

# Foundations of Cardiometabolic Health Certification Course


## Certified Cardiometabolic Health Professional (CCHP)





## Out of Office Self Measured Blood Pressure and Resistant Hypertension

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Tulane University School of Medicine  
New Orleans, LA

# ISH vs ACC/ AHA Guidelines

 International Society of Hypertension	Systolic (mmHg)		Diastolic (mmHg)
Normal BP	<130	and	<85
High-normal BP	130-139	and/or	85-89
Grade 1 Hypertension	140-159	and/or	90-99
Grade 2 Hypertension	≥160	and/or	≥100

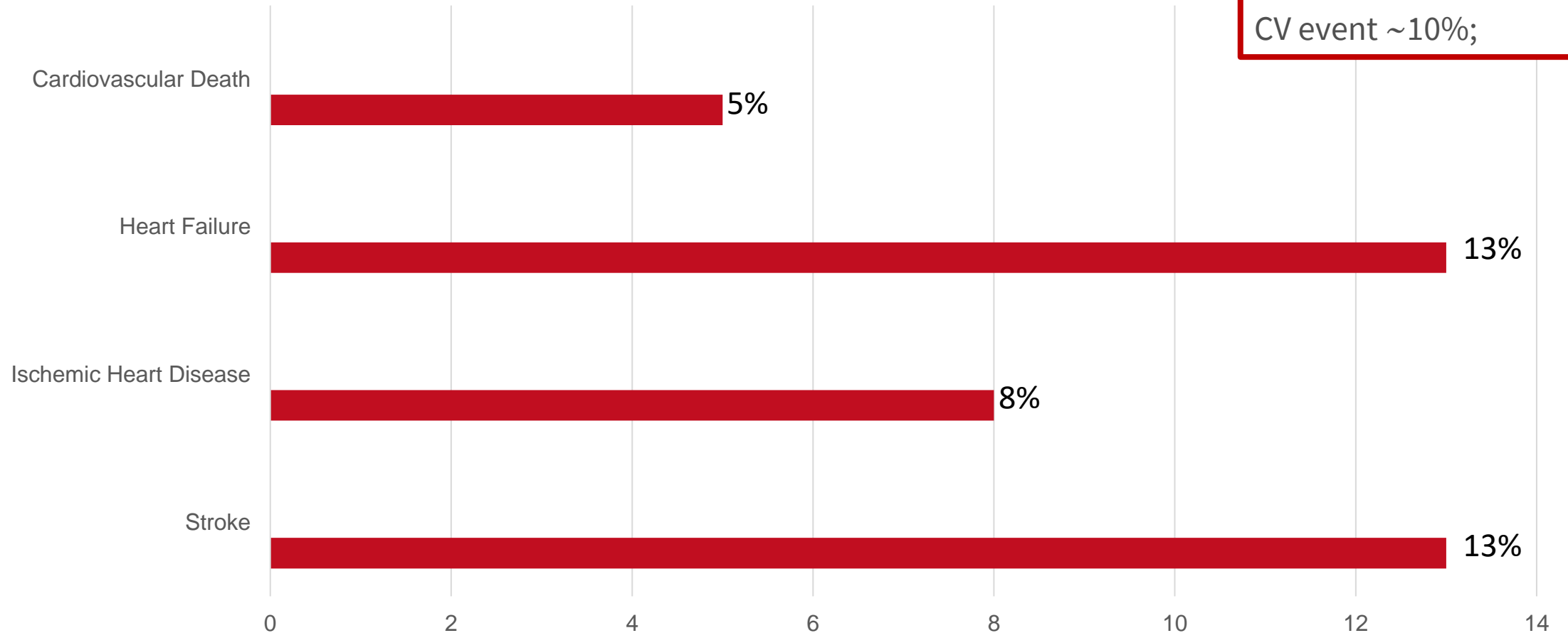
 American Heart Association	 AMERICAN COLLEGE of CARDIOLOGY	SBP		DBP
Normal		<120 mm Hg	and	<80 mm Hg
Elevated		120–129 mm Hg	and	<80 mm Hg
<b>Hypertension</b>				
Stage 1		130–139 mm Hg	or	80–89 mm Hg
Stage 2		≥140 mm Hg	or	≥90 mm Hg

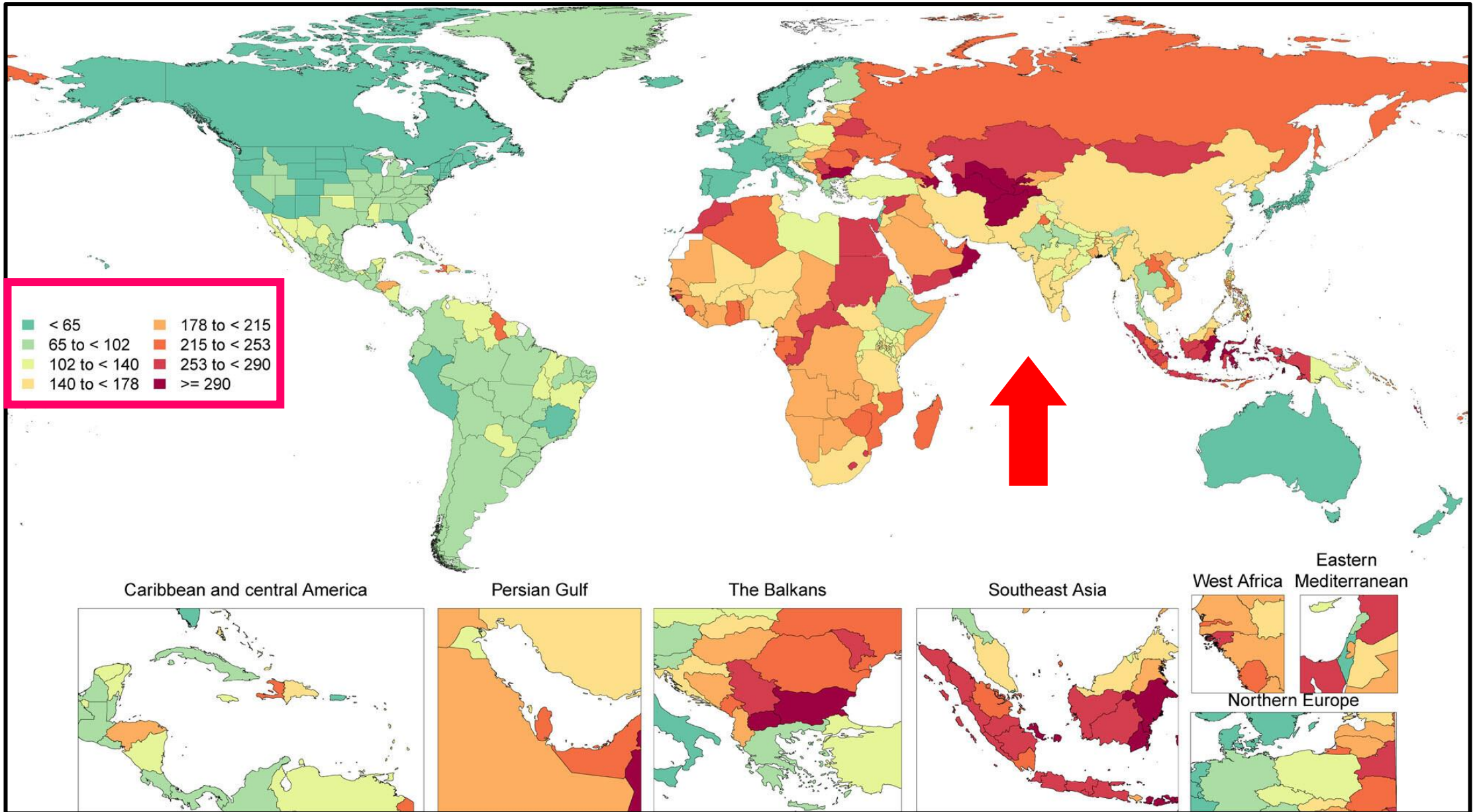


# Association Between Intensity of BP Reduction and Relative Treatment Effects for Prevention of Major CV Events

N=344,716 48 randomized clinical trials available for analysis

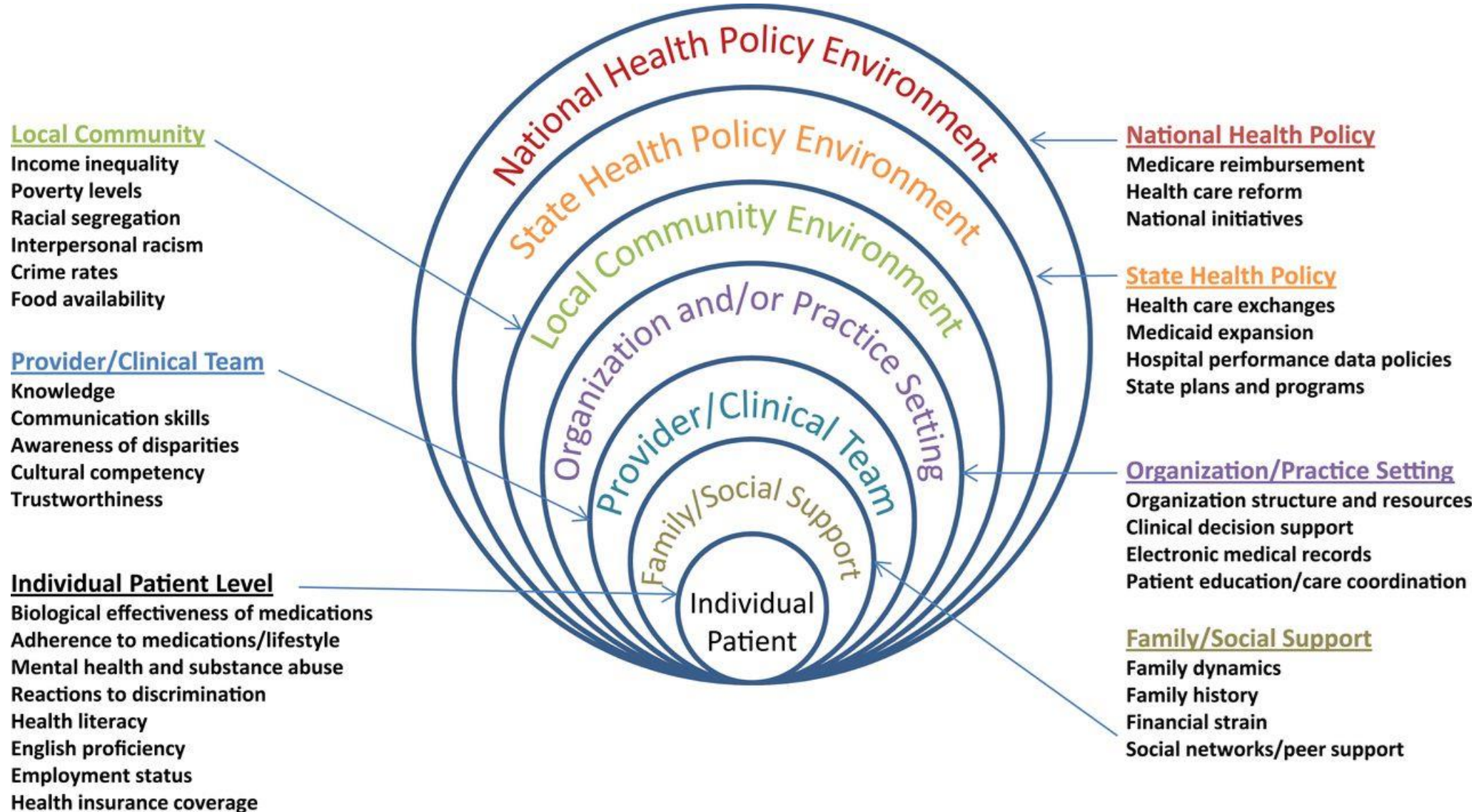
5 mm Hg reduction of SBP reduced the risk of a major CV event ~10%;





**Chart 8-6. Age-standardized global mortality rates attributable to high SBP per 100 000, both sexes, 2020**

# Multilevel Influences on Disparities in Hypertension Prevention and Control



Circulation

Daichi Shimbo, MD, Chair Nancy T. Artinian, PhD, RN, FAHA Jan N. Basile, MD, FAHA Lawrence R. Krakoff, MD, FAHA Karen L. Margolis, MD, MPH Michael K. Rakotz, MD, FAHA Gregory Wozniak, PhD On behalf of the American Heart Association and the American Medical Association

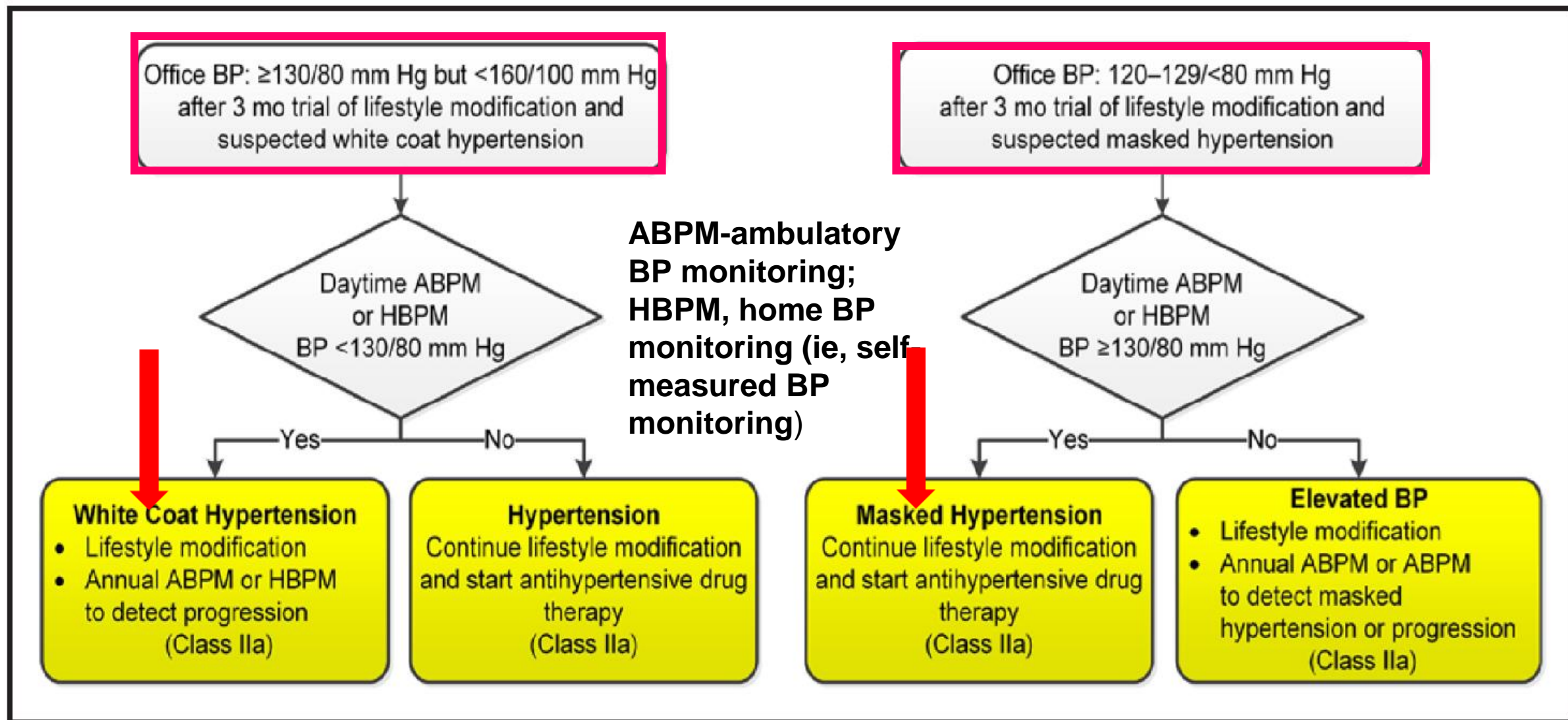
## **AHA POLICY STATEMENT**

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# **Self-Measured Blood Pressure Monitoring at Home**

**A Joint Policy Statement From the American Heart Association  
and American Medical Association**

# Algorithm for White-Coat HTN and Masked HTN- Not Taking Anti-HTN Medication





# 2017 ACC/AHA HBP Guideline

## Out-of-Office and Self-Monitoring of BP

COR	LOE	<b>Recommendation for Out-of-Office and Self-Monitoring of BP</b>
I	A <sup>SR</sup>	<p><u>Out-of-office</u> BP measurements are recommended to <u>confirm the diagnosis</u> of hypertension and for <u>titration</u> of BP-lowering medication, in conjunction with <u>telehealth</u> counseling or clinical interventions.</p> <p>SR indicates systematic review.</p>

# US Preventive Services Task Force:

## Final Recommendation office BP measurement (OBPM)

April 27, 2021

Population	Recommendation	<u>Grade</u>
Adults $\geq 18$ years without known HTN	Recommends obtaining BP measurements <b>outside of the clinical setting for diagnostic confirmation before starting treatment</b>	<b>A</b>

# AHA Scientific Statement

## Resistant Hypertension: Detection, Evaluation, and Management A Scientific Statement From the American Heart Association

Robert M. Carey, MD, FAHA, Chair; David A. Calhoun, MD, FAHA, Vice Chair;  
George L. Bakris, MD, FAHA; Robert D. Brook, MD, FAHA; Stacie L. Daugherty, MD, MSPH;  
Cheryl R. Dennison-Himmelfarb, PhD, MSN, FAHA; Brent M. Egan, MD;  
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and Outcomes Research; and Stroke Council

# Global HBP Burden and New Developments

Leading cause of death globally.

10.4 million deaths/year.

BP trends clear shift: highest BPs from HIC to LMIC regions:

~349 million with HTN in HIC and 1.04 billion in LMICs.

Recent developments:

Redefining HTN, salt reduction, initiating single pill combinations, wider out-of-office BP measurement, and lower BP targets.

# Global HBP Burden and New Developments

- Distinction between low-resource and high-resource settings often refers to HIC and LMIC.
- However, well established in HIC, there are areas with low-resource settings, and vice versa.
- Despite several initiatives, prevalence of raised BP and adverse impact on CV morbidity and mortality increasing globally, irrespective of income.



## **FDA STATEMENT**

# **To Improve Nutrition and Reduce the Burden of Disease, FDA Issues Food Industry Guidance for Voluntarily Reducing Sodium in Processed and Packaged Foods**

- *Acting FDA Commissioner Janet Woodcock, M.D., and Susan T. Mayne, Ph.D., director of the FDA's Center for Food Safety and Applied Nutrition*

October 13, 2021

# FDA Targets in the Final Guidance

- Decrease average sodium intake from  $\approx 3,400$  to 3,000 mg/day
- 12% reduction over 2.5 years
- Still above [Dietary Guidelines for Americans'](#) recommended limit of 2,300 mg/day for  $\geq 14$  and older
- 70% of the sodium comes from packaged, processed and restaurant foods, making it challenging to limit sodium

# FDA Targets for Sodium in Food : Less is More

## An important step forward, but not enough.

- Lowering sodium further to 2,300mg prevent ~ 450,000 CVD cases, gain 2 million quality-adjusted life years and save ~ \$40 billion in health-care costs over 20-years
- If 1,500 mg/day sodium, could result in **25.6% overall decrease in BP** and estimated \$26.2 billion in health care savings.
- Achieving this goal would **reduce deaths from CVD from 500,000 to nearly 1.2 million** over next 10 years



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# **Self-Measured Blood Pressure Monitoring at Home**

**A Joint Policy Statement From the American Heart Association and American Medical Association**

# Cardiovascular Events and Costs With Home Blood Pressure Telemonitoring and Pharmacist Management for Uncontrolled Hypertension

Karen L. Margolis<sup>1</sup>, Steven P. Dehmer<sup>2</sup>, JoAnn Sperl-Hillen,  
Patrick J. O'Connor, Stephen E. Asche, Anna R. Bergdall, Beverly B. Green,  
Rachel A. Nyboer, Pamala A. Pawloski, Nicole K. Trower, Michael V. Maciosek<sup>3</sup>

**Abstract**—Uncontrolled hypertension is a leading contributor to cardiovascular disease. A cluster-randomized trial in 16 primary care clinics showed that 12 months of home blood pressure telemonitoring and pharmacist management lowered blood pressure more than usual care (UC) for 24 months. We report cardiovascular events (nonfatal myocardial infarction, nonfatal stroke, hospitalized heart failure, coronary revascularization, and cardiovascular death) and costs over 5 years of follow-up. In the telemonitoring intervention (TI group, n=228), there were 15 cardiovascular events (5 myocardial infarction, 4 stroke, 5 heart failure, 1 cardiovascular death) among 10 patients. In UC group (n=222), there were 26 events (11 myocardial infarction, 12 stroke, 3 heart failure) among 19 patients. The cardiovascular composite end point incidence was 4.4% in the TI group versus 8.6% in the UC group (odds ratio, 0.49 [95% CI, 0.21–1.13],  $P=0.09$ ). Including 2 coronary revascularizations in the TI group and 10 in the UC group, the secondary cardiovascular composite end point incidence was 5.3% in the TI group versus 10.4% in the UC group (odds ratio, 0.48 [95% CI, 0.22–1.08],  $P=0.08$ ). Microsimulation modeling showed the difference in events far exceeded predictions based on observed blood pressure. Intervention costs (in 2017 US dollars) were \$1511 per patient. Over 5 years, estimated event costs were \$758000 in the TI group and \$1538000 in the UC group for a return on investment of 126% and a net cost savings of about \$1900 per patient. Telemonitoring with pharmacist management lowered blood pressure and may have reduced costs by avoiding cardiovascular events over 5 years.

**Registration**—URL: <https://www.clinicaltrials.gov>; Unique identifier: NCT00781365. (*Hypertension*. 2020;76:00-00. DOI: 10.1161/HYPERTENSIONAHA.120.15492.)

# Cardiovascular Events and Costs With Home Blood Pressure Telemonitoring and Pharmacist Management for Uncontrolled Hypertension

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## Novelty and Significance

### What Is New?

- Reporting of cardiovascular events and costs during 5 years of follow-up of a randomized trial of home blood pressure telemonitoring with pharmacist management for uncontrolled hypertension.

### What Is Relevant?

- Self-monitoring of blood pressure (including telemonitoring) with additional support as part of team-based care has been shown to lower blood pressure compared with routine care.

- Few studies of similar interventions have reported long-term follow-up, costs, or cardiovascular outcomes.

### Summary

Telemonitoring with pharmacist management may have reduced cardiovascular events by about 50% over 5 years. Savings from the reduction in cardiovascular events more than offset the intervention costs.

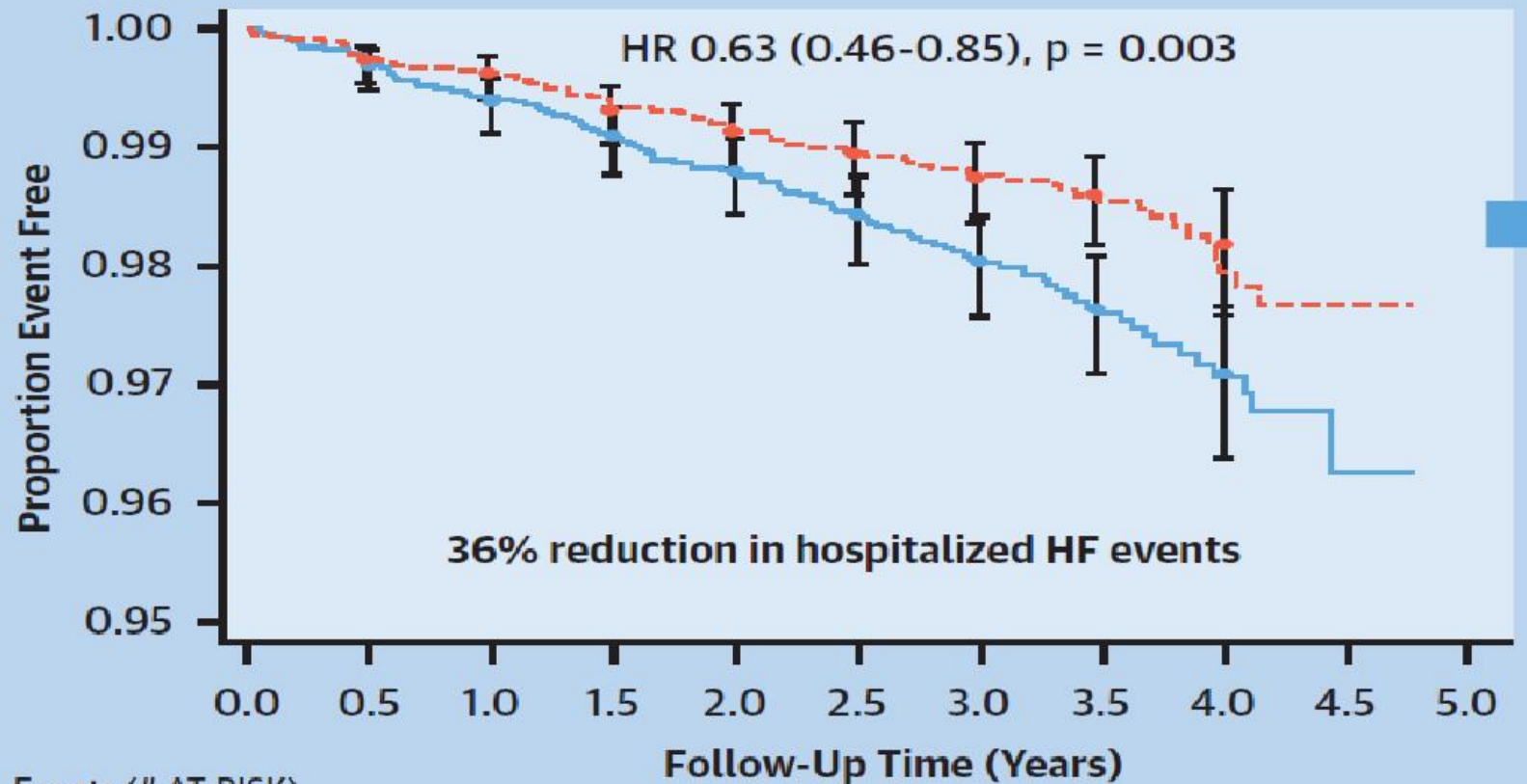
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DOI: 10.1161/HYPERTENSIONAHA.120.15492.)

**Heart Failure Prevention  
in Older Patients Using  
Intensive Blood Pressure  
Reduction  
Potential Role of  
Diuretics**

**Systolic BP Intervention Trial (SPRINT) (n = 9,361)**  
(mean age 68 years; 28% ≥ age 75)

**Intensive arm**  
(SBP <120 mm of Hg)  
(n = 4,678)

**Standard arm**  
(SBP <140 mm of Hg)  
(n = 4,683)



Events (# AT RISK)

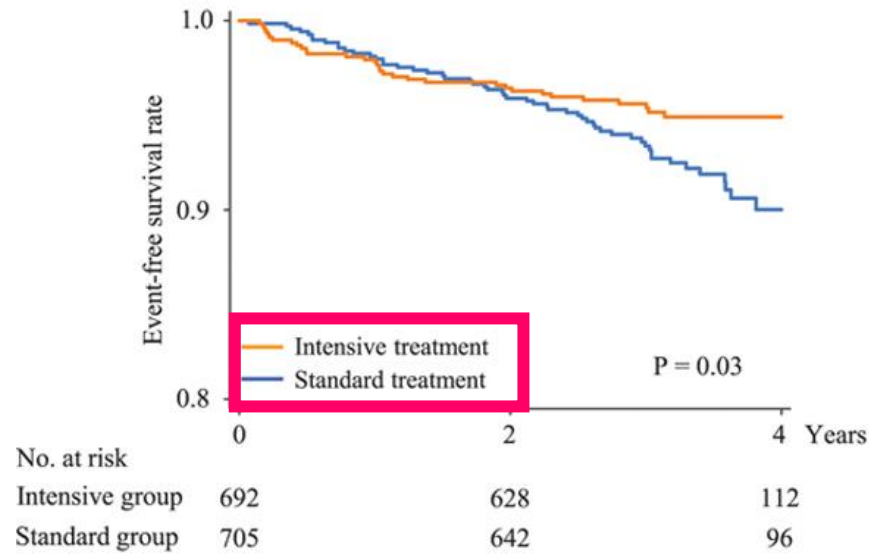
Intensive 0 (4678) 11 (4563) 16 (4491) 30 (4421) 39 (4371) 47 (4148) 54 (3120) 59 (1878) 66 (883) 68 (126)

Standard 0 (4683) 12 (4559) 26 (4493) 41 (4423) 55 (4346) 70 (4127) 85 (3070) 94 (1833) 102 (848) 105 (130)

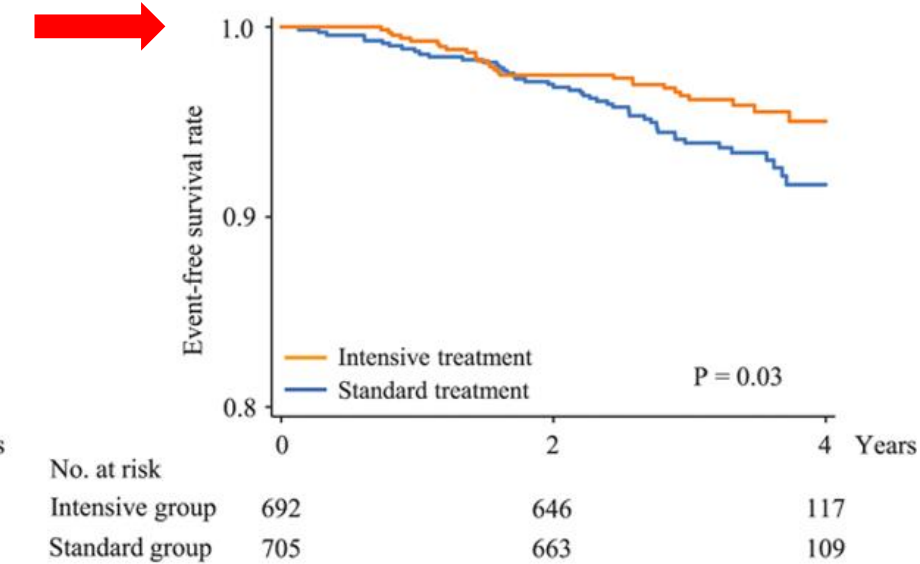
— Standard    - - - Intensive

# SPRINT – Intensive BP Lowering Lowers MACE

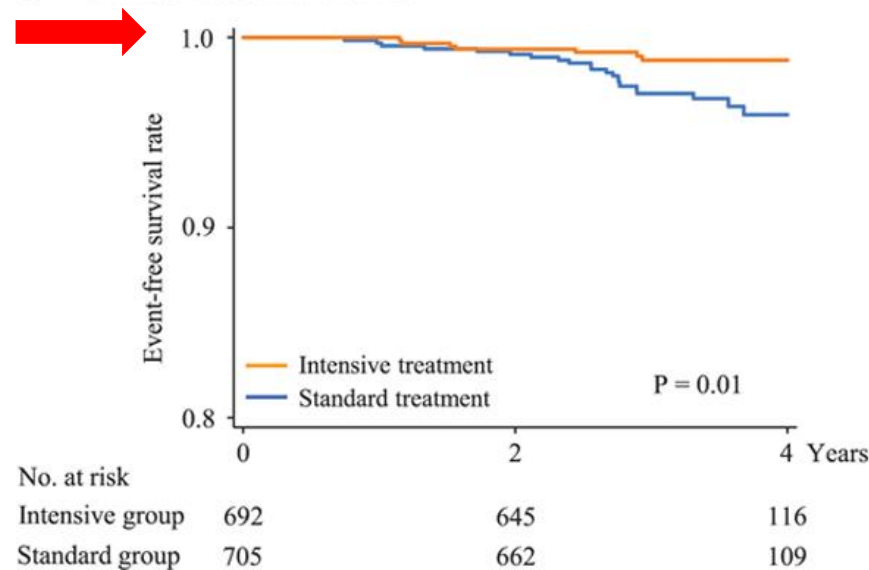
**A Major adverse cardiovascular events**



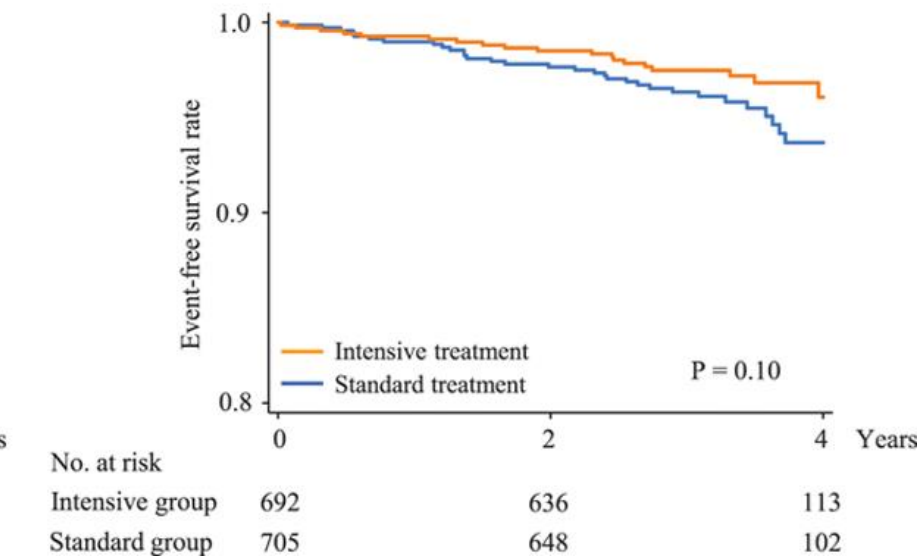
**B All-cause death**



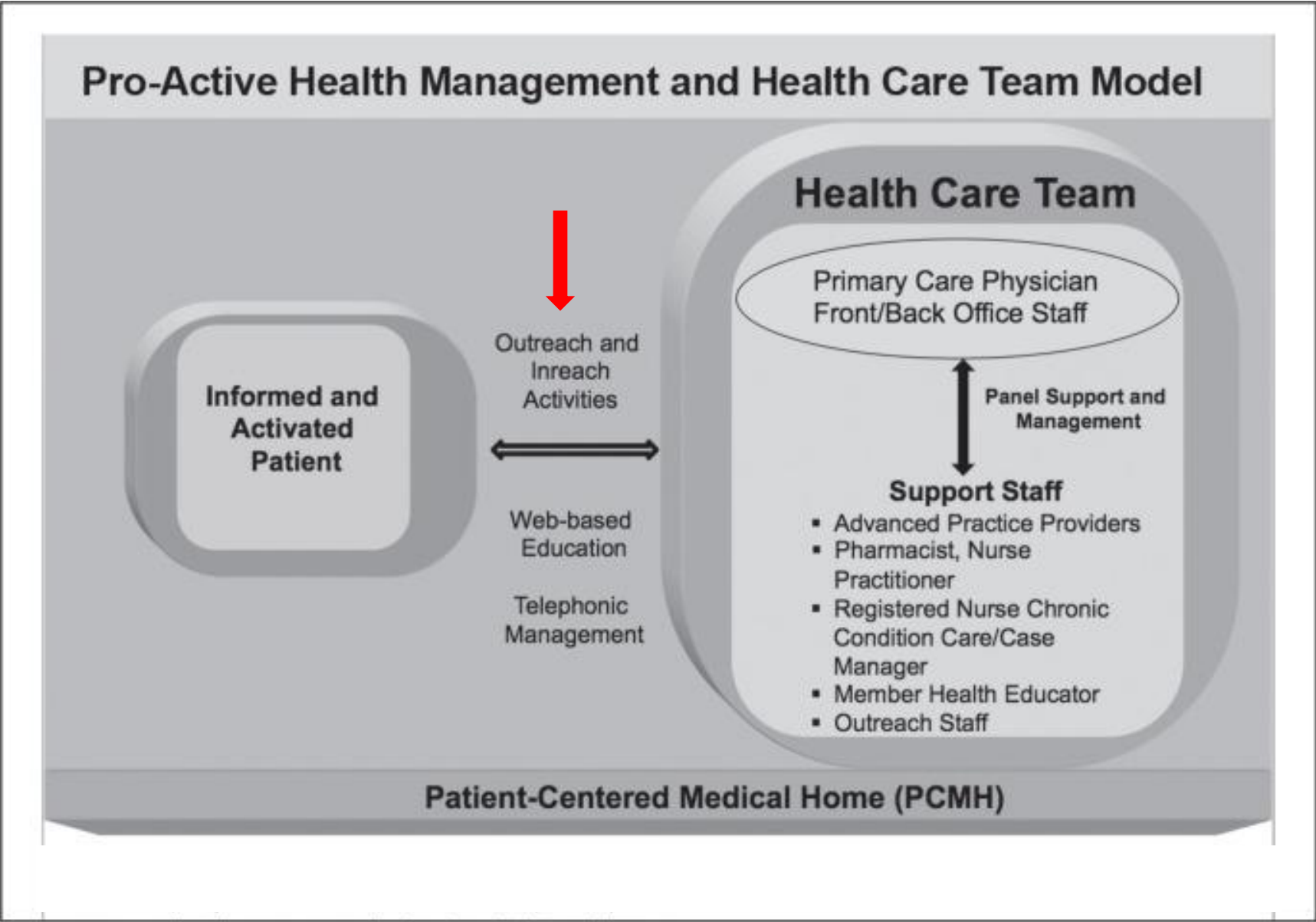
**C Cardiovascular death**

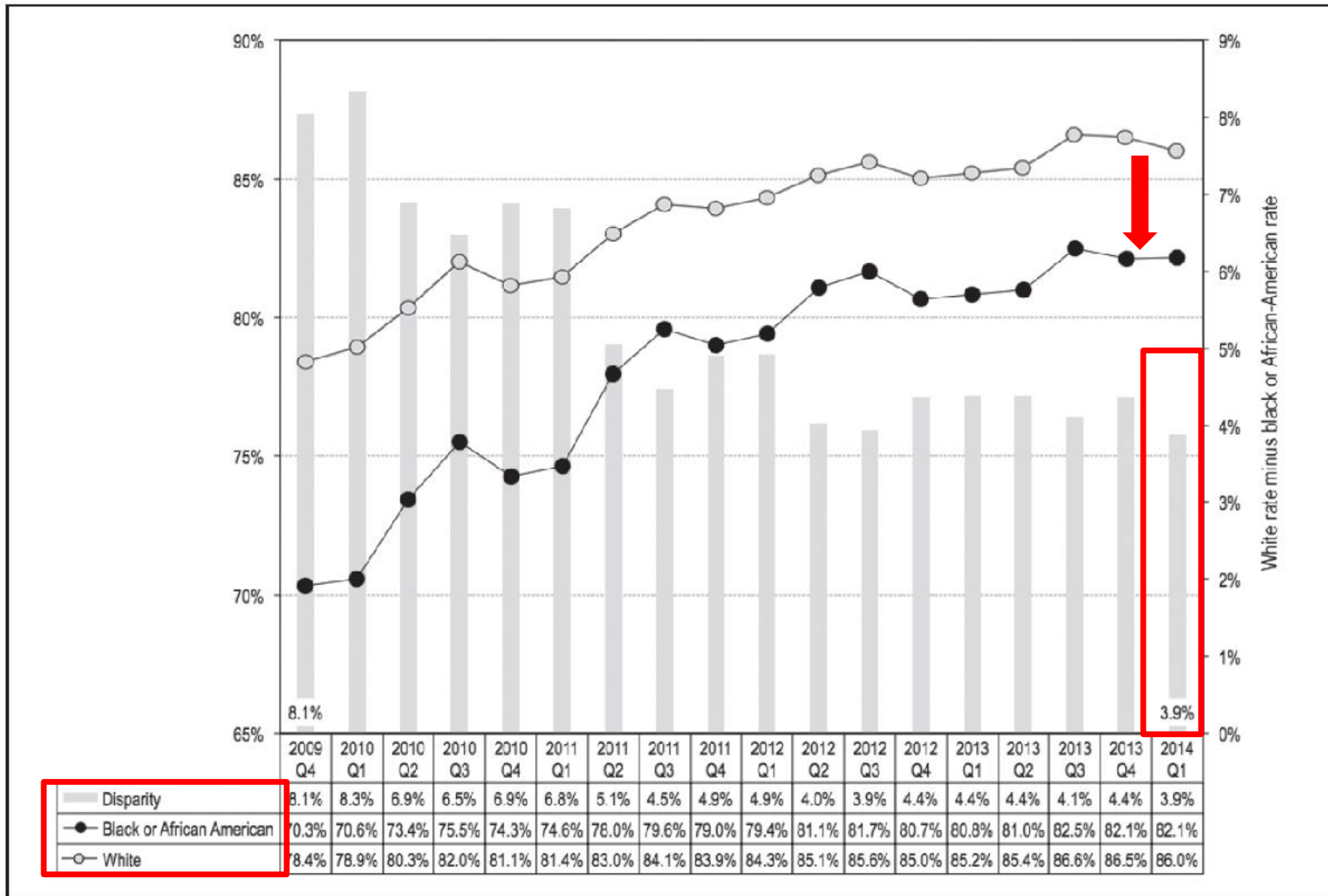


**D Heart failure**



# Pro-Active Health Management and Health Care Team Model







March 12, 2018

ORIGINAL ARTICLE

Los Angeles Barbershop Blood Pressure Study (LABBPS)

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

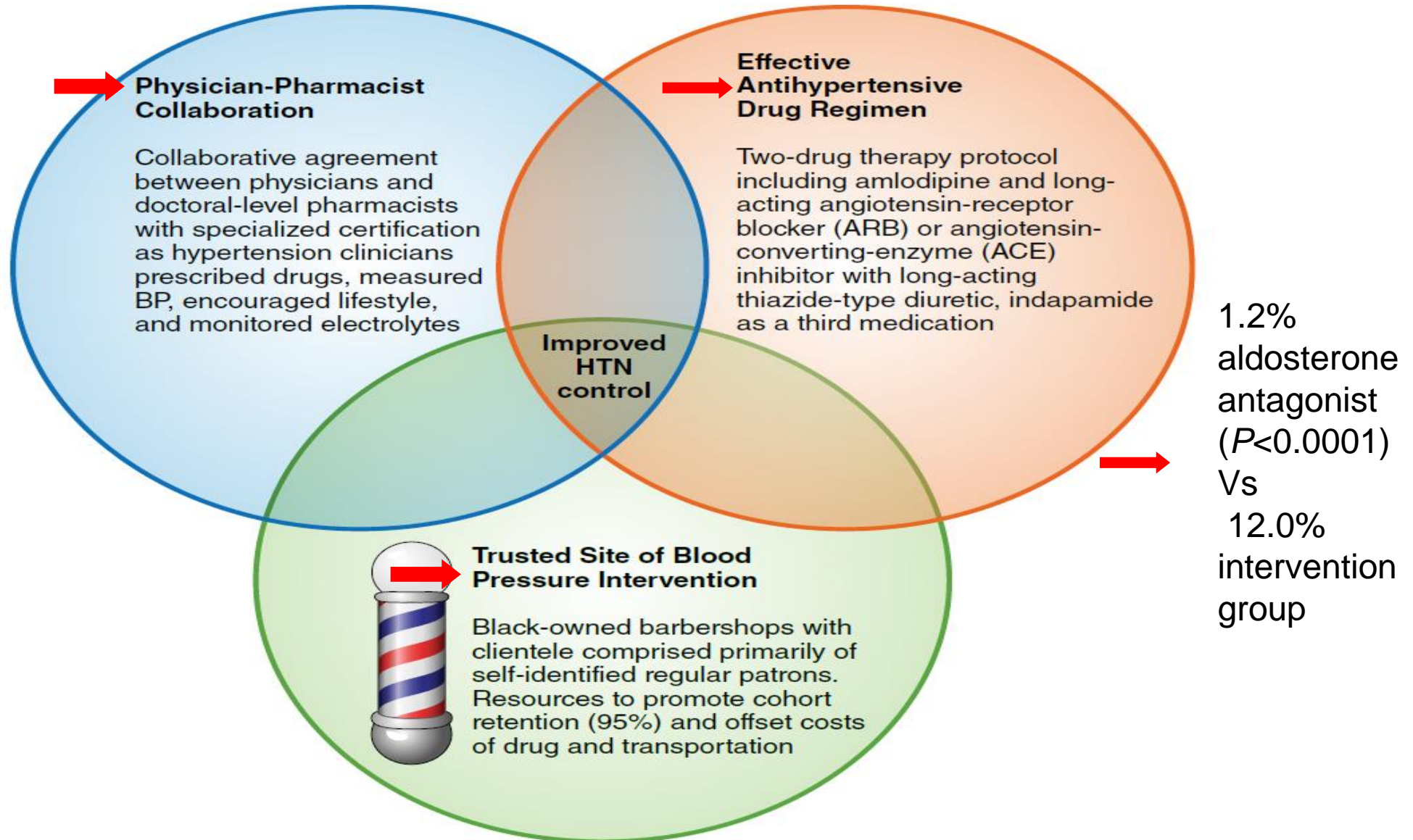
Ronald G. Victor, M.D.,\* Kathleen Lynch, Pharm.D., Ning Li, Ph.D.,  
Ciantel Blyler, Pharm.D., Eric Muhammad, B.A., Joel Handler, M.D.,  
Jeffrey Brettler, M.D., Mohamad Rashid, M.B., Ch.B., Brent Hsu, B.S.,  
Davontae Foxx-Drew, B.A., Norma Moy, B.A., Anthony E. Reid, M.D.,\*  
and Robert M. Elashoff,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

# BP Reduction in LA Black Barbershops

**Table 2. Primary and Secondary Blood-Pressure Outcomes.\***

Outcome	Intervention Group (N = 132)	Control Group (N = 171)	Intervention Effect	P Value†
<b>Blood pressure</b>				
<b>Systolic blood pressure — mm Hg‡</b>				
At baseline	152.8±10.3	154.6±12.0		
At 6 mo	125.8±11.0	145.4±15.2		
Change	-27.0±13.7	-9.3±16.0	-21.6 (-28.4 to -14.7)§	<0.001
<b>Diastolic blood pressure — mm Hg</b>				
At baseline	92.2±11.5	89.8±11.2		
At 6 mo	74.7±8.3	85.5±12.0		
Change	-17.5±11.0	-4.3±11.8	-14.9 (-19.6 to -10.3)§	<0.001
<b>Hypertension control at 6 mo — no. (%)</b>				
Blood pressure <140/90 mm Hg	118 (89.4)	55 (32.2)	3.4 (2.5 to 4.6)¶	<0.001
Blood pressure <135/85 mm Hg	109 (82.6)	32 (18.7)	5.5 (2.6 to 11.7)¶	<0.001
Blood pressure <130/80 mm Hg	84 (63.6)	20 (11.7)	5.7 (2.5 to 12.8)¶	<0.001

# Positive components of the LABP intervention



# In the Los Angeles intervention, which of the following is true?

- A. Barbers prescribed medication based on physician directions
- B. Patients were started on chlorthalidone as a first step agent monotherapy
- C. Blood pressure was identified as elevated in the barbershop and treated in the physician's office
- D. Patients in the intervention group were more often started on aldosterone antagonists vs. control

# In the Los Angeles intervention, which of the following is true?

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US BLOOD PRESSURE  
**VALIDATED**  
DEVICE LISTING

The validation of BP measurement devices for  
clinical accuracy April 23, 2020



<https://www.ama-assn.org/delivering-care/hypertension/validation-bp-measurement-devices-clinical-accuracy>



Validation  
Protocol(s):  
ANSI/AAMI/ISO  
81060-2: 2009

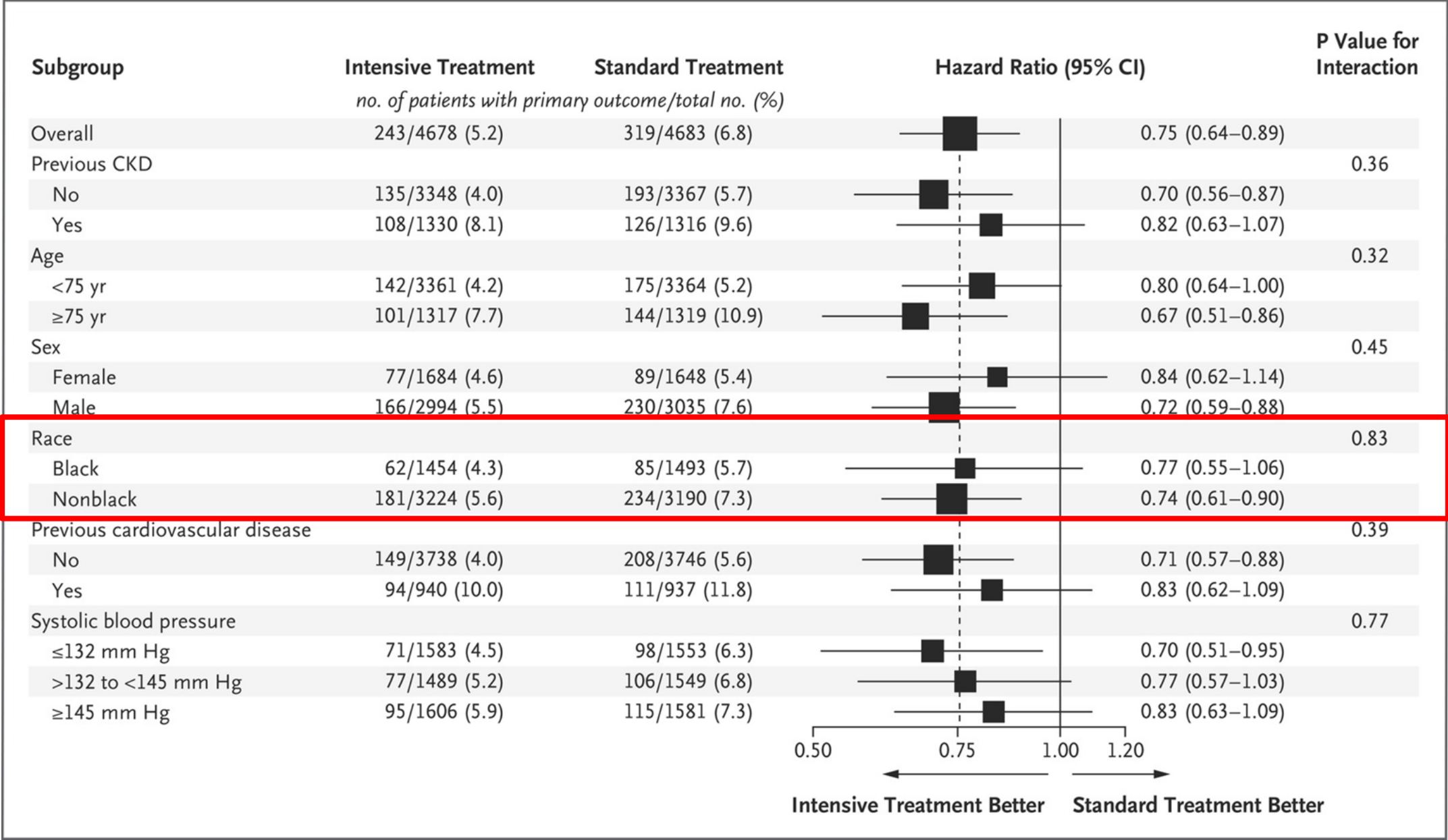


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 <https://www.validatebp.org/>



# Patients' Characteristics of Resistant Hypertension

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Female sex

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Non-Hispanic black race

Older Age (>75 years)

Obesity (BMI >30 kg/m<sup>2</sup>)

Residence in Southeastern United States

Excessive dietary salt intake (>2 grams/day)

Excessive alcohol intake (>2 drinks/day for men, and >1 drink/day for women)

High baseline blood pressure

Presence of micro/macroalbuminuria

Chronic kidney disease (estimated GFR <60 mL/min/1.73m<sup>2</sup>)

Self-reported history of congestive heart failure, coronary heart disease, diabetes mellitus, and/or stroke

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# AHA Scientific Statement

## Resistant Hypertension: Detection, Evaluation, and Management A Scientific Statement From the American Heart Association

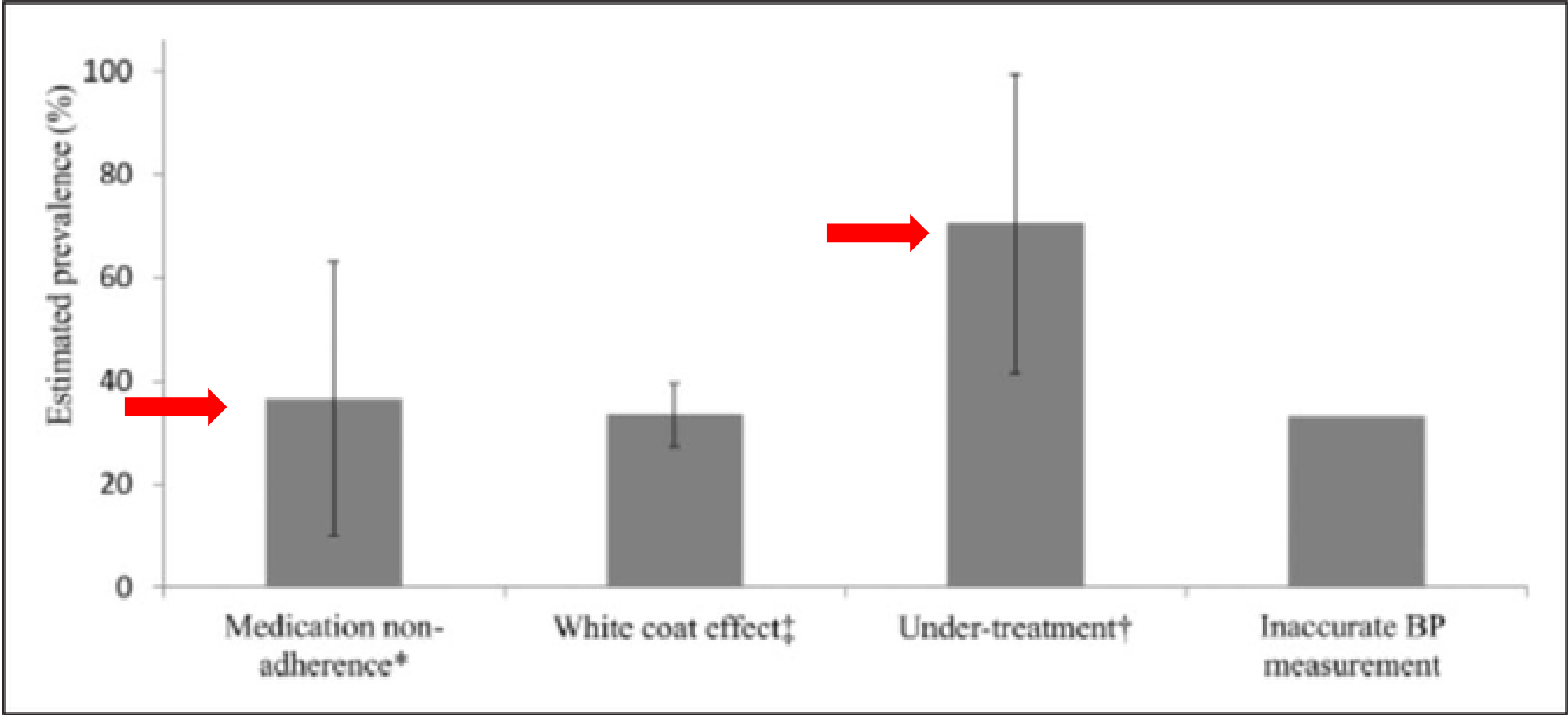
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and Outcomes Research; and Stroke Council

# Why RH: Treatment Inertia

- Suboptimal anti-HTN therapy: a large subset of patients not achieving BP targets.
- Only 49.6% uncontrolled aTRH\* (2007-2010) in a community-based practice network prescribed optimal anti-HTN regimen
- Anti-HTN meds at <50% of maximally recommended doses in 42.1% with uncontrolled aTRH.

\*Apparent treatment resistant hypertension- aTRH

# Why a Patient Has Resistant HTN?



# What is the most common cause that a patient has resistant hypertension?

- a) Medication non-adherence
- b) White coat effect
- c) Under-treatment
- d) Inaccurate BP measurement

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# Resistant Hypertension

OPEN

## Intensive Blood Pressure Treatment for Resistant Hypertension Secondary Analysis of a Randomized Controlled Trial

Tetsuro Tsujimoto, Hiroshi Kajio

See Editorial Commentary, pp 299–300

**Abstract**—Evidence about the target blood pressure **SPRINT** with resistant hypertension is limited. The present study aimed to assess the efficacy of intensive BP treatment (systolic BP target, <120 mmHg) versus standard BP treatment (systolic BP target, <140 mmHg) in patients with resistant hypertension. This is a secondary analysis using data from SPRINT (Systolic Blood Pressure Intervention Trial). This study included 1397 patients with resistant hypertension and 7698 without resistant hypertension. Using the Cox proportional hazards model, we compared time to first occurrence of a major adverse cardiovascular event (cardiovascular death, myocardial infarction, and stroke) between the intensive and standard BP treatment groups. Mean follow-up was 3.1 years; major adverse cardiovascular events was confirmed in 381 patients. Risk of major adverse cardiovascular events was significantly lower in the intensive treatment group than in the standard treatment group (hazard ratio, 0.62; 95% CI, 0.40–0.96;  $P=0.03$ ). Risks of all-cause and cardiovascular death in patients with resistant hypertension were also significantly lower in the intensive treatment group than in the standard treatment group (hazard ratio for all-cause death: 0.60; 95% CI, 0.38–0.97;  $P=0.03$ ; hazard ratio for cardiovascular death: 0.34; 95% CI, 0.15–0.81;  $P=0.01$ ). Similar associations were observed in various subgroups. Intensive BP treatment was significantly associated with a decreased risk of major adverse cardiovascular events in patients with resistant hypertension. (*Hypertension*. 2019;73:415-423. DOI: 10.1161/HYPERTENSIONAHA.118.12156.) • [Online Data Supplement](#)

# Management of Resistant Hypertension

