Hypertension

RESEARCH LETTER

Utilizing Mobile Health Units for Mass Hypertension Screening in Socially Vulnerable Communities Across Detroit

Robert D. Brook, Katee Dawood, Bethany Foster, Randi M. Foust, Catherine Gaughan, Paul Kurian, Brian Reed, Andrea L. Jones, Barbara Vernon, Phillip D. Levy

Nearly half of all adults in the United States have hypertension, defined as a blood pressure (BP) ≥130/80 mm Hg. However, both the prevalence (56%) and control rates (18%) are worse in Black patients. Numerous social determinants of health in socially vulnerable populations further exacerbate these disparities while reducing hypertension awareness and access to health care. Few places exemplify this crisis like the city of Detroit (78% Black race) where hypertension rates are the highest in Michigan (https://www.cdc.gov/places) and all census tracks are in health professional shortage areas (https://data.hrsa.gov/tools/shortage-area/). As such, the public health importance of large-scale screening efforts to identify the enormous number of individuals with hypertension cannot be overstated. We here describe the first-year results using our novel Wayne Health Mobile Unit program developed in collaboration with Wayne State University to address health disparities in Detroit.

METHODS

The Wayne Health Mobile Unit program, launched March 2020, comprises a fleet of up-fitted Ford Transit vans staffed with multiple personnel. The initial focus on coronavirus disease 2019 (COVID-19) testing was rapidly expanded to additional health care capabilities given community needs. Five to 7 mobile health units deploy 5 to 6 days per week to 376 available community partner locations covering the Detroit area targeting locations with higher social vulnerability using specialized geocoding methodologies.

RESULTS

As of December 2021, 53,305 unique patient visits had been conducted at ~1400 events. During the first year of offering BP screening (November 2020 to December 31, 2021), 3040 individuals elected to participate. Roughly 63% of patients had high BP values with nearly one-third in the stage-II hypertension range (Table). Among Bring-It-Down participants (n=143), 42% had no prior

Key Words: blood pressure • COVID-19 • prevalence • social determinants of health • social vulnerability
diagnosis of hypertension or were unaware of their BP status; whereas 59% had confirmation of clinic follow-up.

### DISCUSSION

Hypertension persists as a leading risk factor for mortality. Unfortunately, control rates (≈20%) are worsening while nearly one-quarter (≈25 million) of adults are not aware of their hypertension. The true percentage of unaware hypertensives, especially among those not receiving medical care (ie, hiding out-of-site); however, is likely much higher. This is particularly relevant for socially vulnerable communities as our results suggest (≈42%). Innovative approaches that better enable the identification of individuals with hypertension across the United States while fostering improved access to medical follow-up are of critical public health importance. The first-year findings from our Wayne Health Mobile Unit program demonstrate the feasibility and success of our novel strategy. The relatively low number of BP screenings compared to total visits was due to it being optional, whereas many individuals were only seeking care for COVID testing/vaccination. Moving forward, BP screening will be performed in everyone, unless specifically declined, thereby markedly increasing (perhaps by an order of magnitude) the number of people with potential hypertension identified and linked to care.

Mobile health units have existed for some time (https://www.mobilehealthmap.org/). The Family Van serving 6 Boston neighborhoods has shown success in lowering BP. However, our program is unique for several reasons including its large scale (7 vehicles and growing), skilled staffing (nurses, community health workers), near-daily deployment encompassing hundreds of partnering locations, and vast reach to a large population living across a wide geographic area. Other special capabilities include assessments for multiple acute and chronic conditions, data collection within Wayne Health’s clinical electronic medical record allowing for seamless linkages to medical or social service care, and onsite blood draws. Finally, we have recently launched 3 trials to elucidate best practice implementation approaches and follow-up management strategies for individuals with elevated or high BP. Future analyses will validate the accuracy of BP measurement in a car, assess the percentage of patients with hypertensive screening BPs who are confirmed to have hypertension on follow-up (and differentiate those with a new diagnosis from previously-known but uncontrolled hypertension), and document our ultimate success in controlling BP.

### Table. BP Screening Results

| Categories                                           | N, %   | BP* mm Hg     |
|------------------------------------------------------|--------|---------------|
| All patients                                         | 3039   | 126.9±23.1/76.8±14.7 |
| Normal BP                                            | 1136 (37%) | 105.5±9.28/65.0±6.34 |
| Systolic BP <120 and diastolic BP <80 mm Hg          |        |               |
| High BP categories†                                   |        |               |
| Elevated BP                                          | 306 (10%) | 124.2±2.8/70.1±6.44 |
| Systolic BP 120–129 and diastolic BP <80 mm Hg       |        |               |
| Hypertension categories‡                              | 1597 (53%) | 142.7±19.39/86.4±12.43 |
| Systolic BP ≥130 or diastolic BP ≥80 mm Hg           |        |               |
| Stage I                                              | 629 (21%) | 127.7±8.73/80.3±6.84 |
| Systolic BP 130–139 or diastolic BP 80–89 mm Hg      |        |               |
| Stage II                                             | 968 (32%) | 152.4±18.15/90.4±13.6 |
| Systolic BP ≥140 or diastolic BP ≥90 mm Hg           |        |               |
| Enrolled hypertensive patients                        | 143    |               |
| No known prior hypertension or diagnosis             | 48 (34%) |               |
| Prior diagnosis of hypertension                      | 84 (59%) |               |
| Unknown BP status                                    | 11 (8%) |               |
| Age, y                                               | 55±12* |               |
| Sex (female)                                         | 68 (48%) |               |
| Race and ethnicity                                   |        |               |
| Black                                                | 137 (96%) |               |
| White                                                | 2 (1%)  |               |
| Other                                                | 4 (3%)  |               |
| Clinic follow-up confirmed                           | 84 (59%) |               |

BP indicates blood pressure. *Mean±SD. †High BP categories encompass all levels of BP above normal. ‡Hypertension categories represent patients with screening BP readings within hypertension ranges. The formal diagnosis of hypertension requires ≥2 BP readings performed during ≥2 separate occasions. Patients were not given the diagnosis of hypertension by this single screening event, rather their BP readings were categorized within the hypertension range. Subsequent follow-up BP readings were required and recommended.

### Nonstandard Abbreviations and Acronyms

| BP | blood pressure |
|----|----------------|
| COVID-19 | coronavirus disease 2019 |

ARTICLE INFORMATION

Affiliations

Division of Cardiovascular Diseases (R.D.B.), Integrative Biosciences Center (R.D.B., K.D., B.F., B.R., A.L.J., P.D.L.), Wayne Health (R.D.B., R.M.F., C.G., P.K., B.V., P.D.L.), and Department of Emergency Medicine (B.F., A.L.J., P.D.L.), Wayne State University.

Sources of Funding

R.D. Brook and P.D. Levy have grant support from the National Institute on Minority Health and Health Disparities (P60 MD017351-01) and the American Heart Association (the AHA, part of the Health Equity Research Network on the Prevention of Hypertension). Bring-It-Down is funded by the Centers for Disease
Control through a grant from the Michigan Department of Health and Human Services.

Disclosures
R.D. Brook is medical consultant for Sensogram Technologies Inc.

REFERENCES
1. Centers for Disease Control and Prevention (CDC). Hypertension Cascade: Hypertension Prevalence, Treatment and Control Estimates Among US Adults Aged 18 Years and Older Applying the Criteria From the American College of Cardiology and American Heart Association’s 2017 Hypertension Guideline—NHANES 2015–2018. US Department of Health and Human Services; 2021.

2. Carey RM, Muntner P, Bosworth HB, Whelton PK. Prevention and control of hypertension: JACC health promotion series. J Am Coll Cardiol. 2018;72:1278–1293. doi: 10.1016/j.jacc.2018.07.008

3. US Preventive Services Task Force. Screening for hypertension in adults. US Preventive Services Task force reaffirmation recommendation statement. JAMA. 2021;325:1650-1656. doi: 10.1001/jama.2021.4987

4. Levy P, McGlynn E, Hill AB, Zhang L, Korzeniewski SJ, Foster B, Criswell J, O’Brien C, Davood K, Baird L, et al. From pandemic response to portable population health: a formative evaluation of the Detroit mobile health unit program. PLoS One. 2021;16:e0256908. doi: 10.1371/journal.pone.0256908

5. Song Z, Hill C, Bennet J, Vavasis A, Oriol NE. Mobile clinic in Massachusetts associated with cost savings from lowering blood pressure and emergency department use. Health Aff (Millwood). 2013;32:36-44. doi: 10.1377/hlthaff.2011.1392