

# Rates of Undiagnosed Hypertension and Diagnosed Hypertension Without Anti-hypertensive Medication Following the Affordable Care Act

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## BACKGROUND

The Affordable Care Act (ACA) Medicaid expansion improved access to health insurance and health care services. This study assessed whether the rate of patients with undiagnosed hypertension and the rate of patients with hypertension without anti-hypertensive medication decreased post-ACA in community health center (CHC).

## METHODS

We analyzed electronic health record data from 2012 to 2017 for 126,699 CHC patients aged 19–64 years with  $\geq 1$  visit pre-ACA and  $\geq 1$  post-ACA in 14 Medicaid expansion states. We estimated the prevalence of patients with undiagnosed hypertension (high blood pressure reading without a diagnosis for  $\geq 1$  day) and the prevalence of patients with hypertension without anti-hypertensive medication by year and health insurance type (continuously uninsured, continuously insured, gained insurance, and discontinuously insured). We compared the time to diagnosis or to anti-hypertensive medication pre- vs. post-ACA.

## RESULTS

Overall, 37.3% of patients had undiagnosed hypertension and 27.0% of patients with diagnosed hypertension were without a prescribed anti-hypertensive medication for  $\geq 1$  day during the study period. The rate of undiagnosed hypertension decreased from 2012 through 2017. Those who gained insurance had the lowest rates of undiagnosed hypertension (2012: 14.8%; 2017: 6.1%). Patients with hypertension were also more likely to receive anti-hypertension medication during this period, especially uninsured patients who experienced the largest decline (from 47.0% to 8.1%). Post-ACA, among patients with undiagnosed hypertension,

time to diagnosis was shorter for those who gained insurance than other insurance types.

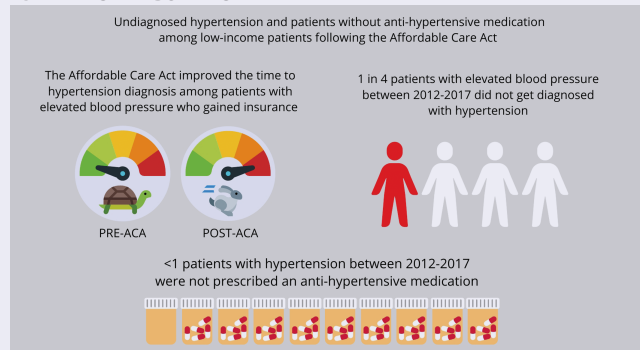
## CONCLUSIONS

Those who gained health insurance were appropriately diagnosed with hypertension faster and more frequently post-ACA than those with other insurance types.

## CLINICAL TRIALS REGISTRATION

Trial Number NCT03545763.

## GRAPHICAL ABSTRACT



**Keywords:** Affordable Care Act; blood pressure; community health center; hypertension; Medicaid expansion; medication

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Uncontrolled hypertension is the largest single contributor to all-cause and cardiovascular mortality.<sup>1</sup> Annually, hypertension—as a primary or contributing cause—leads to about 500,000 US deaths<sup>2</sup> and to high medical spending, estimated at >\$50 billion yearly.<sup>3</sup> Currently, about 108 million US adults (nearly 1 in 2) have

hypertension.<sup>2,3</sup> In 2017, only 43.7% of patients with hypertension had blood pressure <140/90 and 19.0% had blood pressure <130/80.<sup>4</sup> Additionally, Wall *et al.*<sup>5</sup> noted that up to 30% of clinic patients with sustained high blood pressure are “hiding in plain sight” with

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multiple documented elevated blood pressure measurements, but no hypertension diagnosis or anti-hypertensive medications.

Patients with hypertension must engage in daily management activities such as taking medications or adhering to diet and exercise regimens.<sup>6</sup> Access to health insurance is a critical aspect of hypertension detection, treatment, and control<sup>7</sup> and a lack of insurance can greatly exacerbate barriers to successful hypertension care and management.<sup>8</sup> Adults without insurance have lower prevalence of *known* hypertension (<20%) relative to Medicaid recipients (~30%),<sup>9</sup> as they are more likely to be undiagnosed; an estimated 30% of uninsured adults have undiagnosed hypertension.<sup>10,11</sup> Health insurance may be especially beneficial for patients with lower income and hypertension, who may be unable to afford health care services without coverage.

The Affordable Care Act (ACA) Medicaid expansion substantially improved access to health insurance and health care services for patients, including preventive services, especially among adults with lower income.<sup>12–16</sup> To date, several studies have focused specifically on changes to hypertension care following the ACA and found improvement in blood pressure screening and fewer barriers to accessing care.<sup>17–19</sup> One study showed a significant reduction in access barriers for young adults (19–25 years of age) with hypertension and a subsequent increase in access to health care services following the ACA.<sup>18</sup> There was no evidence, however, whether this improved access to care led to decreases in undiagnosed hypertension. As noted above, individuals without health insurance are more likely to have undiagnosed hypertension. As such, it is hypothesized that gaining health insurance could lead to increased rates of appropriate hypertension diagnosis as well as adequate treatment (i.e., receiving anti-hypertensive medications). Thus, we sought to investigate whether the rate of patients with undiagnosed hypertension and the rate of patients with diagnosed hypertension without anti-hypertensive medication would decrease post-ACA among patients with lower income who receive care in community health centers (CHCs).

## METHODS

### Data source

Electronic health record (EHR) data were obtained from the OCHIN community health information network, a multistate collaboration of CHCs.<sup>20</sup> Eligible clinics ( $n = 93$ ) were primary care clinics or local health departments that were “live” on OCHIN’s EHR before 1 January 2012 and remained live throughout the entire period and were in a state that expanded its Medicaid program following the ACA. We analyzed data from 2012 to 2017 (pre-ACA: 2012–2013; post-ACA: 2014–2017) for patients who were 19–64 years of age throughout the study period, had at least 2 ambulatory visits within 2 years of each other at an eligible clinic, and had at least 1 visit pre-ACA and at least 1 visit post-ACA. Patients who were pregnant during the study period, those with a documented diagnosis for end-stage renal disease, and patients with a Medicare-financed visit during the study period were excluded. Our final sample included 126,699 patients from 14 states (Alaska, California, Hawaii, Indiana,

Maryland, Minnesota, Montana, New Mexico, Nevada, Ohio, Oregon, Rhode Island, Washington, and Wisconsin).

### Definitions of patients with no hypertension, diagnosed hypertension, undiagnosed hypertension, and patients with diagnosed hypertension without hypertensive medication

No hypertension was defined as those without a diagnosis or any indication of undiagnosed hypertension as defined below.

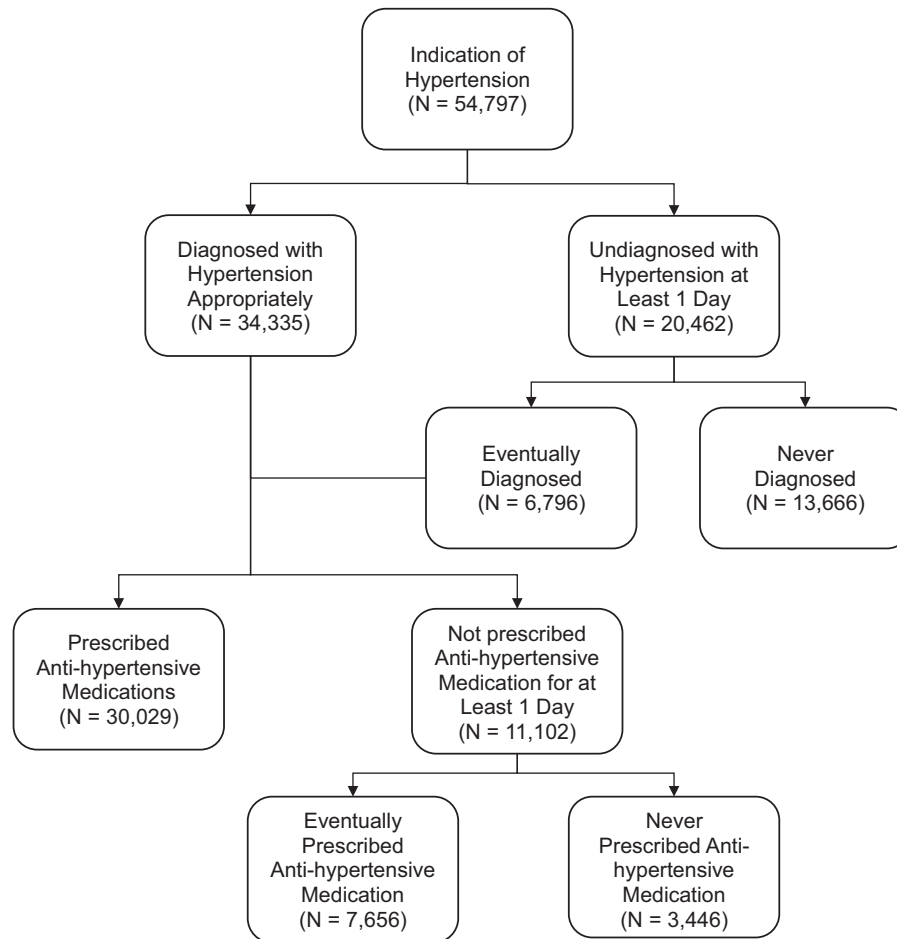
Patients with *diagnosed hypertension* had a documented problem list or visit diagnosis for hypertension any time before or during the study period (see Figure 1).

Following previous studies, patients with *undiagnosed hypertension*<sup>21</sup> had an elevated blood pressure reading (defined below) at least 1 day before a documented diagnosis during the study period. Patients remained in the undiagnosed hypertension group until they were diagnosed with hypertension (see definition above) or until their last visit during the study period. Among patients with undiagnosed hypertension who eventually received a diagnosis, only 9.6% were diagnosed within the first month of their elevated blood pressure reading. Elevated blood pressure included: at least 1 blood pressure reading  $\geq 160$  mm Hg systolic or 100 mm Hg diastolic (stage 2 hypertension), 2 consecutive elevated blood pressure readings  $\geq 140$  mm Hg systolic or 90 mm Hg diastolic within 2 years of each other, or 2 consecutive elevated blood pressure readings  $\geq 130$  mm Hg systolic or 80 mm Hg diastolic within 2 years of each other for patients with a diagnosis for diabetes or chronic kidney disease.<sup>22</sup> Patients with a documented diagnosis for white coat hypertension<sup>23</sup> at any time before or during the study were excluded from the undiagnosed hypertension group (see Figure 1).

Patients with *diagnosed hypertension without anti-hypertensive medication* had a diagnosis of hypertension (documented problem list or visit diagnosis,  $N = 52,161$ ) any time during the study period and were without a documented prescription for an anti-hypertensive medication for at least 1 day after a documented diagnosis. Patients remained in this group until they received a prescription for an anti-hypertensive medication or their last visit during the study period. Among patients with diagnosed hypertension without anti-hypertensive medication for at least 1 day, 17.0% received an anti-hypertensive prescription within the first month of their hypertension diagnosis. Because of data limitations, we focused only on anti-hypertension medications as a proxy for hypertension treatment as counseling or referral for lifestyle changes are not consistently available in EHR (see Figure 1).

### Definition of health insurance coverage types

Our main independent variable of interest was health insurance coverage type during the time patients were either with undiagnosed hypertension or with diagnosed hypertension without anti-hypertensive medication. For the undiagnosed hypertension analysis, we used insurance from the date of the elevated blood pressure associated with the undiagnosed hypertension date to hypertension diagnosis date



**Figure 1.** Operationalization of patients defined as having undiagnosed hypertension and those with diagnosed hypertension without anti-hypertensive medication.

or end of the study period, whichever came first. For patients with diagnosed hypertension without anti-hypertensive medication, we utilized insurance coverage from the date of diagnosis to the first anti-hypertensive medication prescription date or end of the study period, whichever came first. Insurance types included continuously insured, continuously uninsured, gained insurance, or discontinuously insured, as described below:

- *Continuously insured* patients had any type of health insurance (Medicaid or private insurance) at all visits during the time they had undiagnosed hypertension or were diagnosed with hypertension and without anti-hypertensive medication in the study period (2012–2017).
- *Continuously uninsured* patients had no health insurance at any visit during the time they had undiagnosed hypertension or were diagnosed with hypertension and without anti-hypertensive medication in the study period (2012–2017).
- Patients who *gained insurance* were uninsured at the first visit identifying them as having undiagnosed hypertension or as diagnosed with hypertension and without anti-hypertensive medication, but gained insurance (Medicaid or private insurance) at a subsequent visit, and kept health

insurance for the remainder of their visits during the study period (2012–2017). Over 83% of patients who gained insurance were uninsured pre-ACA, and most gained Medicaid coverage post-ACA (80%).

- *Discontinuously insured* patients fluctuated on and off health insurance throughout the time they had undiagnosed hypertension or were diagnosed with hypertension and without anti-hypertensive medication. In other words, some patients were uninsured at the first visit identifying them as having undiagnosed hypertension or with diagnosed hypertension without anti-hypertensive medication, were insured at a subsequent visit, and uninsured again at another follow-up visit. Other patients were insured at the first visit identifying them as having undiagnosed hypertension or with diagnosed hypertension without anti-hypertensive medication, and had subsequent visits that were either insured or uninsured.

Additional covariates included in our models were: age at the start of the study (19–26, 27–39, 40–59 years), sex (male, female), race (white, Black, other, unknown), ethnicity (Hispanic, non-Hispanic, unknown), number of visits to an eligible clinic during the undiagnosed hypertension or time without an anti-hypertensive for those diagnosed

with hypertension, rurality (urban, urban cluster, rural, unknown), a modified Charlson comorbidity index score (0, 1–2, 3–5, 6+) that excluded hypertension diagnosis from the final score,<sup>24</sup> and percent federal poverty level ( $\leq 138\%$ ,  $>138\%$ , missing).

### Statistical analysis

We summarized demographic characteristics of our CHC patient study population by hypertension status (no hypertension, diagnosed hypertension, undiagnosed hypertension, diagnosed hypertension without anti-hypertensive medication). We estimated the unadjusted prevalence of undiagnosed hypertension and of patients with diagnosed hypertension without anti-hypertensive medication by year and insurance type and reported those graphically.

Since provisions were established within the ACA that eliminated cost sharing for preventive care and a large number of patients gained insurance coverage after implementation of the ACA, we estimated time to diagnosis for undiagnosed hypertension and time to prescription among patients with diagnosed hypertension without anti-hypertensive medication in both the pre- and post-ACA periods using Cox proportional hazard models, adjusting for the covariates noted above. For each period (pre- and post-ACA), time to diagnosed hypertension was the time, in months, from the date they were first noted to have undiagnosed hypertension to a documented diagnosis. For those who never received a documented diagnosis, the censoring data point was set as their last visit to a study clinic. Time to prescription among patients with diagnosed hypertension without anti-hypertensive medication was the time, in months, from the first documented hypertension diagnosis until the first documented prescription for an anti-hypertensive medication. For patients who never received a documented anti-hypertensive medication prescription, it was the time until their last visit to a study clinic. For these analyses, gained insurance was the referent category, as we were interested in the effect of gaining insurance on diagnosis of hypertension and prescription of anti-hypertensive medications for patients with diagnosed hypertension compared with the other insurance types. Analyses were performed in SAS Enterprise Guide version 7.1 and Stata version 15.1. This study was approved by the Oregon Health & Science University Institutional Review Board. The data that support the findings of this study may be made available, upon reasonable request.

### RESULTS

Overall, 37.3% of patients had undiagnosed hypertension for at least 1 day during the study period, and 27.0% of patients with diagnosed hypertension were without an anti-hypertensive medication for at least 1 day after their diagnosis. A greater percentage of patients with undiagnosed hypertension were male, non-Hispanic, lived in an urban cluster, and had continuous insurance compared with those with no hypertension. A greater percentage of patients with diagnosed hypertension without anti-hypertensive medication were Black, non-Hispanic, lived in rural areas, and were continuously insured (Table 1).

The rate of undiagnosed hypertension steadily decreased from 2012 (22.4%) through 2017 (12.9%). These trends were seen across all insurance types (Figure 2). Those who gained insurance had the lowest rate of undiagnosed hypertension in all years. Those who were continuously uninsured had the highest rate of undiagnosed hypertension at the start of the study period, but saw the largest decline in rate over the study period, a 20.9 percentage point drop. Among patients with undiagnosed hypertension at any point in the study period, 24.9% remained undiagnosed at the end of the study period. A significantly greater percentage of continuously insured patients never received a diagnosis (31.1%) compared with the other insurance types (25.9% for continuously uninsured, 22.1% for discontinuously insured, and 14.5% for gained insurance; results not shown). Rates of patients with diagnosed hypertension without anti-hypertensive medication decreased across all insurance groups (Figure 3); with uninsured experienced the largest decline. Among patients with diagnosed hypertension without anti-hypertensive medication, 8.4% remained without a documented prescription at the end of the study period.

In the pre-ACA period, the time to diagnosis among patients with undiagnosed hypertension was longer for those who gained insurance than it was for patients in all other insurance types (Figure 4 and Supplementary Table S1 online). For instance, those continuously insured received a diagnosis 4 times faster than those who gained insurance (hazard ratio = 4.71; 95% confidence interval = 3.79–5.85). In the post-ACA period, the time to diagnosis was shorter for those who gained insurance than it was for the other insurance types. Time to hypertension diagnosis in both the pre- and post-ACA periods was shorter for those who were female, older, non-Hispanic, and had fewer visits. Time to diagnosis was shorter for Black than white patients in the post-ACA period (Supplementary Table S1 online). Additionally, there was some indication that those who were more medically complex (measured via the Charlson comorbidity index score) had a faster time to hypertension diagnosis pre-ACA, but these differences disappeared in the post-ACA period.

Among patients with diagnosed hypertension without anti-hypertensive medication, the time to anti-hypertensive medication prescription was significantly longer for patients who gained insurance in both the pre- and post-ACA periods compared with other insurance types, after adjusting for covariate. In both the pre- and post-ACA periods, the time to anti-hypertensive medication prescription was longer for men, patients who were less medically complex, those with more visits, and patients with a higher federal poverty level compared with their counterparts. In the pre-ACA period, time to anti-hypertensive medication prescription was longer for younger patients. In the post-ACA period, time to anti-hypertensive medication prescription was longer for Hispanic than non-Hispanic patients (Supplementary Table S1 online).

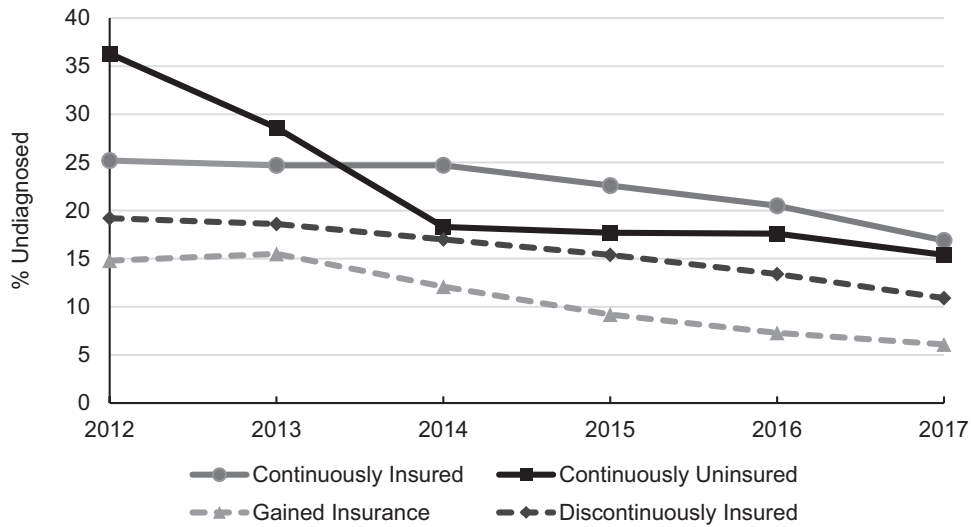
### DISCUSSION

The purpose of this study was to evaluate the impact of gaining insurance on rates of undiagnosed hypertension and

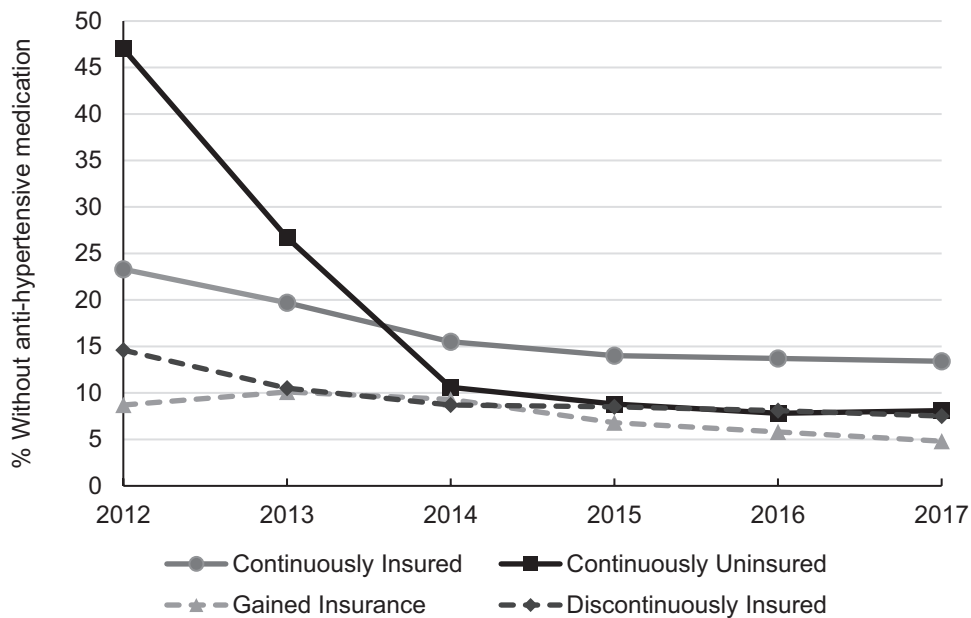
**Table 1.** Patient characteristics by hypertension status

	No hypertension (N = 71,902)	Diagnosed hypertension <sup>a</sup> (N = 54,797)	Undiagnosed hypertension (N = 20,462)	Diagnosed hypertension without anti-hypertensive medication (N = 11,102)
Sex, %				
Male	34.6	46.1	45.6	46.0
Female	65.4	53.9	54.4	54.0
Age at study start, mean (SD)				
	35.1 (10.4)	44.1 (9.7)	40.8 (10.3)	44.6 (9.5)
Race, %				
White	81.1	78.0	83.8	79.5
Black	8.9	13.9	8.0	12.7
Other Race	5.4	5.1	5.0	5.2
Unknown Race	4.6	3.0	3.3	2.6
Ethnicity, %				
Non-Hispanic	64.3	73.5	71.5	75.3
Hispanic	34.3	25.1	27.0	23.2
Unknown	1.4	1.5	1.5	1.5
Federal poverty level, %				
≤138%	70.6	72.9	72.3	70.7
>138%	25.3	24.0	24.6	24.9
Missing	4.1	3.1	3.1	4.3
Urban/rural location, %				
Urban	72.5	71.4	64.4	68.1
Urban cluster	19.9	19.2	24.5	20.8
Rural	6.5	8.3	9.7	10.2
Unknown	1.1	1.1	1.4	0.9
Ambulatory visits, mean (SD)				
	11.5 (11.4)	19.8 (18.0)	19.8 (19.1)	19.1 (17.5)
Charlson comorbidity index score 2012, %				
0	62.0	35.3	37.2	37.4
1–2	17.3	27.8	27.8	26.8
3–5	17.3	29.0	27.4	28.3
6+	3.4	8.0	7.6	7.5
Insurance groups, %				
Continuously insured	42.6	40.7	56.8	54.4
Continuously uninsured	14.6	9.2	14.3	22.3
Gained insurance	21.9	27.5	12.9	9.0
Discontinuously insured	20.9	22.7	16.0	14.3

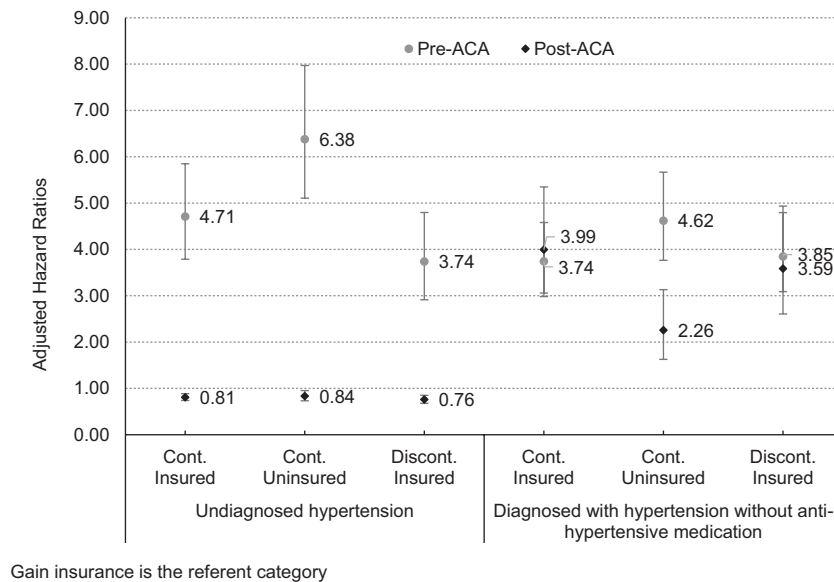
<sup>a</sup>Include patients receiving care in community health centers with elevated blood pressure (never diagnosed = 13,666) or diagnosis of hypertension ( $n = 41,131$ ) by the end of the study period (2012–2017). Patients with diagnosed hypertension without anti-hypertensive medication were those with a diagnosis of hypertension that did not have a documented prescription for a hypertension medication for at least 1 day. Patients with diagnosed hypertension without anti-hypertensive medication had a diagnosis of hypertension any time during the study period and were without a documented prescription for an anti-hypertensive medication for at least 1 day after a documented diagnosis. Patients remained in this group until they received a prescription for an anti-hypertensive medication or their last visit during the study period. Continuously uninsured patients had no health insurance at any visit during the time they had undiagnosed hypertension or were diagnosed with hypertension and without anti-hypertensive medication in the study period (2012–2017). Patients who gained insurance were uninsured at the first visit identifying them as diagnosed with hypertension and without anti-hypertensive medication but gained insurance at a subsequent visit, and kept health insurance for the remainder of their visits during the study period (2012–2017). Discontinuously insured patients fluctuated on and off health insurance throughout the time they had undiagnosed hypertension or were diagnosed with hypertension and without anti-hypertensive medication.



**Figure 2.** Trends in the proportions of patients with undiagnosed hypertension by insurance type, 2012–2017. Patients with diagnosed hypertension without anti-hypertensive medication were those with a diagnosis of hypertension that did not have a documented prescription for a hypertension medication for at least 1 day. Continuously insured patients had any type of health insurance (Medicaid or private insurance) at all visits during the time they had undiagnosed hypertension in the study period (2012–2017). Continuously uninsured patients had no health insurance at any visit during the time they had undiagnosed hypertension in the study period (2012–2017). Patients who gained insurance were uninsured at the first visit identifying them as having undiagnosed hypertension but gained insurance (Medicaid or private insurance) at a subsequent visit, and kept health insurance for the remainder of their visits during the study period (2012–2017). Discontinuously insured patients fluctuated on and off health insurance throughout the time they had undiagnosed hypertension.



**Figure 3.** Trends in the proportions of patients with diagnosed hypertension without anti-hypertensive medication by insurance type, 2012–2017. Patients with diagnosed hypertension without anti-hypertensive medication had a diagnosis of hypertension any time during the study period and were without a documented prescription for an anti-hypertensive medication for at least 1 day after a documented diagnosis. Patients remained in this group until they received a prescription for an anti-hypertensive medication or their last visit during the study period. Continuously insured patients had any type of health insurance (Medicaid or private insurance) at all visits during the time they were diagnosed with hypertension and without anti-hypertensive medication in the study period (2012–2017). Continuously uninsured patients had no health insurance at any visit during the time they were diagnosed with hypertension and without anti-hypertensive medication in the study period (2012–2017). Patients who gained insurance were uninsured at the first visit identifying them as diagnosed with hypertension and without anti-hypertensive medication but gained insurance (Medicaid or private insurance) at a subsequent visit, and kept health insurance for the remainder of their visits during the study period (2012–2017). Discontinuously insured patients fluctuated on and off health insurance throughout the time they were diagnosed with hypertension and without anti-hypertensive medication.



**Figure 4.** Adjusted time to diagnosis among undiagnosed hypertension and those with diagnosed hypertension without anti-hypertensive medication pre- and post-ACA by insurance type. Hazard ratios were adjusted for sex, ethnicity, race, age at the study starts, urban/rural location, number of visits, Charlson comorbidity index score, and federal poverty level. Error bars represent the 95% confidence intervals. Referent insurance type is gained insurance. Time to diagnosed hypertension was the time, in months, from the date of their elevated blood pressure to a documented diagnosis. For those who never had a documented diagnosis, it was the time until their last visit to a study clinic. Time to prescription among patients with diagnosed hypertension without anti-hypertensive medication was the time, in months, from the first documented hypertension diagnosis until the first documented prescription for an anti-hypertensive medication. For patients who never received a documented anti-hypertensive medication, it was the time until their last visit to a study clinic. Continuously insured (Cont. Ins) patients had any type of health insurance at all visits during the time they had undiagnosed hypertension or were diagnosed with hypertension and without anti-hypertensive medication in the study period (2012–2017). Continuously uninsured (Cont. Unins) patients had no health insurance at any visit during the time they had undiagnosed hypertension or were diagnosed with hypertension and without anti-hypertensive medication in the study period (2012–2017). Discontinuously insured (Discont. Ins) patients fluctuated on and off health insurance throughout the time they had undiagnosed hypertension or were diagnosed with hypertension and without anti-hypertensive medication. Abbreviation: ACA, Affordable Care Act.

anti-hypertensive medication prescriptions among patients with lower income receiving care in CHCs. Our findings are consistent with other studies that showed CHC patients and CHCs themselves benefited from the ACA.<sup>25,26</sup> We observed that the prevalence of undiagnosed hypertension decreased over time, and decreased more rapidly following the ACA Medicaid expansion. Further, the differences between insurance types among patients with undiagnosed hypertension were significantly reduced post-ACA, suggesting that patients who gained insurance were more likely to get a diagnosis post-compared with pre-ACA. Post-ACA, the time to hypertension diagnosis was shorter for patients who gained insurance than other insurance types. These results showcase the importance of supporting and sustaining health insurance expansion to ensure detection of chronic conditions among low-income individuals. This is particularly relevant following the COVID-19 pandemic, which led to a dramatic increase in unemployment likely associated with substantial losses of health insurance. As such, reductions in barriers to obtaining health insurance, such as the Medicaid expansion, are critical. Our findings also stress the need to expand health insurance access to those who remain uninsured to ensure they are able to receive timely diagnoses and treatment. One possible strategy is universal health care coverage for all.

Regarding patients with diagnosed hypertension without anti-hypertensive medication, those without insurance

showed the greatest improvement in receiving prescriptions for anti-hypertensive medication when needed. This is likely because patients without insurance seen in CHCs benefit from the 340B drug pricing program,<sup>27</sup> which allows clinics, hospitals, and affiliated pharmacies to obtain drugs at a significant discount and reduce the cost burden for patients. Although this program is available to all patients regardless of insurance status, it is critical for patients without insurance who might not otherwise be able to afford needed prescriptions. Following the ACA, this program grew, but especially so in Medicaid expansion states, which might explain the large decline in uninsured patients with diagnosed hypertension without anti-hypertensive medication. However, the US Centers for Medicare and Medicaid Services proposed to cut the program in 2020 by 22.5%,<sup>28</sup> which could impact CHCs' ability to assist patients who are uninsured or unstably insured with their medication needs. The continuity of this program and other medication cost containment efforts are imperative in the wake of the COVID-19 pandemic.

Although clinicians play a leading role in whether a patient receives a hypertension diagnosis or an anti-hypertensive medication prescription, there are many multilevel factors influencing diagnoses and treatment. For example, diagnosis is influenced by clinic workflows and how high blood pressure readings are communicated to the clinician prior to them seeing the patient. Treatment is influenced by whether

or not a patient prefers to take a medication or prioritize nonpharmacological treatments. Importantly, the COVID-19 pandemic physical distancing policies and regulations may have had a large impact on the ability of clinics to screen for and document blood pressure readings and/or provide patients with timely treatment. Thus, more research is needed to understand the impact of COVID-19 on blood pressure screenings and health care utilization for hypertension treatment. Although health insurance facilitates access to care and treatment, it is only one of the many factors influencing when a chronic condition is diagnosed and what options are recommended for treating it.<sup>29</sup>

Our results highlight several demographic (race and ethnicity) and health-related factors (medical complexity and number of visits) that may influence receipt of a hypertension diagnosis and/or a prescription once diagnosed. We found that Hispanic patients experienced a longer time to diagnosis and treatment than non-Hispanic patients, while Black patients received diagnoses and prescriptions more rapidly than all other races. These results suggest that Hispanic CHC patients may experience unique barriers to hypertension diagnosis and treatment. We found that Hispanic patients were more likely to be uninsured pre-ACA and to remain uninsured post-ACA,<sup>30</sup> which impacts health care access. Other studies focused on evaluating the barriers to hypertension treatment and control among Hispanic patients found income, ancestry, health literacy, access to transportation, family support, and physician communication skills impeded health care;<sup>19,29,31–33</sup> we could not measure these factors with our data. We also found that patients with undiagnosed hypertension or with diagnosed hypertension without anti-hypertensive medication have medical complexity and numerous health care visits, suggesting competing health conditions may gain priority for time and attention<sup>34,35</sup>—leaving hypertension unaddressed, especially among continuously insured and those who gained insurance.

Additional mixed-methods research is needed to understand the barriers and facilitators to diagnosis and treatment of hypertension, especially among Hispanic populations, and identify strategies to improve adequate receipt of recommended care. For instance, there are numerous EHR tools<sup>21,36,37</sup> and other population health tactics that successfully identify undiagnosed patients that could be implemented in CHCs. Other strategies may include recruiting a team to monitor a registry of patients with a hypertension diagnosis or consistently high blood pressure measurements; this team could expand beyond the clinician to include others, such as community health workers or patient navigators to assist with medication management and clinical pharmacists to reduce polypharmacy risk. Another approach could be to focus on cultural competency training, provider–patient communication, and increasing patient knowledge of health care benefits, wellness, and illness.

This study has some limitations: it includes CHCs who are part of the OCHIN community health network and therefore results may not be representative of all clinics, states, or expansion groups. This analysis is visit-based and does not assess the CHC population without visits and health insurance

status is based on insurance at each visit. Inaccurate blood pressure measurements recorded in the EHR may have inaccurately categorized patients.<sup>38,39</sup> Additionally, patients may seek care outside CHCs; however, evidence suggests that most established CHC patients continue to receive care from CHCs.<sup>40</sup>

In conclusion, those who gained health insurance had greater improvement in getting diagnosed with hypertension post-ACA than other insurance types. No such relationship was observed among patients with diagnosed hypertension without anti-hypertensive medication. More research is needed to untangle the barriers to hypertension diagnosis and treatment in CHC populations.

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## SUPPLEMENTARY MATERIAL

Supplementary data are available at *American Journal of Hypertension* online.

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## DISCLOSURE

The authors declared no conflict of interest.

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