

**SPECIAL REPORT**

# Inequities in Hypertension Control in the United States Exposed and Exacerbated by COVID-19 and the Role of Home Blood Pressure and Virtual Health Care During and After the COVID-19 Pandemic

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**ABSTRACT:** The COVID-19 pandemic is a public health crisis, having killed more than 514 000 US adults as of March 2, 2021. COVID-19 mitigation strategies have unintended consequences on managing chronic conditions such as hypertension, a leading cause of cardiovascular disease and health disparities in the United States. During the first wave of the pandemic in the United States, the combination of observed racial/ethnic inequities in COVID-19 deaths and social unrest reinvigorated a national conversation about systemic racism in health care and society. The 4th Annual University of Utah Translational Hypertension Symposium gathered frontline clinicians, researchers, and leaders from diverse backgrounds to discuss the intersection of these 2 critical social and public health phenomena and to highlight preexisting disparities in hypertension treatment and control exacerbated by COVID-19. The discussion underscored environmental and socioeconomic factors that are deeply embedded in US health care and research that impact inequities in hypertension. Structural racism plays a central role at both the health system and individual levels. At the same time, virtual healthcare platforms are being accelerated into widespread use by COVID-19, which may widen the divide in healthcare access across levels of wealth, geography, and education. Blood pressure control rates are declining, especially among communities of color and those without health insurance or access to health care. Hypertension awareness, therapeutic lifestyle changes, and evidence-based pharmacotherapy are essential. There is a need to improve the implementation of community-based interventions and blood pressure self-monitoring, which can help build patient trust and increase healthcare engagement.

**Key Words:** COVID-19 ■ health disparities ■ health policy ■ hypertension

The COVID-19 pandemic is a public health crisis that has killed more than 514 000 adults in the United States alone as of March 2, 2021. In addition to the immediate morbidity and mortality of the virus, COVID-19 mitigation strategies continue to have unintended consequences on managing

chronic conditions, such as hypertension, which is a leading cause of cardiovascular disease and health disparities in the United States.<sup>1</sup> As such, the COVID-19 pandemic continues to put tremendous pressure on the preexisting cracks in our healthcare delivery system and is likely to have major long-term

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## Nonstandard Abbreviations and Acronyms

<b>BRFSS</b>	Behavioral Risk Factor Surveillance System
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implications. In response to the social and public health phenomena occurring during the pandemic, the 4th Annual University of Utah Translational Hypertension Symposium gathered frontline clinicians and leaders from diverse backgrounds to discuss the intersection of preexisting inequities in hypertension treatment and control that were exposed and exacerbated by COVID-19, and the role of virtual health care and home blood pressure (BP) monitoring during and after the COVID-19 pandemic. The goal of this Primer Article is to provide an overview of the panelist discussion and to identify key areas in the domains of public health, clinical care, health policy, and implementation science to focus future work aimed at reducing existing disparities.

Most strikingly, while COVID-19 impacts everyone, not all are affected equally. In the United States, low-resourced communities, immigrant communities, and communities of color are being disproportionately impacted. For example, in Louisiana, Black individuals account for 70% of COVID-19 deaths despite making up only 30% of the population.<sup>2</sup> In Washington state, Latinx people comprise 13% of the population but represent 44% of COVID-19 cases and 29% of COVID-19-related hospitalizations.<sup>3</sup> In the first half of 2020, life expectancy decreased more significantly among non-Hispanic Black (2.7 years [74.7–72.0]) and Hispanic Americans (1.9 years [81.8–79.9]) compared with Non-Hispanic White Americans (0.8 years [81.8–79.9]).<sup>4</sup>

COVID-19 has accelerated virtual health care into the forefront of routine health care. Many virtual healthcare platforms rely on smartphones, computers, and high-speed internet access, all of which are not equally available to all patients and communities. For example, a recent analysis of the Behavioral Risk Factor Surveillance System (BRFSS) found that the prevalence of internet use was substantially lower among Black (62%) and Hispanic Americans (56%) compared with White Americans (77%) with hypertension or diabetes mellitus.<sup>5</sup> Some communities and health systems are well-situated to transition to virtual health care and have been able to develop and expand their infrastructure during this crisis.<sup>6</sup> However, many are not as fortunate. For example, patients without access to or who are not literate in using the technologies necessary for virtual health care may go without health care during the pandemic. Whether the transition to virtual health care

will alleviate or exacerbate existing disparities in healthcare access remains to be seen.

During the first wave (ie, March–June 2020) of the COVID-19 pandemic in the United States, outrage erupted across the nation in response to the killings of George Floyd, Ahmaud Arbery, Breonna Taylor, and countless other Brown and Black Americans. The combination of the observed racial/ethnic inequities in COVID-19 deaths and the widespread social unrest reinvigorated a national conversation about systemic racism in health care and society.

The 4th Annual University of Utah Translational Hypertension Symposium panel discussed the impacts of structural and institutional racism in the US healthcare system and its effects on health disparities before and during COVID-19. To inform the discussion and before the panel convened, we surveyed healthcare providers ( $n = 24$ ) who directly cared for patients with hypertension during the COVID-19 pandemic. Among respondents, 87% reported that routine in-person visits for hypertension were suspended, postponed, or rescheduled as virtual appointments. Two responses highlight the impacts of socioeconomic and access barriers to managing hypertension during the pandemic: (1) “Many patients lost their jobs and could not pay their phone bills, making virtual health care inaccessible ...” and (2) “Clinics were shut down for several weeks, and many patients were lost to follow-up and still have not been able to be reached to reschedule them from March.” These vignettes set the stage for our discussion.<sup>7,8</sup> We summarize the key themes and recommendations that emerged from the conversation.

## KEY THEMES THAT EMERGED FROM THE CONVERSATION

### COVID-19 Related Barriers to Hypertension and Vascular Care

Panelists consistently described a substantial or complete reduction of in-person outpatient visits for hypertension at their organizations in response to COVID-19, coupled with a rapid increase in virtual visits. Many patients did not have access to validated home BP monitors when clinics were shut down. Low access to validated home BP monitors is disturbing but not surprising. A recent report from the Lancet Commission on Hypertension found that, out of the 3000 commercially available BP-measuring devices on the market, only 15% are validated.<sup>9</sup> Home BP monitoring is a highly reliable approach that can improve patient engagement in their own care.<sup>10-13</sup>

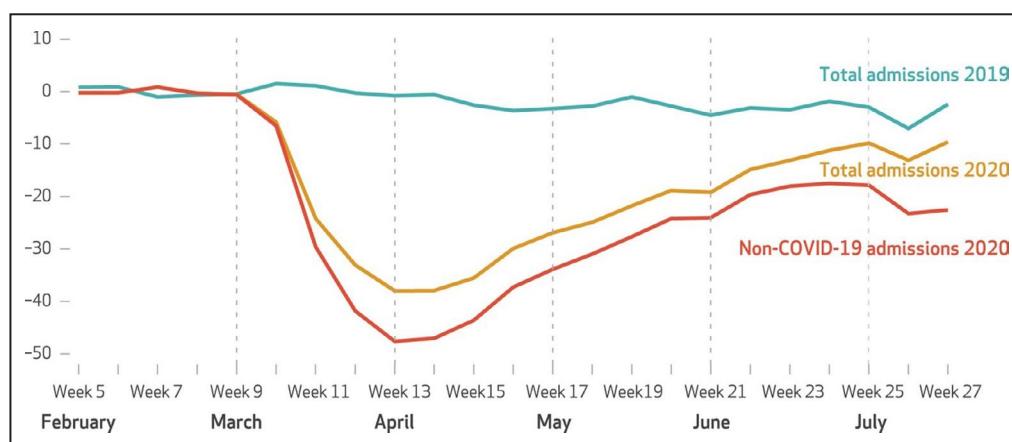
There was also a marked decrease in acute visits for myocardial infarction (16.3 versus 4.0 per week), strokes (14.7 versus 7.0 per week), and heart failure

(25.6 versus 9.0 per week), followed by an increase in out-of-hospital deaths by 20%.<sup>14,15</sup> The decrease in cardiac hospitalizations was likely because of patients sequestering at home rather than risking real or perceived potential exposure to COVID-19 by presenting to the hospital. Reflecting the experiences of the panelists, an analysis of 4 hospitals in the New York University Langone Health System showed a substantial decrease in total (51.1 versus 25.3 per week) and heart failure hospitalizations (25.6 versus 9.0 per week) from March to May 2020.<sup>15</sup> Another analysis of a nationally representative sample of US hospitalizations found a 20% decline in non-COVID-19 hospitalizations early in the pandemic (February–April 2020) that only rebounded to 16% below pre-pandemic levels by early July 2020 (Figure 1).<sup>16</sup> Non-COVID-19-related hospitalizations were substantially lower for patients residing in majority-Hispanic neighborhoods (32% below pre-pandemic levels) and remained well below pre-pandemic levels for myocardial infarction (22%). The observed rebound in non-COVID-19-related hospitalizations is consistent with the panelists' reported expectations that providers will be seeing a surge in hospitalizations for exacerbations of chronic conditions in the months to come caused by the manifestation of uncontrolled risk factors. Furthermore, the decrease in acute visits seemed to translate to an increase in out-of-hospital deaths. A systematic review and meta-analysis of ten studies reporting data from 35 379 out-of-hospital cardiac arrests reported a 120% increase in arrests and a 33% higher mortality rate among arrests that occurred after the start of the pandemic compared with before the pandemic.<sup>17</sup>

The panelists discussed how COVID-19 is transforming healthcare delivery in the United States by rapidly increasing virtual healthcare visits and other telehealth and virtual strategies. A nationally representative audit of outpatient practices in the United States found that new outpatient visits (both in-person and virtual) for managing hypertension decreased by 39% from Q2 2020 compared with pre-pandemic (2018/2019).<sup>18</sup> Virtual healthcare visits in the Veterans Health Administration early in the pandemic grew from 1739 per day (March 11) to 11 406 per day (April 22), a 556% increase, and the majority of these were first-time virtual visits for Veterans.<sup>19</sup> In-person visits declined by 81% (57 296 to 10 931 per day) during this time period. An analysis of the OptumLabs Data Warehouse from January 1, 2020 to June 16, 2020 showed that telemedicine visits increased 17-fold (ie, 0.8 to 17.8 visits per 1000 enrollees), while in-person visits dropped by 30% (102.7 to 76.3 visits per 1000 enrollees).<sup>20</sup> The evidence clearly shows that COVID-19 caused a rapid increase in virtual healthcare utilization in the United States.

## Exacerbation of Inequities in Hypertension Care During COVID-19

The panelists highlighted how COVID-19 is exacerbating preexisting disparities in hypertension treatment and control in the United States. The panelists discussed recent data showing declining BP control rates overall and to a greater extent in people of color.<sup>21</sup> The effects of health insurance and access to health care on BP control in the United States were a key theme. In a recent JAMA report, BP control rates in 2017–2018 (defined as systolic BP/diastolic BP <140/90 mm Hg)



**Figure 1. Average percent reduction in total and non-COVID-19-related hospitalizations in the United States from Feb to July in 2019 to 2020.**

This line graph shows the percentage reduction in each week relative to the average weekly admissions during February 2nd to 8th of the year in question. Data are shown for total hospital admissions in the year 2019 (blue line), as well as total (yellow line) and non-COVID-19 related admissions (red line) in the year 2020. The source of the data is the Sound Physicians hospital admissions: <https://soundphysicians.com/hospitals/>. Adapted with permission from Birkmeyer et al<sup>16</sup>, ©2020, PROJECT HOPE.

were only 8% among those who did not report seeing a healthcare provider in the past 12 months versus 47% for those who did.<sup>21</sup> Control rates among the uninsured were 22% compared with 40–46% among those with some form of health insurance. Additionally, Black individuals were 12% less likely to have controlled BP than White individuals in 2018.<sup>21</sup>

Although virtual health care, self-monitoring of BP, and other technologies hold great promise in improving BP control, as with every new technology, they can also exacerbate inequities. Some of the key challenges raised were unequal access to high-speed internet and other necessary technologies, even in younger generations, and unequal digital literacy, even in basic tasks such as “opening a file or highlighting text.” In 2012, the US Department of Education reported that 89% of White, compared with 78% of Black and 65% of Hispanic, adults were digitally literate.<sup>22</sup> Additional challenges include unequal access to validated home BP monitoring devices and whether technology users can fully commit the time and resources (eg, optimizing audio/video and internet speed) to communicate effectively.

Equitable access to high-speed internet was a key focus, as hypertension disproportionately afflicts communities of color, who are also reported to have lower rates of healthcare literacy and less access to the resources needed for virtual health care.<sup>23</sup> Substantial disparities exist in internet access by race among adults with diabetes mellitus or hypertension.<sup>5</sup> For example, there are substantial differences in the prevalence of internet access by race, with a lower prevalence of internet use among Black (62%) and Hispanic Americans (56%) compared with White Americans (77%).

## Patient-Level Factors Contributing to Inadequate BP Control

A key theme was the fundamental importance of adherence to the recommended therapeutic lifestyle modifications and pharmacotherapy. There are multiple reasons for poor adherence, including: (1) limited access to healthcare facilities and out-of-pocket medication cost, and lack of physical activity opportunities or access to healthy foods; (2) low health literacy (ie, lack of understanding of the benefits of antihypertensive medications and lifestyle modifications); and (3) distrust of the healthcare system. Multiple studies show associations between patients’ trust in their provider and their adherence, healthcare utilization, and quality of communication with their provider.<sup>24–26</sup> However, historical atrocities and years of institutional racism have reduced trust among Black patients and other minorities of color in the healthcare system, and this has been exacerbated by an inadequate representation of

racial/ethnic minority participants in clinical trials and as healthcare providers.<sup>27</sup> While patient distrust affects many aspects of chronic care, it is most recently and troublingly manifesting as high levels of mistrust of COVID-19 vaccines among Black Americans.<sup>28</sup>

## Provider-Level Factors Contributing to Inequities in BP Control

The panel also discussed the role of provider-level factors in perpetuating disparities in hypertension care. Providers have biases, clinical and cultural uncertainty, beliefs, and stereotypes about minority patients that may translate into differences in quality of care and clinical inertia.<sup>29,30</sup> A study of 543 family and internal medicine physicians (70% White and 6% Black) found a strong implicit preference for White over Black patients.<sup>29</sup> The study found that providers’ biases about the medical cooperativeness of Black versus White patients may have affected treatment decisions.<sup>29</sup> Clinical inertia, defined as clinicians’ failure to initiate or intensify antihypertensive therapy when BP goals are unmet, was discussed as a key driver to inadequate BP treatment and control rates. In some analyses, when meeting with a patient with hypertension, providers increase antihypertensive medication in only 13% of visits.<sup>31</sup> An analysis by Bellows et al. found that, out of the multiple interventions to achieve BP control, medication intensification was the most impactful.<sup>32</sup>

## NEXT STEPS TO MAKE PROGRESS

The panel discussed what must be done to improve healthcare access and “meet patients where they are.” Implementation of proven and effective patient-centered strategies (such as team-based and protocolized care with pharmacists and nurses, as well as home BP monitoring) are needed.<sup>33,34</sup> The impressive results of the BARBER trial were discussed. In a cluster-randomized design, the BARBER trial randomly assigned 78 Los Angeles County predominantly Black barbershops and 319 Black male patients to 1 of 2 interventions: (1) a clinical pharmacist-led intervention, in which Black barbers encouraged patrons with uncontrolled hypertension to meet with specialty-trained clinical pharmacists who initiated, monitored, and intensified antihypertensive medication therapy, or (2) an active-control approach, where barbers encouraged lifestyle modification and doctor appointments only to manage hypertension. The barbershops assigned to the clinical pharmacist-led intervention resulted in a 21.6 mm Hg greater reduction in systolic BP (−27.0 versus −9.3 mm Hg) and a 51.9 percentage point increase (63.6% versus 11.7%) in BP control (defined as systolic/diastolic BP <130/80 mm Hg) at 6 months follow-up compared with the barbershops assigned

the control intervention. The BP reductions with the clinical pharmacist-led intervention were sustained at 12-months follow-up and were determined to be highly cost-effective over ten years.<sup>35,36</sup>

The panel discussed that the critical components of the intervention driving the BARBER trial's success were likely 2-fold.<sup>37</sup> The first critical component was the trusted environment/business embedded within the community (ie, Black barbershops) that the intervention took place within. The second critical part was that the intervention was delivered via team-based care with specifically trained hypertension clinical pharmacists initiating, titrating, and monitoring antihypertensive medication for efficacy and safety at the point of care within the trusted Black barbershop environment. The panel emphasized that we need to design, test, and scale *more* interventions like the one studied in the BARBER trial, specific to Black and other racial/ethnic minority Americans' unique social context and lived experiences. Focused interventions are critical to addressing hypertension in the context of structural racism and societal inequity. However, critical gaps remain. A recent analysis of ClinicalTrials.gov found that, out of all the hypertension trials registered in ClinicalTrials.gov, only 5.4% reported enrolling exclusively Black adults, suggesting that few interventions are currently being designed and tested specifically for Black Americans.<sup>38</sup> Greater awareness by funding agencies and trial sponsors, with increased investment in clinical trials designed to test interventions that address and account for the unique social and healthcare context and inequities specific to communities of color, will help address the additive risk of hypertension faced by these groups. We must increase the pipeline of trialists and implementation scientists from backgrounds underrepresented in medicine. There is a disproportionately low proportion of underrepresented minorities in medical schools and as faculty in research 1 (R1) universities.<sup>39,40</sup> There needs to be increased funding for investigators from diverse backgrounds to improve the quality, number, design, and conduct of trials addressing hypertension in diverse communities.<sup>41</sup>

The panel underscored that we must better use antihypertensive medications and work to overcome clinician inertia. There should be an increase in the use of 2 and 3 drug fixed-dose combinations and, for resistant hypertension, the preferred 4th agent of a mineralocorticoid-receptor antagonist (ie, spironolactone or eplerenone).<sup>42,43</sup> To do so, we must invest in increasing the implementation of and providing greater access to proven highly effective team-based care models for hypertension.<sup>32,33</sup> We have a steep climb ahead. A recent report found that 40% of patients with uncontrolled hypertension are only taking one antihypertensive medication.<sup>44</sup> An analysis of Medicare beneficiaries found that a substantial proportion of

older US adults who initiate antihypertensive medications do so with non-guideline-recommended classes of medication.<sup>45</sup> Among Black individuals with resistant hypertension, only 5.9% were taking the recommended thiazide-like diuretic, and only 9.8% were taking a mineralocorticoid receptor antagonist, which is the preferred 4th agent for resistant hypertension.<sup>46</sup> Interventions, such as behavioral economics (eg, defaults and nudges),<sup>47</sup> are needed to encourage providers to appropriately prescribe higher quality antihypertensive medication and to improve adherence.

We must increase adherence to therapeutic lifestyle changes and antihypertensive medications. The American College of Preventive Medicine has released "Keep It Simple" recommendations to improve adherence.<sup>48</sup> Use once-daily regimens and, if possible, decrease pill burden using fixed-dosed combination products, which have been shown to increase medication adherence.<sup>49</sup> Cost is often perceived as a barrier to fixed-dose combination use; however, there are currently 33 fixed-dose antihypertensive combination products available in the United States, most of which are available at less than the sum of the individual free equivalent medications.<sup>50</sup> We must impart knowledge to every patient. An empowered patient is knowledgeable about his or her condition. Healthcare providers must address patients' beliefs, behaviors, and goals in a culturally sensitive manner. Cultural competence and diversity training for providers can effectively promote culturally sensitive approaches to addressing patients' needs.<sup>51</sup> We also must overcome communication and trust barriers by engaging patients and their communities in all stages of intervention development and implementation.<sup>52,53</sup> Restoring trust is difficult because many historical atrocities (like the Tuskegee syphilis study and more recent ethical violations in research) have led to the public's distrust in health care and research.<sup>54</sup>

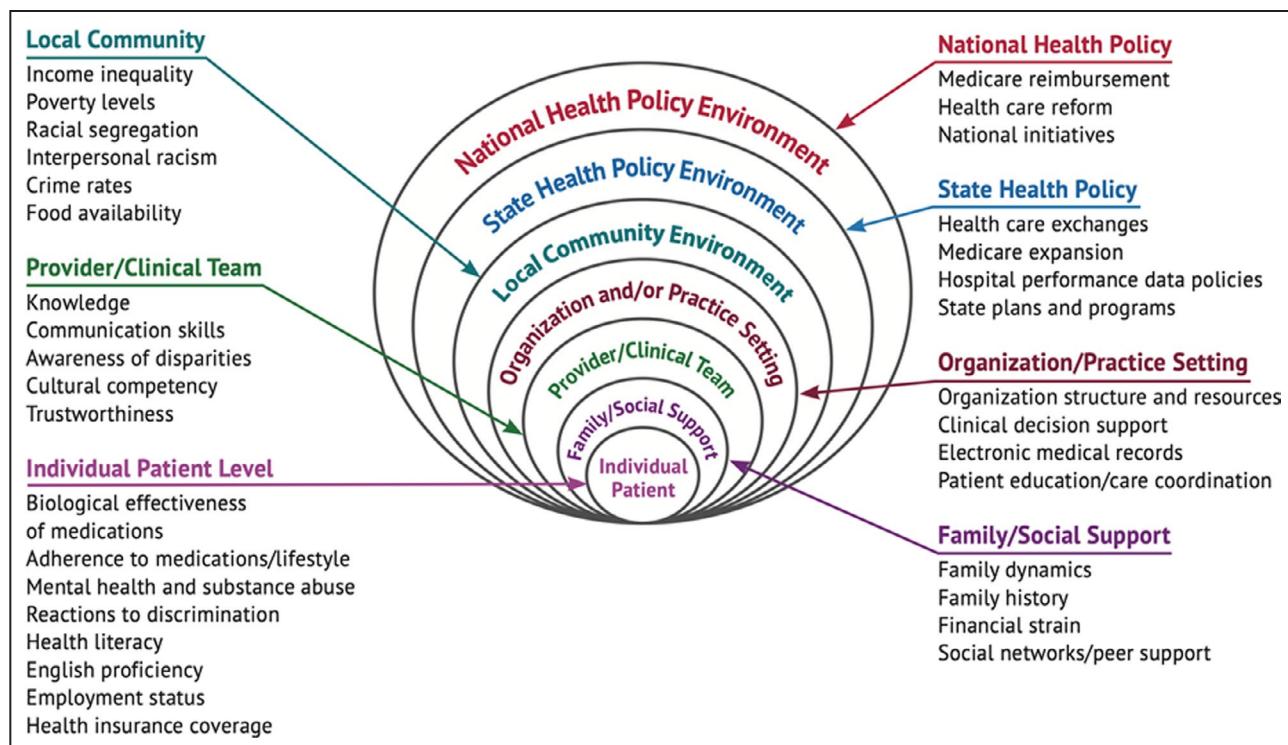
We must ensure the rising tide of virtual health care lifts all boats. The panel discussed how the most significant potential for impact is at the healthcare system and policy level. Providing greater and easier access to higher quality and more affordable health care for all Americans is essential and should be a national priority. Universal health care is a *sine qua non* to reduce health inequities. As a first step, expanding the Affordable Care Act should be a national priority. The large disparities in BP control rates among those with and without health insurance and those with and without a regular healthcare provider are unacceptable.<sup>21</sup> Patients without insurance or a regular healthcare provider often obtain their care in the emergency department after irreversible hypertension-related end-organ damage has already occurred. Payers covering home BP monitors will remove important financial barriers to achieving BP control.

Medicare and select commercial plans partially reimburse providers for the interpretation of home BP monitoring with or without co-pays.<sup>55-57</sup> At this time, most insurers do not cover the cost of purchasing home BP monitors; some federally qualified health centers have implemented programs where they loan home BP monitors to patients, but this is not widespread. As the cost of home BP monitors decreases and as more data suggest that reimbursement of home BP monitoring is cost beneficial from the insurer's perspective, there will be greater incentive to broaden coverage eligibility. In the meantime, clinicians should provide patients who are interested in purchasing home BP monitors with resources on selecting validated BP monitors (eg, <https://www.validatebp.org>) and on how to use them correctly.<sup>58-60</sup> Given the known benefits of home BP monitoring, particularly when paired with team-based care led by a pharmacist, universal coverage of home BP monitors and hypertension care by ancillary providers could markedly decrease hypertension care and outcome inequities".<sup>33,61,62</sup>

Another important step is to carefully design implementation studies to identify the best approaches for translating evidence into practice and to ensure

that approaches are adapted (if needed) scaled up, and sustained over time.<sup>63</sup> Implementation science is needed to systematically evaluate and determine the essential components of a particular multi-faceted evidence-based intervention (like the one tested in the BARBER trial) so that they can be tailored to the unique needs of a healthcare setting and patient population and to facilitate their uptake.

In summary, COVID-19 has exacerbated the pre-existing inequities in hypertension management and control in the United States. Virtual health care is now in widespread use because of COVID-19, and this may widen the divide in healthcare access across race/ethnicity, wealth, geography, and education levels. Structural racism plays a large role at both the healthcare system and the individual level. BP control rates are declining, especially among communities of color and those without access to health care or health insurance.<sup>21</sup> Disparities in hypertension treatment and control are caused by a combination of interconnected and inter-related factors, including individual patient factors, family and social support, healthcare providers and team-based care, healthcare organization and practice settings, local communities, and state and



**Figure 2. Multilevel influences on disparities in hypertension prevention and control.**

In October 2020, The Surgeon General's Call to Action to Control Hypertension<sup>64</sup> outlined 3 goals to improve<sup>65</sup> hypertension control across the United States, and each goal is supported by strategies to achieve success: (1) Make hypertension control a national priority, (2) Ensure that the places where people live, learn, work, and play support hypertension control, and (3) Optimize patient care for hypertension. The document also highlighted a framework for how a confluence of multiple inter-connected and inter-related factors at multiple levels contribute to disparities in hypertension, including individual patient factors, family and social support, healthcare providers and team-based care, healthcare organization and practice settings, local communities, and state and national health policies. Adapted with permission from Mueller et al.<sup>64</sup>, ©2015, Oxford University Press.

national health policies (Figure 2). Many of these factors are driven by the built-in structural inequalities that are part of our society and the healthcare industry's landscape in the United States. Therapeutic lifestyle change is essential yet challenging in the current social and economic conditions facing many communities of color. We also need to improve the implementation of evidence-based pharmacotherapy, and self-monitoring BP can help patients become partners in their own care. COVID-19 did not create these disparities but instead worsened many long-standing, unacceptable inequities in the United States. Race and ethnic group-specific efficacy, patient and community engagement, and implementation studies are needed to ensure that the transition to virtual health care does not leave behind disadvantaged groups. We end with a call to action for readers to commit to implementing the above-mentioned items to close these gaps.

## ARTICLE INFORMATION

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### Disclosures

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