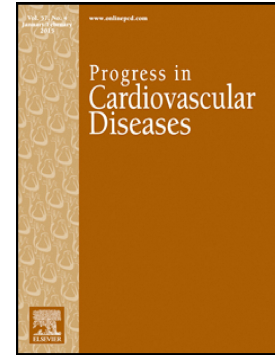


## Journal Pre-proof

Hypertension in African Americans: Advances in community outreach and public health approaches

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**Article Title:**

Hypertension in African Americans: Advances in Community Outreach and Public Health Approaches

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**Abstract:**

While there have been significant advances made towards controlling cardiovascular disease (CVD) morbidity and mortality in recent decades, African- Americans continue to experience a markedly elevated burden of CVD. Multiple factors have contributed to this major public health

crisis, including medication adherence, racial inequities in diagnosis and treatment, lack of culturally competent care, and disparities in healthcare access. Historical approaches to reduce this burden are targeted towards community outreach by recruiting community partners and healthcare providers to disseminate health information on CVD awareness and prevention. Current community-based approaches, such as the barbershop programs and faith-based programs, have built upon previous approaches and incorporated novel ideas to increase community engagement in risk factor and disease reduction. Based on these models, future directions point to an increased usage of community partners, alongside health information technology and healthy behavior patient education, to reduce risk factors and prevalence of CVD in an ethnically vulnerable community.

**Key Words:** Hypertension, African-Americans, Barriers, Social Determinants, Disparities, Community Outreach, Public Health Approaches, Medication Adherence, Barbershops, Physician-Pharmacist Collaboration, Information Technology

**Relevant Abbreviations:**

ABPM- Ambulatory Blood Pressure Monitoring

ACC- American College of Cardiology

ACEI- Angiotensin converting enzyme inhibitor

AHA- American Heart Association

ARB- Angiotensin-receptor blocker

BP- Blood Pressure

CHAMP- Church/Community Health Awareness and Monitoring Program

CVD- Cardiovascular Diseases

DBP- Diastolic Blood Pressure

EHR- Electronic Health Records

FAITH- Faith-based Approaches in Treating Hypertension

HHCPP- Healthy Heart Community Prevention Project

HIT -Health Information Technology

HTN- Hypertension or Hypertensive

IT- Information Technology

LABP- Los Angeles Barbershop Program

NHANES- National Health and Nutrition Examination Survey

NHLBI- National Heart, Lung, and Blood Institute

SBP- Systolic Blood Pressure

SMBP- Self-measured Blood Pressure

TLC-MINT- Therapeutic Lifestyle Changes and Motivational Interviewing

### **The High Burden of Hypertension (HTN) in African Americans**

Over the past several decades, there has been overall improvement in cardiovascular disease (CVD) morbidity and mortality in the United States. However, despite these advancements almost half of the U.S. adult population have CVD or associated risk factors, according to an annual report from the American Heart Association (AHA) (1). The rates of CVD will continue to rise as more individuals are diagnosed with HTN due to the current definitions of the 2017 ACC/AHA Guidelines on Hypertension. Individuals with a blood pressure (BP)  $\geq 130/80$  mm Hg versus the previous threshold  $\geq 140/90$  mm Hg are now diagnosed as HTN (2), which is a major public health problem which increases the risk for CVD affecting 29% of the U.S. adult population (3). Prevention of CVD can be accomplished by controlling risk factors, such as high BP, high cholesterol, diabetes, and maintaining healthy lifestyle behaviors. Patients are often faced with barriers to primary prevention of CVD such as access to healthcare providers or lack of environmental resources impacting their ability to promote healthy lifestyle behaviors. Therefore, shifting primary prevention strategies to community-based interventions may have

utility with supporting clinical treatment and management efforts to improve and reduce CVD (4).

Under the criteria using the 140/90 mmHg threshold, African Americans were noted to have a higher burden of HTN (40.3%) compared to white (27.8%), Asian (25.0%) or Hispanic (27.8%) adults (3). However, using the 2017 ACC/AHA guidelines of 130/80 mm Hg HTN threshold, the data for which was collected from a National Health and Nutrition Examination Survey (NHANES) study from 2011-2014 with 9623 participants, the rates for HTN prevalence in African-American men and women subsequently increased to 59% and 56% respectively (2). In addition, African Americans (44.6%) have lower HTN control rates than whites (50.8%) (3). This inadequate control of BP can lead to a myriad of serious consequences including myocardial infarction, heart failure, stroke, and renal failure (5).

High BP is a significant risk for deaths due to CVD in the black community. Death rates from HTN reported in 2016 was higher in both non-Hispanic black males (54.0%) and non-Hispanic black females (36.7%) compared to non-Hispanic white males (21.1%) and non-Hispanic white females (17.3%) (1). In looking at mortality from HTN-induced CVD incidents, non-Hispanic blacks experience 1.8 times increased chance of death from fatal stroke, 1.5 times increased chance of death from CVD, and 4.2 times increased chance of death from end-stage renal disease compared with non-Hispanic Whites (6). Even though mortality rates for both non-Hispanic whites and blacks have been declining since 2000, non-Hispanic Black communities continue experiencing higher mortality from CVD as compared to their non-Hispanic White counterparts (7).

### **Crucial Barriers to Improve HTN Control**

### Poor Adherence to Anti-HTN Medication Therapy

One crucial factor that actively contributes to increased HTN prevalence in the African-American community is low medication adherence. In a meta-analysis compiling data from 20 observational studies with 376, 172 subjects, approximately 50% of patients prescribed to medication therapy are non-adherent (8). This high level of non-adherence corresponds to increased risk for strokes and death. Upon close examination, there are five factors that may influence medication adherence rates: socioeconomic status, health systems, medical conditions, therapy, and patient characteristics. A Veterans Affairs study completed in 2006 studying 569 African American patients found that 63% of black HTN patients exhibited inadequate control, with 81% of these patients even less likely to adhere to anti-HTN medications (8, 9). African American patients, compared to their white counterparts, may be less likely to have strong social support, be educated about their medications, read prescription labels, and experience low medication costs. In addition, the African American patient may be less likely to receive coordinated and continued team-based care from physicians, nursing teams, and pharmacists. In fact, a 9-month pharmacist intervention approach to educate patients about their medications resulted in an 11% increase in adherence (8).

### Access to Healthcare: An Important Social Determinant of Health

Another major contributing factor to disparities in HTN is the absence of consistent insurance coverage and astronomically high cost of healthcare, especially in the African-American community. An old survey data from the Current Population Survey in 2006 showed that 23% of African Americans were less likely to be insured compared to white individuals at 17%, and 54%

of African-Americans were insured by private coverage compared to 70% in the white population (10). According to the NHANES data from 1999 to 2002 that was used to study insurance coverage and HTN prevalence, African Americans were least likely to enroll in Medicare or private health insurance (11). The differences in hypertension control due to insurance status results from the inability to adhere to the anti-HTN medications, to engage in multiple medication therapy, and to titrate or intensify treatments. While older adults may receive cost benefits from Medicare Part D, other factors including reluctance to be treated and age can complicate the efficacy of treatment (11).

These findings emphasize that increased insurance coverage can help to ensure coordination of HTN care, initiation and adherence to therapy, and reducing its burden in CVD morbidity and mortality. Treatment adherence and long-term optimal BP surveillance behaviors are necessary but are not sufficient. Currently, there is an increased demand for a need of public health interventions to help better control BP among African Americans, monitor risk factors and comorbidities, ensure high adherence, and reduce mortality and morbidity. Community-based outreach has been shown to help mitigate CVD risk factors and educate this population about disease states, which may lead to improvement in adherence and outcomes.

### **Historical Perspectives of Community Outreach**

To better understand the need and potential benefits for appropriate public health interventions necessary to reduce hypertension prevalence in this cultural community, an analysis of the past community outreach approach is required. In Baltimore, Maryland, the late Elijah Saunders, MD,

founding member of the Association of Black Cardiologists, Inc., and pioneer in the treatment and management of HTN, and B.Waine Kong, PhD, educational psychologist, spearheaded a 5-year National Heart, Lung, and Blood Institute (NHLBI) grant program called Church/Community Health Awareness and Monitoring Program (CHAMP) in 1979 (12-14). They trained over 500 church volunteers from approximately 100 churches in Baltimore, Maryland to monitor BP of their membership and make appropriate referrals. Drs. Saunders and Kong also coined the concept of creating barbershops as HTN control centers back in the 1980's (12-14). The concept of meeting African American men patients where they live, particularly in health deficient areas, and providing appropriate preventive resources helped understand the prevalence and monitoring of HTN in an endemic community.

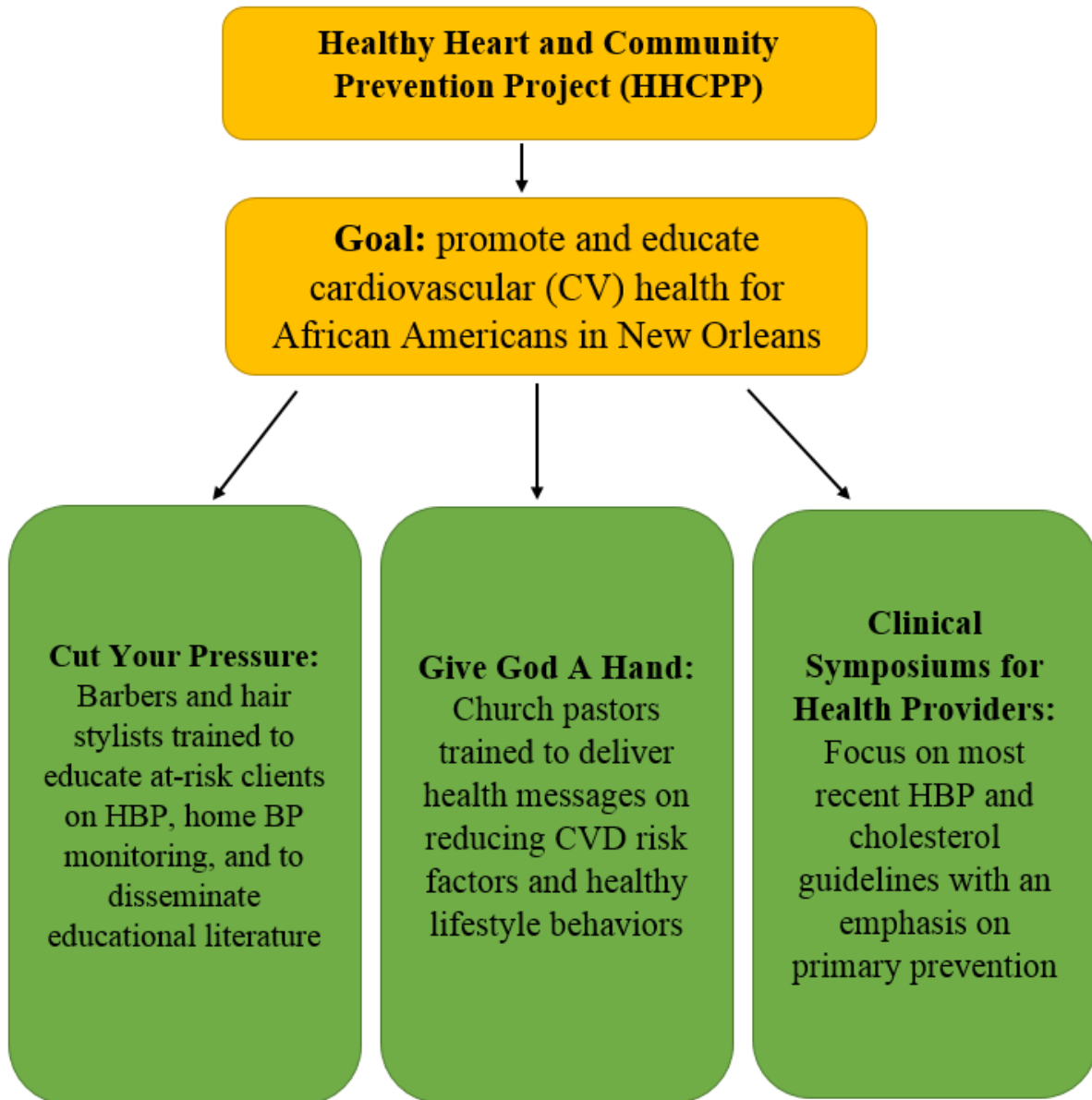
The New Orleans-based Healthy Heart Community Prevention Project, Inc. (HHCPP), spearheaded by the New Orleans natives Daphne P. Ferdinand, PhD, RN and Keith C. Ferdinand, MD, modeled a similar BP program during the 1990's as a subset of the "You Gotta Have Heart" program during the Healthy People 2000 campaign (15). The principal goal of HHCPP was to develop a coalition of community organizations, health agencies, and volunteers to develop and support a 12-month program that promoted and educated cardiovascular health of the African Americans in New Orleans.

The HHCPP utilized three approaches to accomplish its goals. Firstly, it developed a HTN education program in 10 barbershops and beauty shops, titled "Cut Your Pressure", in which barbers and hair stylists had a series of training sessions to learn how to educate their clients about high BP and lifestyle behaviors, to measure and monitor their clients blood pressure, and to disseminate educational literature on HTN. Secondly, faith-based partnerships offered opportunities to reach African American families, "Give God a Hand", through which pastors



from five churches delivered health sermons during worship services to congregants on reducing CVD risk factors and practicing specific healthy lifestyle behaviors (15). Thirdly, clinical symposia for physicians, nurses, and allied health professionals were organized to ensure the citizens of New Orleans would continue to receive competent and innovative health care strategies (15). Presentations were delivered on the most recent HTN and cholesterol guidelines by experts in their field of practice with a focus on primary prevention. The HHCPP initiative has shown the need for a coalition of healthcare workers and volunteers to coordinate and organize community-level interventions, significant planning to establish and ensure continued execution of outreach programs, and extensive training programs to educate volunteers about HTN risk factors and guidelines (15) (**Figure 1**).

**Figure 1:** Early Efforts for Community Prevention: A Three-Pronged Approach



More recently, on a national level, the NHLBI Community Health Workers Health Disparities Initiative has been developed to address and reduce cardiovascular health disparities around the country (16). In this program, community health workers use evidence-based materials and educational programs to lessen CVD disparities in minority communities, including in African-American populations. Community health workers are trained on a rigorous curriculum structured to increase knowledge of and make culturally appropriate lifestyle modifications to

CVD. There are four components to the successful functioning of this initiative: health education resources and training, shared learning, partnerships, and evaluation. The education materials are culturally and age appropriate, containing information that not only appeals to all sensory modalities, but also is comprehensive to include information on diet, physical activity, risk factor identification, and preventive measures. Through this program, there has been notable decreases in important CVD risk factors, including low density lipoprotein- cholesterol and triglyceride levels, BP levels, weight, and glycosylated hemoglobin levels (16).

### **Recent Successful Models for Community**

Based on the historical approaches previously described and continued efforts in field intervention research, current community outreach models have been established to increase health care access to high-risk populations. These models reinforce the needs to reach communities with limited access to and low trust in the medical community, and to facilitate meaningful relationships between community organizations and health care organizations.

#### *Los Angeles Blood Pressure Barbershop Study: A Model for Success*

One most recent successful model that is used to detect and treat HTN in African-American men is the barbershop- based clinical trial in Los Angeles, California (LABP) (17). As published by the research from Victor and colleagues, and building from previous research, evidence suggests that traditional health approaches to reducing uncontrolled HTN often omit African-Americans from the target pool. In this model, non-Hispanic Black men with systolic BP (SBP)  $\geq 140$  mm Hg were placed in either intervention or control groups to determine greatest systolic BP reduction six months post trial inclusion. Trial inclusion criteria was a cohort of 319 African American men with SBP  $\geq 140$  mm Hg from 52 black-owned barbershops (17). In the

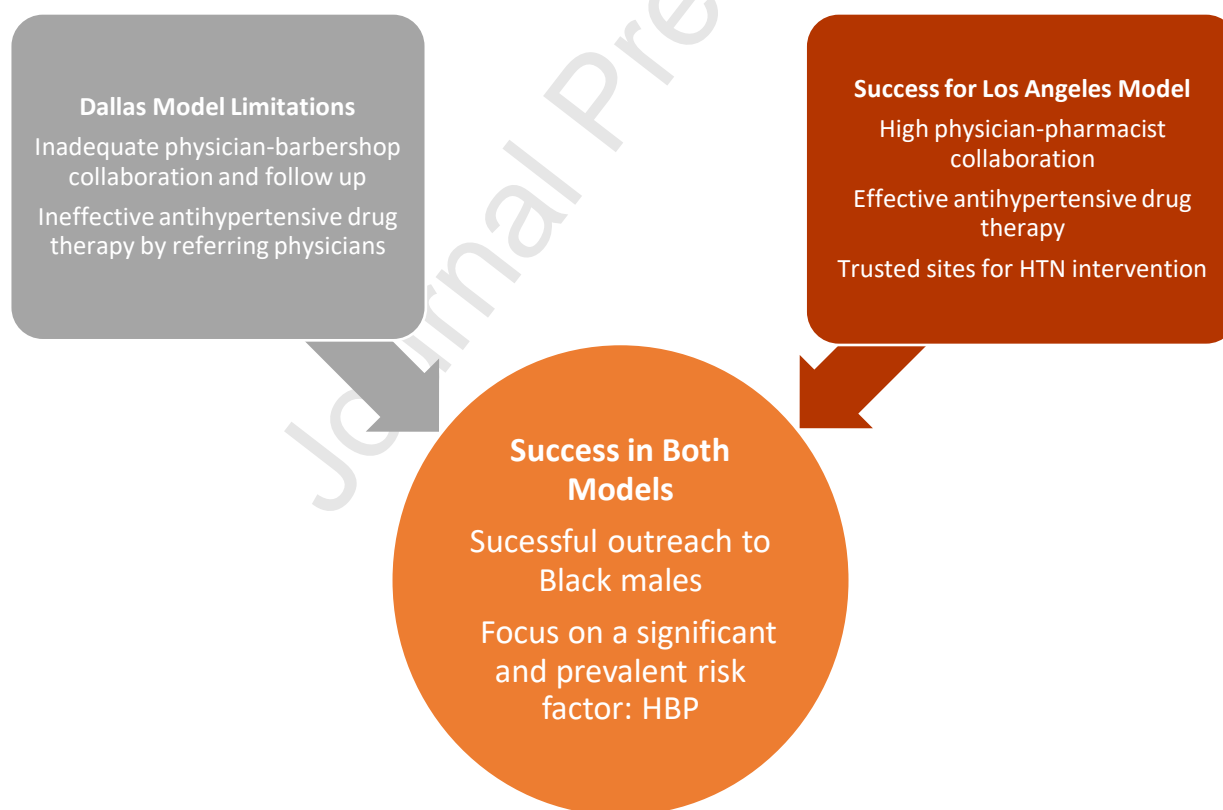
intervention group, barbers encouraged potential HTN patients to partner with pharmacists, obtain BP readings, receive medication [specifically angiotensin-receptor blockers(ARBs) and angiotensin converting enzyme inhibitors (ACEIs) ], and monitor plasma electrolyte levels. In the control group, participants were encouraged to simply establish follow-up appointment with a provider (17).

The LABP study confirmed strong evidence that BP measurement and discussion by barbers paired with HTN medication therapy by an onsite clinical pharmacist and follow up healthcare visits led to the largest reductions in SBP six months after enrollment (17). At the conclusion of the six-month trial, the SBP for the intervention group decreased by 21.6 mm Hg and the diastolic BP(DBP) decreased by 14.9 mm Hg (18). Moreover, intervention patients were prescribed 2.6 anti-HTN medications with strong adherence and BP control, whereas control patients were prescribed 1.4 medications. The LABP study yielded more successful results compared to a similar study, also led by Victor and colleagues, that was established in Dallas, Texas. All of the barbershop recruitment, intervention methods, and data analysis of BP changes were preserved in both studies. Results from the Dallas model noted that the intervention group and the control groups displayed a significant decrease in SBP, with an absolute decrease of 7.8 mm Hg and 5.3 mm Hg respectively. Yet, the intervention effect was only marginal with mean systolic BP decrease of 2.5 mm Hg ( $p= 0.08$ ), indicating that the intervention was not as statistically significant in the Dallas model compared to the LA model (19).

In delving deeper, the success of the intervention in the LA model can be attributed to three positive components: physician-pharmacist collaboration, effective anti-HTN drug regimen prescribed to participants, and trusted site of BP intervention (20). The LABP showed strong evidence collaborative discussions between the physicians and pharmacists helped with

appropriate recommendation of drug therapy, convincing patients to make modifications to their lifestyle, and regularly monitoring patient health status (20-21). This increase in physician-pharmacist contact addressed this significant limitation noted in the Dallas model. In addition, initial two medication anti-HTN drug combination therapy with calcium channel blocker amlodipine and ARB or ACEI paired with long acting thiazide-based diuretic demonstrated significant decrease in BP. Finally, enlisting and training local affiliates, including barbers, to engage in consistent contact the African-American community serve as critical liaisons in HTN management. This strongly shows that social support systems in the community play significant roles in identifying and improving HTN outcomes in vulnerable populations (**Figure 2**).

**Figure 2:** Comparison of the Los Angeles and Dallas Barbershop Models



Another community approach that has yielded modest success is the Faith-based Approaches in the Treatment of Hypertension (FAITH) (22). FAITH is a religion-centered approach conducted in the African-American community of New York City. The unique aspect of the FAITH community intervention approach is the use of therapeutic lifestyle changes and motivational interviewing (TLC-MINT) to facilitate BP reduction. Churches are considered to be important cultural gathering centers and support systems for black communities, which is why this crucial gathering center was used to implement the FAITH program and provide resources. 32 churches were recruited to participate in the study between 2010 and 2014. In the MINT-TLC intervention group, eligible participants received eleven 90-minute group sessions focused on healthy lifestyle behaviors, meal planning, stress management, structured goal setting for BP management and medication adherence, as well as a daily log to monitor healthy behaviors, all intertwined with prayers and scriptures relating to wellness. The control group, on the other hand, received one 90-minute session on hypertension management, a booklet “Your Guide to Lowering Blood Pressure”, and ten sessions on general health information (22).

BP readings conducted six months after program initiation revealed significant SBP reduction in both intervention and control groups; however, the MINT-TLC intervention showed the most dramatic decrease of 16.53 mm Hg (95% CI -25.24 mm Hg to -7.83 mm Hg). In addition, at the conclusion of the six-month program, the SBP decreased by 5.8 mmHg ( $p= 0.03$ ) (19). Despite this decrease, the effects of SBP reduction at 9 months showed no significant differences between groups and DBP was also not significant. Overall, the results were modest because behavioral change is a difficult approach to accurately measure BP reduction. In addition, most of the participants were women and it was difficult to quantify if these women regularly

frequented the participating churches. Regardless of the significance, even one mm Hg reduction in SBP has shown to decrease heart failure events by 20 per 100000 person years (22).

### **Emerging and Future Considerations in Improving HTN Control of African Americans**

The historical efforts and the current successful models expose the need to pair outreach with medication therapy to achieve optimum BP management in the Black community. More recent national efforts seek to optimize a public health approach to BP control.

#### *SMBP and Ambulatory BP reading:*

The ACC/AHA 2017 high BP guidelines have recently been encouraging highly the use of in-home or self-monitoring BP measurements to confirm hypertension diagnosis and to monitor effects of anti-HTN medications in BP reduction. One avenue to consider is teaching patients to take accurate measurements of their blood pressure, referred to as self-measured blood pressure (SMBP). The goal of SMBP is “to empower patients to accurately measure their BP at home to improve BP control” (2). A critical component of home BP measurement and SMBP is that the patient regularly measures their BP and adheres to the guidelines to properly acquire BP readings. The SMBP model offers guidelines to follow for proper home BP measurement as well as pertinent information on the usefulness of home monitoring, which includes better predicting risk of heart attacks and strokes, increasing adherence, improving clinician’s ability to accurately screen for hypertension, avoiding white coat HTN misdiagnosis, assessing the merits of anti-HTN therapy, and providing patients agency in their care through a shared care plan (2).

For patients who are employed and do not have the time to complete regular BP measurements, automated ambulatory BP measurements (ABPM) may be of better choice (2). ABPM provides

mean BP measurements with separate daytime and nighttime measurements. These automated readings allow the patient and physician to note nocturnal “dipping” and daytime BP surges as well as note episodes of elevated HTN and hypotension. ABPM threshold for HTN is 135/85 mmHg daytime, 120/73 mmHg nighttime, and 130/80 mmHg over a 24-hour period, according to the 2017 AHA/ACC guidelines. Based on the research conducted with ABPM measurements, high daytime SBP is correlated with increased risk for CVD and mortality, whereas high BP readings at nighttime are correlated with risks for coronary heart disease and strokes (2).

### *The Million Hearts® Campaign*

A national initiative that is the offspring of the Department of Health and Human Services, the Million Hearts® Campaign, developed and championed primarily by Thomas R. Frieden, MD, MPH, aimed to prevent 1 million heart attacks and strokes by 2017 (23). At the epicenter of this campaign are the goals of increasing medication adherence through knowledge dissemination, incentivization, adequate measuring and reporting, and stakeholder participation in their own health. The initiative is targeted more towards improving ABCS of CVD, aspirin for high-risk patients, BP control, cholesterol management, and smoking cessation (21). The community outreach aims to achieve its objective through focused clinical measurement, improved quality of health information technology, team-based care, and an array of policies aimed at reducing or eliminating tobacco use, sodium consumption, and fats from heart healthy diets. In addition, through strong backing from the Affordable Care Act, patients are eligible for waived services like BP screening, cholesterol screening, and smoking cessation counseling, improved access to medications, and increased clinical decision making on the electronic health record (EHR) platform (23). Future directions point to an increased usage of EHR to better capture CVD risk and empower patients about their health status, more patient education on BP self-monitoring,

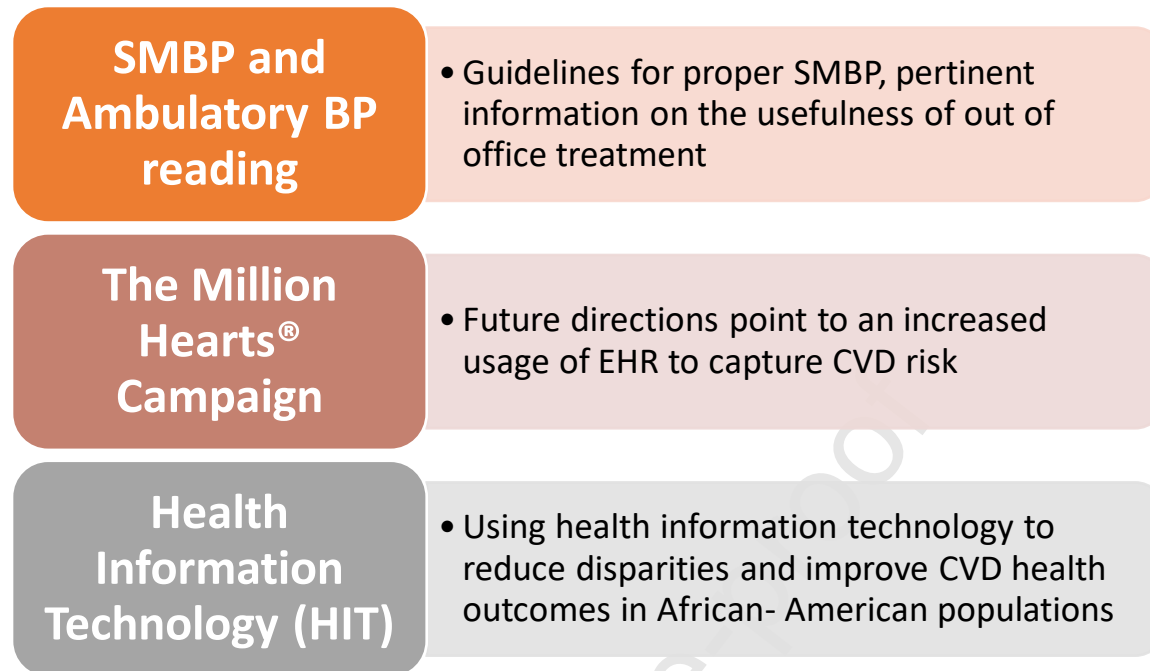


creation of health goals for outpatient practices and referral, and policy measures to prioritize funding and implementation of evidence-based interventions (24).

### *Health Information Technology (HIT) to Address Disparities*

A final consideration is to highly consider, especially in recent efforts to modernize medicine, is to look at health information technology to reduce disparities and improve health outcomes.

Information technology (IT) is used to help patients track their health and participate in shared decision making, but it does not effectively work to reduce disparities in the aforementioned components of information technology (6). Based on the “Addressing Health Disparities with Health Information Technology” conference, a multifaceted set of recommendations were identified. The first recommendation is to promote HIT research to improve health equity via scalability and sustainability of culturally appropriate interventions (6) that best shape the intervention to fit needs of affected communities. The second recommendation is to adopt rapid-cycle, continuous evaluation of new developments in HIT to address social determinants of health. In addition, increased exploration of public-private and other partnerships should incentivize creation and adoption of HIT. Health IT should also work to improve coordination between IT users and developers, with ample IT training in primary care settings. Another recommendation is to encourage eclectic methodologies and participatory approaches to properly evaluate the health information relevant to health decision making. From a systems perspective, practices and programs are to be identified to promote respect, trust, and equity in designing and implementing data systems. Moreover, data collection is to be standardized in EHR to accurately capture health disparities data. Finally, deficiencies must be identified in existing IT systems’ health equity approaches and stakeholder centered approaches are to be used to fix these deficiencies (6) (**Figure 3**).

**Figure 3:** Emerging and Future Considerations for HTN Surveillance and Control**Conclusion:**

While HTN is a major public health issue that increases risk for CVD, significant advances have been made in diagnosing, preventing, and treating this disease. However, systemic inequities and disparities in minority communities, especially in the African- American community, contribute to ineffective HTN management. As a result, extensive research needs to be conducted to control HTN in the African- American community (25). It is important to understand the relationship between social determinants, particularly race and socioeconomic status, to better understand HTN diagnosis and variability in identification (25). It is also important to study the role of environmental, behavioral, and psychosocial factors (i.e. racial discrimination) underlying treatment and medication adherence. While research has identified non-pharmacological interventions that can attenuate HTN, more randomized clinical trials need to be completed to better understand their efficacy in treatment. In addition to individualized treatments prescribed

to patients, more research needs to be conducted on community intervention programs that involve community partner participation in patient care (25). Moreover, team-based interventions that distribute responsibilities to other medical personnel should be researched as they can be powerful in BP control, involves multiple medically trained professionals in improving medication adherence, and be cost-effective to medical personnel. Finally, through advents in technology, including health information technology and home BP monitoring, research needs to study the value of technology-based intervention and information maintenance in dismantling disparities and achieving clinically significant improvements in identification and treatment (25).

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