2–10 mm Hg ²
Full bladder	10 mm Hg ²
Talking or active listening	10 mm Hg ²
Unsupported arm	10 mm Hg ^{1,2}
Unsupported back/feet	6.5 mm Hg ³

* These values are not cumulative.

Key Recommendations for Office-Based Blood Pressures

BP Measurement Devices

- Use of automated devices reduces skill required for measuring BP accurately
- Oscillometric devices should be validated for accuracy and calibrated every 1-2 years
- Aneroid devices should be calibrated at regular intervals
- Aneroid devices can be as or more accurate than automated devices with regular device calibration if proper technique used

Measurement Technique

- Training and retraining for all healthcare professionals measuring BP is recommended
- Appropriate patient preparation, positioning and measurement technique required
- Correct number of BPs, documentation, averaging and communication of readings

Muntner P, Shimbo D, Carey R et al; on behalf of the American Heart Association Council on Hypertension; Council on Cardiovascular Disease in the Young; Council on Cardiovascular and Stroke Nursing; Council on Cardiovascular Radiology and Intervention; Council on Clinical Cardiology; and Council on Quality of Care and Outcomes Research. Measurement of blood pressure in humans: a scientific statement from the American Heart Association. *Hypertension*. 2019;71:e•••–e•••. DOI: 10.1161/HYP.0000000000000087

Fully automated office blood pressure (AOPB)

Monitors can take three BP measurements and average them

Provides unattended measurement, minimizing white coat effect



Total measurement time: five minutes

Correlates well with daytime mean BP on Ambulatory BP monitoring (ABPM)

Confirming In-office BP: Using AOBP in Clinical Practice

AOBP is now the preferred in-office approach for measuring BP

- Canada - Hypertension Canada Guideline 2016 - present
- US - 2019 AHA Scientific Statement on Measurement of BP in Humans

Allows for multiple measurements to be taken at defined intervals and averaged

- Total time required for AOBP is 4 to 6 minutes versus 7 to 8 minutes for auscultatory and semiautomated devices
- Correlates well with 24-hour daytime mean on ABPM

Staff does not need to be present during BP measurement

- Saves staff time
- Reduces or eliminates white-coat effect in most patients

Muntner P, Shimbo D, Carey R et al; on behalf of the American Heart Association Council on Hypertension; Council on Cardiovascular Disease in the Young; Council on Cardiovascular and Stroke Nursing; Council on Cardiovascular Radiology and Intervention; Council on Clinical Cardiology; and Council on Quality of Care and Outcomes Research. Measurement of blood pressure in humans: a scientific statement from the American Heart Association. *Hypertension*. 2019;71:e•••–e•••. DOI: 10.1161/HYP.0000000000000087

Confirming In-office BP: Using Out-of-Office Measurements

For confirming the **diagnosis** of hypertension

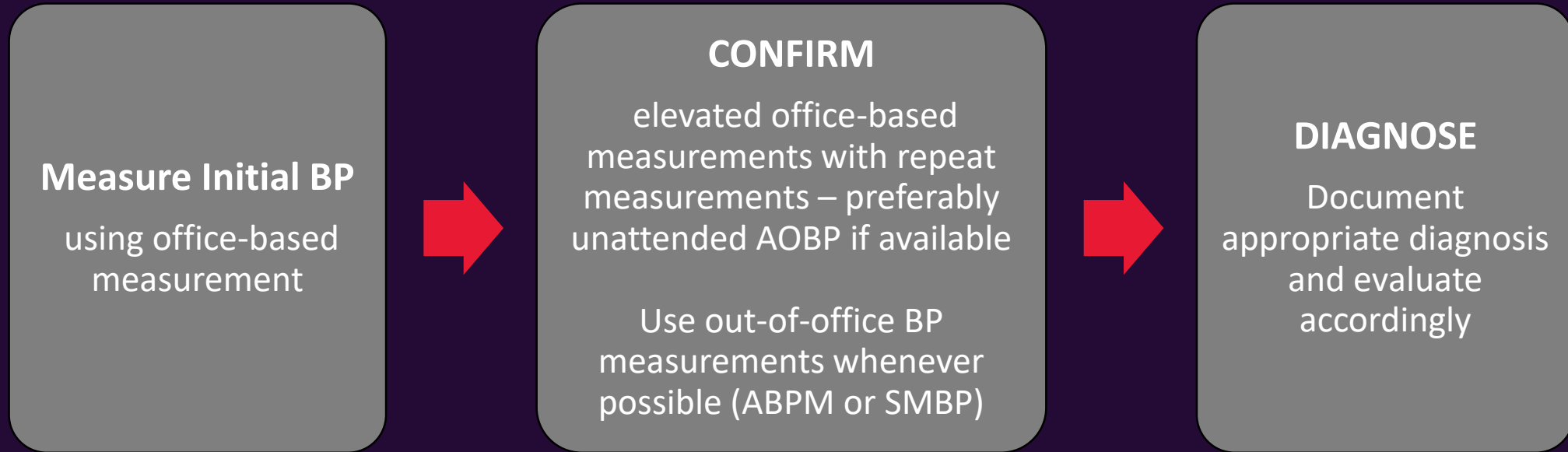
- 2017 ACC/AHA Hypertension Clinical Practice Guidelines: ABPM should be performed, with SMBP used when ABPM is unavailable or not tolerated
- 2015 USPSTF recommends confirmation of suspected HTN based on in-office BPs by ABPM, and SMBP as an acceptable alternative to ABPM

For the **management** of established hypertension

- 2017 Hypertension Clinical Practice Guidelines recommend that SMBP be used to assess control of treated HTN and ABPM performed if confirmatory testing needed

BPs measured with ABPM and SMBP have a stronger association with CVD risk than office-based BP measurements

Practical Approach to Measuring Accurately



Components of the M.A.P. BP Program

Act Rapidly

To treat confirmed uncontrolled high BP

Act rapidly

EVIDENCE-BASED STRATEGY

Intensify treatment for confirmed uncontrolled High Blood Pressure

ACTION STEPS

Intensify treatment

- Use a treatment protocol
- Use single-pill combination therapy
- Increase follow up frequency to every 2-4 weeks until BP is controlled (include outreach)

KEY

AVAILABLE RESOURCES

- Hypertension treatment protocol
- Therapeutic inertia assessment tool
- Registry reporting listing uncontrolled / overdue patients for outreach and or recall

METRICS

Therapeutic Intensification

- % of patients with uncontrolled BP during an office encounter who are prescribed an additional class of antihypertensive medication

Blood Pressure Control

- % adults with hypertension who have BP controlled to less than 140/90 mm Hg (NQF 0018)

“Therapeutic inertia” defined

A lack of treatment intensification when a patient’s blood pressure is high

- Treatment intensification includes initiation or escalation of anti-hypertensive medication

Treatment intensification enhances survival and decreases the likelihood of cardiovascular events in people with uncontrolled hypertension

Therapeutic inertia: Contributing factors



Clinician factors

- Uncertainty of BP measurement
- Competing priorities (insufficient time)
- Failure to recommend frequent follow-up (4 weeks)
- Delay in diagnosis
- Hesitation to titrate treatment
- Failure to set clear goals and insufficient focus on attainment



System factors

- Absence of BP measurement protocol and hypertension treatment protocol
- Lack of HTN registry
- Lack of dashboards or performance reports
- Poor communication between team members
- Lack of prioritization of HTN

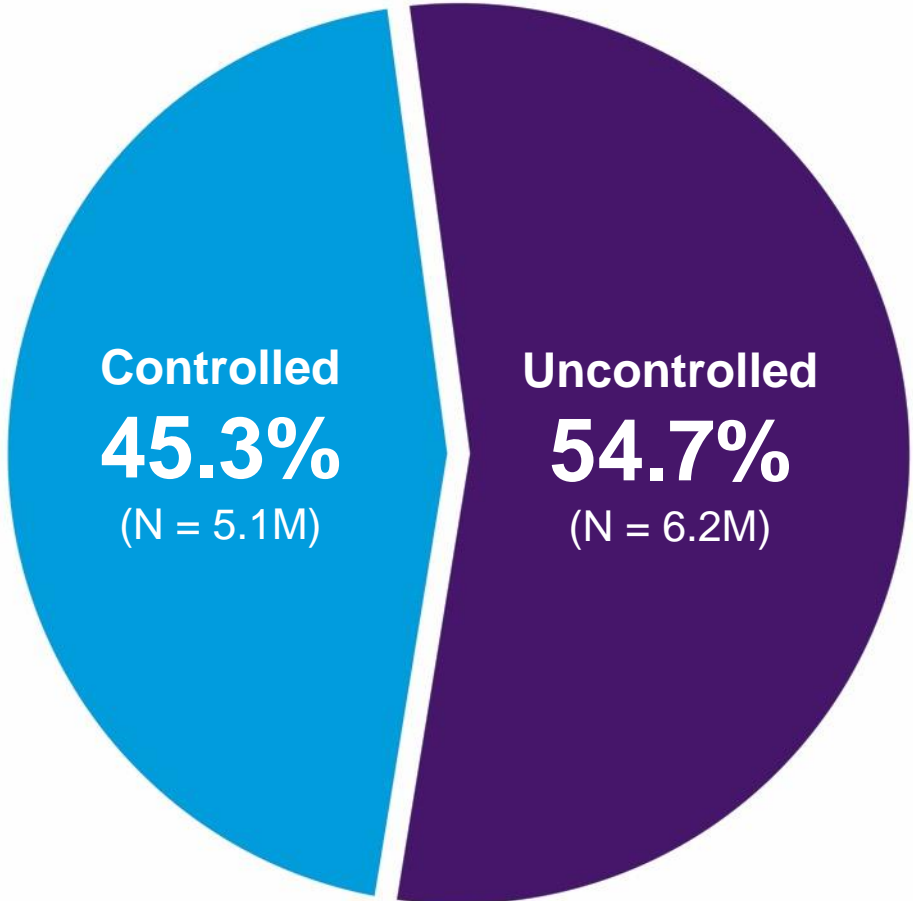


Patient factors

- Absence of Symptoms
- Medication side effects
- Cost of medications
- Missed follow-up
- Denial of disease & severity
- Mistrust of health care professionals
- Poor communication w/ Provider

Hypertension cascade among non-Hispanic black adults over 18

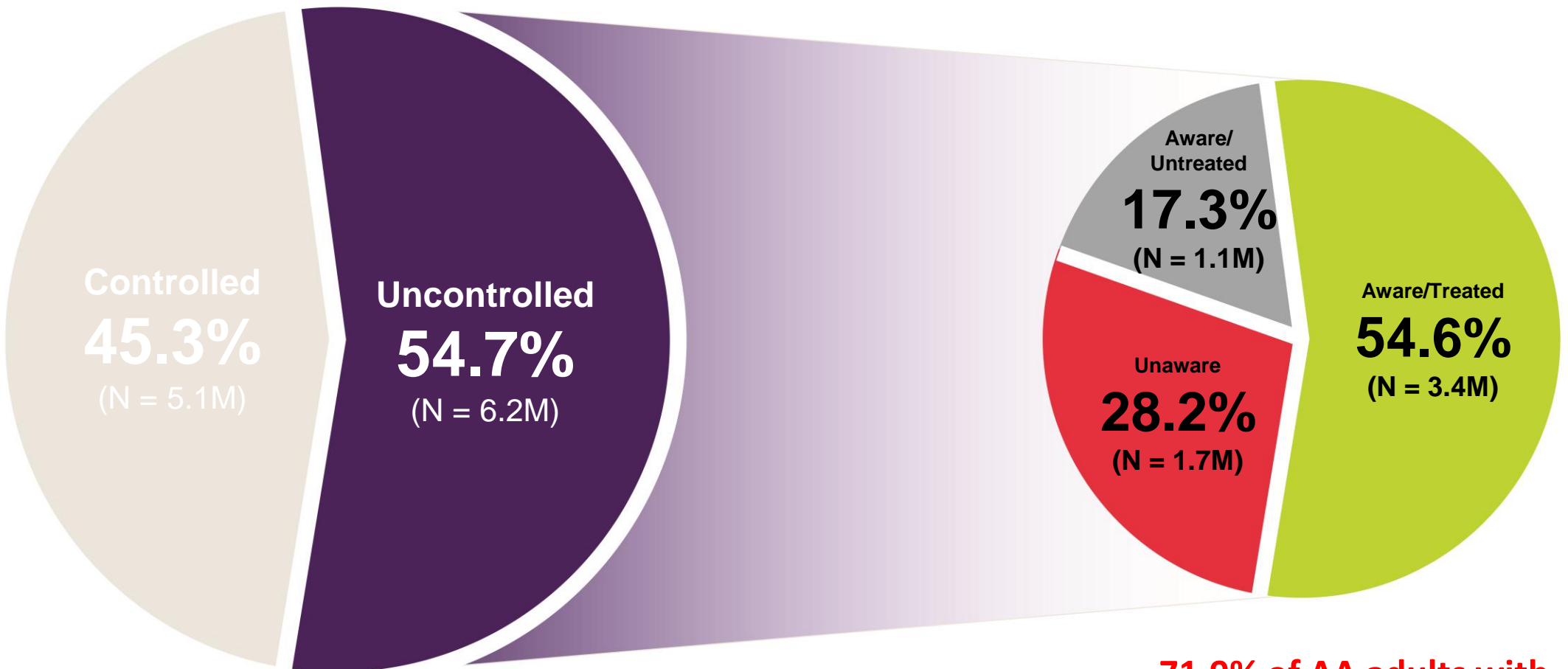
**In 2014, 11.3M
AA adults had
hypertension**



Source: 2013-2016 National Health and Nutrition Examination Survey

Used with Permission from Hilary K Wall, MPH, Sr. Health Scientist and Million Hearts Science Lead, Centers for Disease Control and Prevention, Atlanta GA

Hypertension cascade among non-Hispanic black adults over 18



71.9% of AA adults with uncontrolled HTN are diagnosed, but not treated to goal

Standardized treatment protocols

- Having a “playbook” can help guide the entire care team



Who needs treatment

What treatment should be used

When follow-up should occur

Ways to increase adoption:

- Make sure all clinical team members are familiar with the protocol
- Embed into the EHR
- Audit use and provide feedback

AMA's hypertension medication treatment protocol

For adults without CHF, CAD, pregnancy, CKD stage 3 or albuminuria \geq 300 mg/d or \geq 300 mg/g albumin-to-creatinine ratio*

This document is not intended as a substitute for the medical advice of a physician; it offers no diagnoses or prescription. No endorsement is implied or intended by the American Medical Association of any third-party organization, product, drug or service.

Check labs at clinician's discretion.

Not on antihypertensive medication

- Prescribe dihydropyridine CCB plus ACEI or ARB in a single-pill combination (SPC).^{1a,2,3}
- If concerned about hypotension, frailty in the very old, increased risk of medication intolerance or other factors, consider a low dose SPC or monotherapy with a CCB.^{1a,1b}

Already on antihypertensive medication

- Prescribe one additional medication from a different class (ACEI or ARB, CCB, or thiazide or thiazide-like diuretic) preferably as a single-pill combination (SPC), if available.^{1a}

*If CCB not tolerated (e.g., edema), consider replacing with thiazide-like diuretic.^{1b}
If diabetes with albuminuria and monotherapy desired, use an ACEI or ARB.^{1a}*

Reassess BP in 2–4 weeks^{1c}

Use self-measured BP (SMBP) if available.^{1c}

Yes **BP at goal?** No

Reassess BP in 3–6 months^{1c}

Use SMBP, if available

Assess treatment adherence^{1c}

Use strategies to optimize, if needed

Intensify medication if benefits outweigh risks

1. If on SPC, increase SPC dose or add thiazide-like or thiazide diuretic^{1a}
2. If on CCB monotherapy, add ACEI or ARB^{1a} preferably as SPC²
3. If on ACEI or ARB monotherapy, add CCB preferably as SPC²
4. If on thiazide-like or thiazide monotherapy, add ACEI or ARB^{1a}
5. If on three medication classes, consider referral to specialist and/or adding spironolactone^{1d}

Generic medication summary

Antihypertensive medication	Sample generic options	Dose once daily (initial) ⁴	Dose once daily (intensified) ⁴	Estimated Cost (30-day supply) ⁵
CCB and ACEI (SPC) (if ACEI not tolerated due to cough, go to next row)	amlodipine/benazepril	(a) 2.5/10 mg (b) 5/10 mg (c) 5/20 mg	(a) 5/10 mg or 5/20 mg (b) 5/20 mg or 10/20 mg (c) 10/20 mg or 10/40 mg	\$15–20
CCB and ARB (SPC) (if cost an issue, use CCB monotherapy (amlodipine) and go to next row)	(a) amlodipine/olmesartan (b) amlodipine/telmisartan	(a) 5/20 mg (b) 5/40 mg or 5/80 mg	(a) 5/40 mg or 10/20 mg or 10/40 mg (b) 5/80 mg or 10/80 mg	(a) \$29–40 (b) \$50–60
Add thiazide-like or thiazide diuretic	(a) indapamide (preferred) (b) chlorthalidone (preferred) (c) hydrochlorothiazide	(a) 1.25 mg (b) 12.5 mg = ½ 25 mg tab (c) 12.5 mg	(a) 2.5 mg (b) 25 mg (c) 25 mg	(a) \$4 (b) \$8–16 (c) \$4
Add spironolactone (optional)	spironolactone	12.5 mg = ½ 25 mg tab	25 mg	\$3–\$12

* This protocol should not be used in patients with CHF, CAD, pregnancy, CKD stage 3 or albuminuria or ≥ 300 mg/g albumin-to-creatinine ratio or the equivalent in first morning void. Simultaneous use of an ACEI, ARB, and/or renin inhibitor is not recommended.¹⁹

Initiating Therapy

- Without compelling clinical indications, the four main classes of drugs (diuretics, CCBs, ACEis, ARBs) are acceptable
- For African-American patients, long acting CCBs or thiazide-like diuretics have been recommended (alone or in combination) for more than 20 years, yet most do not appear receiving these medication classes as initial treatment
- Most patients will not be controlled with monotherapy and will need at least two or more medications from different classes to achieve control

Monotherapy versus Combination Therapy

- Sequential monotherapy is more effective than step-wise dosage increases, but single pill combination is even more effective
- Half-standard dosing of most antihypertensive medications has 80% of the BP lowering effect of full dosing
 - BP-lowering effect of three medications taken at half-standard dosing estimated to be about 20/11 mmHg (SBP/DBP) and with less side effects
- As a result, combinations using two or three drugs at lower doses are preferable to one drug at standard or max dose

Law M R, Morris J K, Wald N J. Use of blood pressure lowering drugs in the prevention of cardiovascular disease: meta-analysis of 147 randomised trials in the context of expectations from prospective epidemiological studies *BMJ*. 2009; 338:b1665.

Combination therapy as initial treatment: Gaining momentum

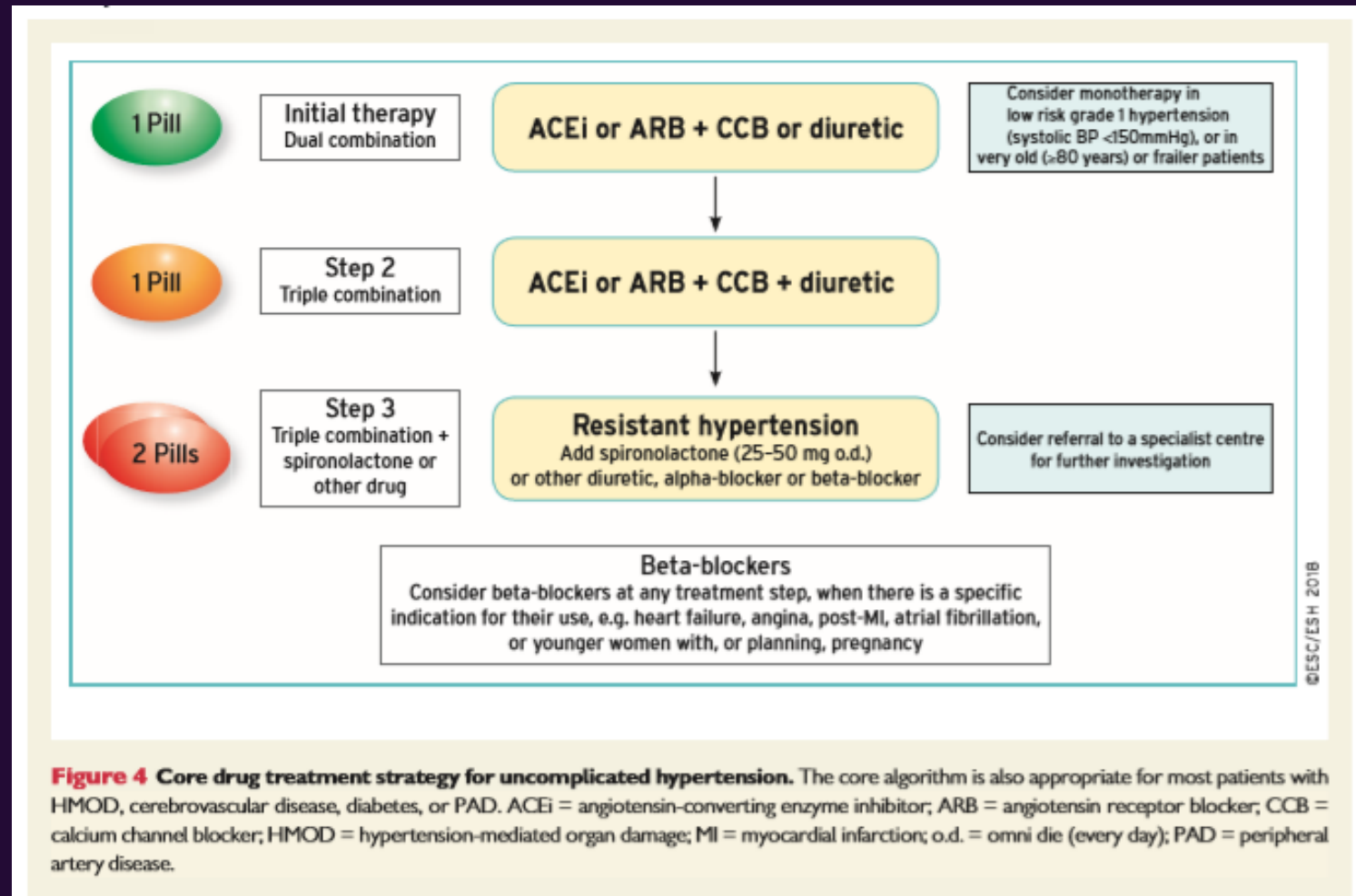


Figure 4 Core drug treatment strategy for uncomplicated hypertension. The core algorithm is also appropriate for most patients with HMOD, cerebrovascular disease, diabetes, or PAD. ACEi = angiotensin-converting enzyme inhibitor; ARB = angiotensin receptor blocker; CCB = calcium channel blocker; HMOD = hypertension-mediated organ damage; MI = myocardial infarction; o.d. = omni die (every day); PAD = peripheral artery disease.

Bryan Williams, Giuseppe Mancia, Wilko Spiering, et al, 2018 ESC/ESH Guidelines for the management of arterial hypertension, *European Heart Journal*, Volume 39, Issue 33, 01 September 2018, Pages 3021–3104, <https://doi.org/10.1093/eurheartj/ehy339>

Combination therapy as initial treatment: More evidence

Efficacy and safety of dual combination therapy of blood pressure-lowering drugs as initial treatment for hypertension: a systematic review and meta-analysis of randomized controlled trials

Abdul Salam^a, Raju Kanukula^a, Emily Atkins^b, Xia Wang^b, Shariful Islam^{b,c,d}, Sandeep P. Kishore^e, Marc G. Jaffe^{f,g}, Anushka Patel^b, and Anthony Rodgers^b

Conclusion: Compared with standard-dose monotherapy, initiating treatment with low-to-standard dose dual combination therapy is more efficacious without increasing withdrawals due to adverse events.

Salam, Abdul ; Kanukula, Raju ; Atkins, Emily et al. Efficacy and safety of dual combination therapy of blood pressure-lowering drugs as initial treatment for hypertension: a systematic review and meta-analysis of randomized controlled trials. *Journal of Hypertension*. 2019. Vol.37(9), p.1768(7). DOI: 10.1097/HJH.0000000000002096

Single-Pill Combination Therapy: STITCH

Simplified Treatment Intervention to Control Hypertension (STITCH) trial

- STITCH algorithm included initial therapy with a single pill low dose combination ACEI/diuretic or ARB/diuretic, followed by up-titration
- Randomization occurred in Canadian primary care practices to either use the STITCH algorithm vs the Hypertension Canada Guideline
- Patients treated at practices randomized to STITCH were significantly more likely to reach goal BP at 6 months
 - 64.7% compared 52.7%

Feldman RD, Zou GY, Vandervoort MK, Wong CJ, Nelson SA, Feagan BG. A simplified approach to the treatment of uncomplicated hypertension: a cluster randomized, controlled trial. *Hypertension*. 2009;53:646–653. doi: 10.1161/HYPERTENSIONAHA.108.123455.

Diuretic Options

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Pharmacology of diuretics used to treat hypertension

	Bioavailability (%)	Half-life (hours)	Duration of action (hours)
Thiazide diuretics*			
Bendroflumethiazide	90	3-4	6-12
Chlorothiazide	9-56 (dose dependent)	Biphasic: Initially 1-2, then ~12	6-12
Hydrochlorothiazide	65-75	Biphasic: Initially ~5, then 6-15	6-12
Thiazide-like diuretics			
Chlorthalidone	65	40-60 [†]	24-72
Indapamide	90	Biphasic: Initially ~14, then 25	16-36
Metolazone	65	6-20	18-25

- Based on an analysis of head-to-head trials, indapamide and chlorthalidone are more potent than HCTZ in lowering systolic blood pressure (indapamide ≈50% more potent than HCTZ)
- Indapamide did not have a detectably greater effect than HCTZ on metabolic adverse effects

Roush G, Ernst M, Kostis B, Tandon S, Sica D. Head-to-head comparisons of hydrochlorothiazide with indapamide and chlorthalidone: antihypertensive and metabolic effects. *Hypertension*. 2015;65:1041-1046. DOI: 10.1161/HYPERTENSIONAHA.114.05021

Components of the M.A.P. BP Program

Partner with Patients

Partner with patients

EVIDENCE-BASED STRATEGY

Engage/support patients and their families in self-management of HTN

ACTION STEPS

Use shared decision making

- Collaborative communication skills (e.g. open-ended questions and teach back)

Provide healthy lifestyle counseling

- Healthy weight
- DASH Diet (Na, K)
- Physical Activity
- Alcohol in moderation

Use Self-measured BP (SMBP)

- Patient/Staff Training
- EB Protocol
- Validated devices

Improve Tx adherence

- Low cost generic SPC
- Reminders
- Blister packs / Pill boxes

KEY AVAILABLE RESOURCES

- Healthy Lifestyle Education Tools
- SMBP Patient training tools/videos
- SMBP Staff training tools
- SMBP Infographic
- SMBP loaner device program information
- SMBP Device Accuracy Check Tools

METRICS

Change in BP after therapeutic intensification

- Change in SBP in mm Hg at the office visit following after adding a new antihypertensive medication class

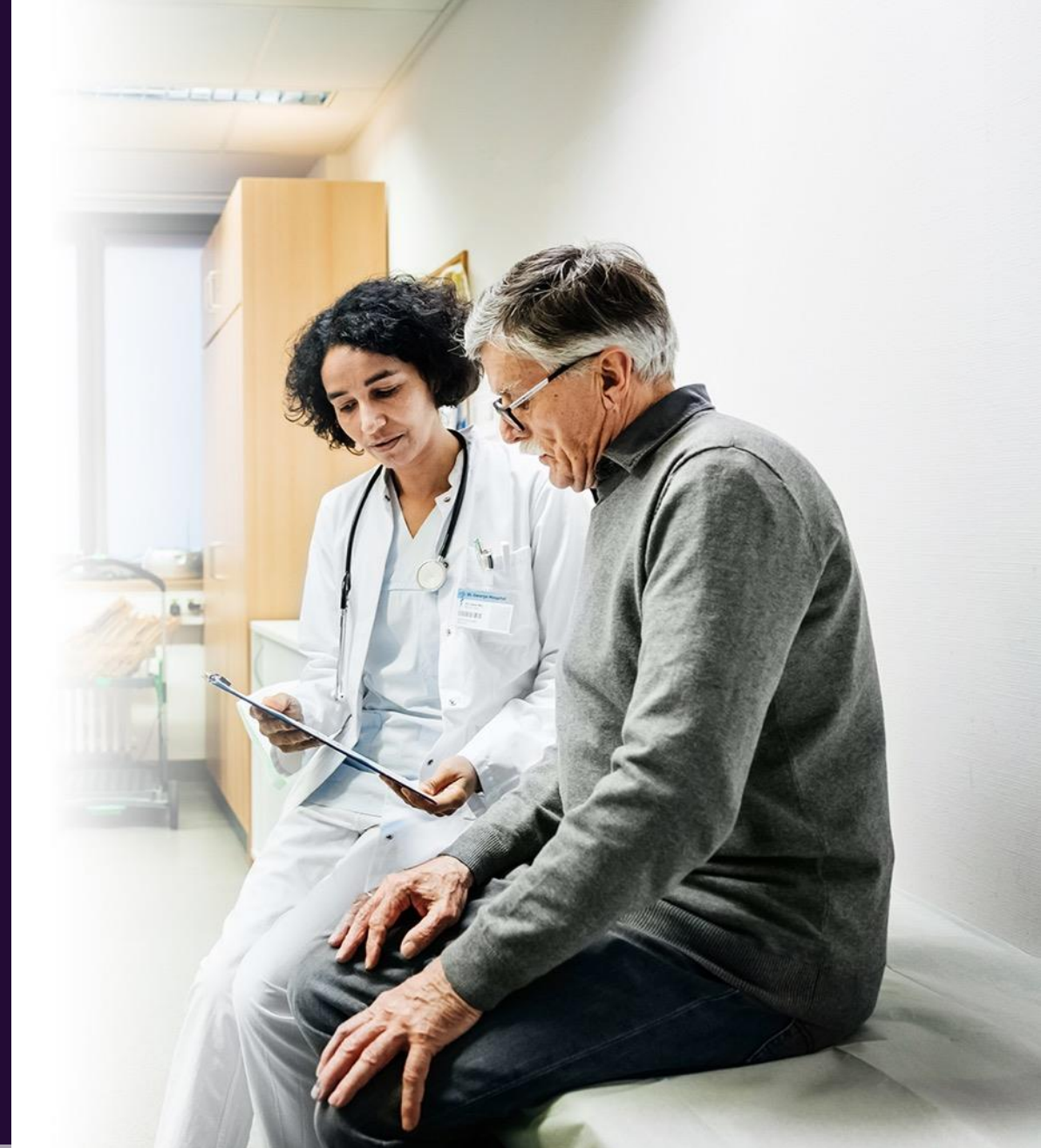
Blood Pressure Control

- % adults with hypertension who have BP controlled to less than 140/90 mm Hg (NQF 0018)

Importance of patient activation

Engaging patients in self-care can increase adherence to care plans and improve BP control

- ✓ Incorporate shared-decision making
- ✓ Promote patient self-management using SMBP
- ✓ Address medication adherence
- ✓ Promote healthy lifestyle changes



SMBP helps patients and providers

SMBP monitoring helps patients better self-manage their high blood pressure and allows providers to diagnose and manage hypertension more effectively

Available resources:

- Training video*
- Infographic*
- SMBP recording logs
- General overview materials for patients

How to measure your blood pressure at home

Follow these steps for an accurate blood pressure reading

- 1 PREPARE**
 - Avoid caffeine, cigarettes and other stimulants 30 minutes before you measure your blood pressure.
 - Wait at least 30 minutes after a meal.
 - If you're on blood pressure medication, measure your BP **before** you take your medication.
 - Empty your bladder beforehand.
 - Find a quiet space where you can sit comfortably without distraction.
- 2 POSITION**
 - PUT CUFF ON BARE ARM, ABOVE ELBOW AT MID-ARM
 - POSITION ARM SO CUFF IS AT HEART LEVEL
 - KEEP ARM SUPPORTED, PALM UP WITH MUSCLES RELAXED
 - SIT WITH LEGS UNCROSSED
 - KEEP FEET FLAT ON THE FLOOR
 - KEEP YOUR BACK SUPPORTED
- 3 MEASURE**
 - Rest for five minutes while in position before starting.
 - Take two or three measurements, one minute apart.
 - Keep your body relaxed and in position during measurements.
 - Sit quietly with no distractions during measurements—avoid conversations, TV, phones and other devices.
 - Record your measurements when finished.

TARGET:BP

This Prepare, position, measure handout 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>.



https://targetbp.org/tools_downloads/self-measured-blood-pressure-video/

* Available in English and Spanish

Improve Treatment Adherence

There is no one best method to improve treatment adherence

- Interventions for **intentional non-adherence**
 - Prescribe low cost generic single pill combinations
 - Use discount programs
 - Coordinate Pharmacy Refills
 - Assist with transportation if possible
 - Use collaborative communication and shared decisions
- Interventions for **unintentional non-adherence**
 - Pill boxes
 - Blister Packs
 - Reminders / Alerts (Apps)

Questions

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