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Original Study

Patient-Level Factors Associated with Antihypertensive Prescribing Patterns in a Free Clinic Setting

A pooled cross-sectional study

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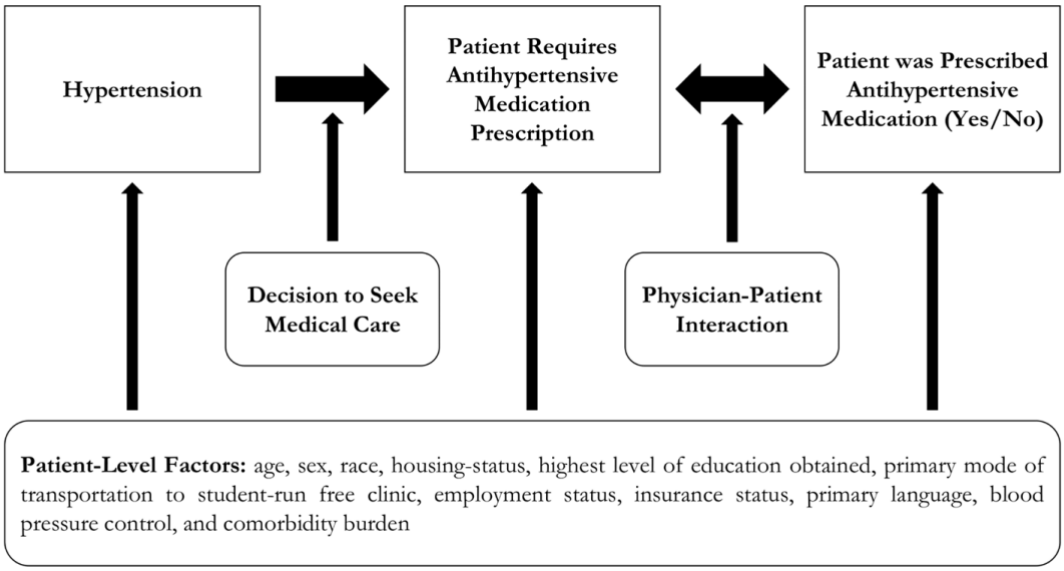
Abstract

Background: Hypertension is the world's leading cause of cardiovascular disease and premature death. In the United States, non-White adults have higher rates of hypertension, yet lower rates of treatment. Furthermore, underinsured and uninsured populations experience unique barriers, receive fewer and lower quality healthcare services, and are the focus of less research; however, student-run free clinics (SRFCs) help address this gap and treat conditions like hypertension. This study assessed patient-level factors that may influence prescribing patterns for hypertension at SRFCs.
Methods: A chart review was conducted on patients diagnosed with hypertension (N=799) seen from January 2013-February 2020 inclusive at one SRFC network. The outcome variable was receipt of antihypertensive medication. A logistic regression analysis assessed the association between antihypertensive prescribing and patient-level variables (age, comorbidities, race, sex, education, language, housing, insurance status, transportation, employment status).
Results: After controlling for other factors, those with two or more comorbidities were more likely to be prescribed an antihypertensive than those with no comorbidities (odds ratio [OR] 1.31, 95% Confidence interval [CI] 1.04-1.65, p=0.021). When compared to non-Hispanic White patients, Hispanic patients were around 40% less likely to be prescribed an antihypertensive (OR 0.58, 95% CI 0.36-0.92, p=0.03). Insured patients were 60% less likely to be prescribed an antihypertensive than uninsured patients (OR 0.40, 95% CI 0.22-0.75, p=0.004).
Conclusions: This study found that, at an SRFC network, differences in antihypertensive prescribing exist by comorbidities, race, and insurance status, indicating patient-level hypertension treatment disparities in this population. This study suggests the need for research into how patient-level factors influence physicians' treatment decisions and how educating SRFC patients about medication assistance programs can mitigate insurance-related disparities.

Introduction

In 2018, almost half of the adults in the United States had hypertension, with rates highest among non-Hispanic Black adults.[1,2] Previous studies indicate disparities in hypertension treatment nationally.[3] When accounting for their relative rates of hypertension, Hispanic and non-Hispanic Black adults are treated at lower rates than non-Hispanic White adults, along with experiencing lower rates

Figure 1. Conceptual framework to inform variable selection for factors associated with receiving an antihypertensive (N = 799; adapted from Lee & Emmett, 2012)[15]



This figure describes factors the patient-level factors and the decisions and interactions that influence antihypertensive prescribing.

of hypertensive control (i.e. reaching blood pressures of <140/90 mm Hg).[3] Socioeconomic barriers can also be significant in hypertension management; studies reported that low-income participants had worse blood pressure control than high-income participants.[4] Barriers to care are augmented between those with and without insurance; those without insurance are more likely to receive less and lower quality care.[5]

Despite these documented access barriers to health care among underserved populations,[6] student-run free clinics (SRFCs) show promise in expanding access to high-quality treatment of chronic conditions, including hypertension.[7,8] While several studies have explored how patient-level factors were associated with antihypertensive prescribing patterns among adults on the national level,[9,10] no current literature examines this association in an SRFC setting. Patients who utilize services at SRFCs often experience unique healthcare barriers related to hypertension, such as uninsured or underinsured status and poverty,[11,12] and require additional research to understand how such challenges can impact health outcomes. These challenges, subsequently, may pose barriers to accessing treatment plans due to rationing available financial resources across competing demands (e.g., housing, groceries, medications);[6,13] some patients may prioritize lifestyle changes and advise clinicians that they cannot afford medication prescriptions to minimize costs.

To address this gap, our study assesses how patient-level variables are associated with antihypertensive prescribing in an SRFC setting. This may offer clinicians and SRFC leaders insight into how these factors can influence hypertension treatments and inform intervention design.

Methods

Study setting and sample

We reported our study using the STROBE guidelines.[14] The study was a retrospective data analysis of electronic health records (EHR) data from a student-run free clinic operated at a public

Table 1. Sample characteristics of hypertensive patients at a student-run free clinic between January 2013-February 2020 (N = 799)

Characteristic	Frequency, n (%)
Antihypertensive Prescription	
Yes	580 (72.6)
No	219 (27.4)
Antihypertensive Drug Classifications	
Angiotensin-converting enzyme inhibitors only	155 (26.7)
Angiotensin receptor blockers only	23 (4.3)
Beta blocker only	35 (6.0)
Alpha blocker only	1 (0.2)
Central alpha agonists only	1 (0.2)
Calcium channel blocker only	65 (11.2)
Diuretic only	14 (2.4)
Miscellaneous	5 (0.7)
Multiple prescriptions (2 or more)	286 (47.9)
Employment Status	
Unemployed	505 (63.2)
Employed	294 (36.8)
Sex	
Female	428 (53.6)
Male	371 (46.4)
Highest Education	
High school / GED or less	444 (55.6)
Postsecondary education†	355 (44.4)
Insurance Status	
Uninsured	748 (93.6)
Insured	51 (6.4)
Housing	
Not homeless	766 (95.9)
Homeless	33 (4.1)
Charlson Comorbidity Index, mean±SD	0.46±0.90
Blood Pressure Control	
Normal	121 (15.1)
High	678 (84.9)
Has Personal Transportation	
Yes	711 (89.0)
No	88 (11.0)
Race/Ethnicity	
White	260 (32.5)
Black	348 (43.6)
Hispanic	135 (16.9)
Other underrepresented group‡	56 (7.0)
Age (in years), mean±SD	51.5±12.5

†*Postsecondary education includes some college, Associate's degree, Bachelor's degree, and graduate school.*
‡*Other underrepresented racial groups include Asian/Pacific Islanders, Native Americans, and Other.*
SD: standard deviation; GED: General education development

university. This SRFC provides primary care and specialty services to over 2,000 medically underserved individuals in North Central Florida annually. Blood pressure readings are manually assessed by clinic staff at the beginning of each visit, prior to seeing the medical team. We abstracted data from the EHR of in-person visits between January 2013 and February 2020 inclusive. Our sample included patients who utilized primary care services and had any diagnosis of hypertension (new or recurring) during this time period.

Measures

Our outcome of interest was whether a patient was prescribed an antihypertensive medication (e.g., beta-blockers, calcium channel blockers, and diuretics) during any visit as determined by treatment documentation in the EHR in the study period.

Our study's variable selection was informed by the conceptual framework developed by Lee and Emmett.[15] This framework suggests that patients' medical conditions and demographic factors influence whether they need an antihypertensive medication prescription, but this is mediated by their decision to seek medical care. When a clinician has determined a patient requires an antihypertensive, the patient is either prescribed or not prescribed an antihypertensive depending on the patient-physician interaction. Thus, our study's variables included age, sex, race, housing status, highest level of education obtained, primary transportation to the SRFC, employment status, insurance status, primary language, blood pressure control, and comorbidity burden (as defined by the Charlson Comorbidity Index).[16] Our adapted conceptual framework (Figure 1) maps factors that may influence whether a patient is prescribed an antihypertensive.

Statistical analysis

Sample characteristics were reported. We conducted logistic regression tests to assess the association between the outcome of interest and the patient-level variables and used a significance level of $p<0.05$. We used complete case analysis to address any missing data in our sample. We also conducted a multicollinearity test, and we found that race and language were highly correlated. Thus, we removed language from our final models. All statistical analyses were performed using StataSE 16 (Stata Corp, College Station, Texas). The study was approved by the University of Florida's Institutional Review Board.

Results

As shown in Table 1, of 799 patients, 580 patients (72.6%) were prescribed an antihypertensive. Most of the study participants were of Black race (43.6%), female (53.6%), unemployed (63.2%), uninsured (93.6%), and did not have blood pressure within control (84.9%). Of those who did receive an antihypertensive prescription, most (52.1%) received only one type of antihypertensive. The antihypertensives that were prescribed at the SRFC are detailed in the Appendix.

After controlling for other factors, we found that patients with greater comorbidity burden, as defined by the Carlson Comorbidity Index, had higher odds of being prescribed an antihypertensive as demonstrated in Table 2 (odds ratio [OR] 1.31, 95% Confidence interval [CI] 1.04-1.65, p=0.021). Furthermore, patients who reported themselves as Hispanic were 42% less likely to be prescribed an antihypertensive than patients reporting themselves as non-Hispanic White (OR 0.58, 95% CI 0.36-0.92, p=0.022). Patients with insurance were 60% less likely to be prescribed an antihypertensive than those who were uninsured (OR 0.40, 95% CI 0.22-0.75, p=0.004).

No differences in antihypertensive prescribing were observed by sex, housing status, education, personal transportation, employment status, and blood pressure control.

Table 2. Adjusted odds ratios on factors associated with antihypertensive prescribing

Characteristic	Odds ratio	95% CI	P-value
Employment status			
Unemployed	1.00	REF	REF
Employed	1.35	0.95-1.92	0.098
Sex			
Female	1.00	REF	REF
Male	1.07	0.77-1.49	0.683
Highest Education			
Less than high school/GED	1.00	REF	REF
Postsecondary education†	1.33	0.95-1.86	0.092
Insurance Status			
Uninsured	1.00	REF	REF
Insured	0.40	0.22-0.75	0.004*
Housing‡			
Stable	1.00	REF	REF
Unstable	0.60	0.28-1.28	0.185
Charlson Comorbidity Index	1.31	1.04-1.65	0.021*
Blood Pressure Control			
Normal	1.00	REF	REF
High	1.03	0.66-1.61	0.886
Has Personal Transportation			
Yes	1.00	REF	REF
No	0.89	0.53-1.50	0.663
Race/Ethnicity			
White	1.00	REF	REF
Black	1.46	0.98-2.17	0.061
Hispanic	0.58	0.36-0.92	0.022*
Other underrepresented group‡	0.58	0.30-1.11	0.101
Age (in years)	1.03	1.01-1.04	<0.001*

**Statistically significant*
†*Postsecondary education includes some college, Associate's degree, Bachelor's degree, and graduate school.*
‡*Other underrepresented racial groups include Asian/Pacific Islanders, Native Americans, and Other.*
CI: Confidence interval ; GED: general education development

Discussion

Our study aimed to assess the association between patient-level factors and the odds of receiving an anti-hypertensive. Overall, after controlling for other factors, we found that patients with greater comorbidity burden had greater odds of being prescribed an antihypertensive. Meanwhile, those who reported themselves as Hispanic or insured showed lower odds of receiving an antihypertensive. These findings suggest that there may be disparities in treatment patterns in SRFCs. We describe implications for clinical practice below.

Our study suggests that patients with greater comorbidity burden may be more likely to be prescribed an antihypertensive as part of their treatment plans, which was consistent with other studies that focused on insured populations.[17] These results may be partly explained by clinical challenges encountered when treating a hypertensive patient who carries other comorbidities. For

instance, hypertensive patients who also have diabetes may have lower rates of blood pressure control.[17] Furthermore, certain antihypertensive drug combinations may be prescribed more frequently for hypertensive patients who have specific comorbidities (e.g., adding angiotensin-converting enzyme inhibitors or angiotensin receptor blockers for patients with hypertension and diabetes).[17,18] However, the efficacy of these medications may be dependent on patients' adherence to their medication plans. Patients without insurance may experience greater financial burdens with covering the costs of medications,[6,13] especially if placed on a multi-drug regimen. Further research is needed to assess cost-related medication nonadherence across comorbidity burden levels and across individual types of comorbidities (e.g., hypertension, diabetes) among free clinic populations (i.e., patients without insurance or cost-sharing arrangements).

Furthermore, our model also suggests that patients who reported themselves as Hispanic were less likely to be prescribed an antihypertensive than patients who were non-Hispanic White. These results were consistent with findings from a national survey.[2,10] These differences in prescribing patterns may be partly due to differences in prevalence rates of hypertension across race/ethnicity groups.[3,19,20] Another potential reason may be treatment preferences. For instance, qualitative research suggests that patients who are Hispanic may attribute higher blood pressure to stress and social factors and believed that lifestyle changes, such as dietary modifications, were more appropriate than taking antihypertensives.[21] Patients who are Hispanic may also have a lack of confidence in the efficacy of antihypertensives.[21] This suggests interventions (e.g., decision aids) that facilitate patient education and review possible treatment options while preserving patient decision-making and treatment preferences may be beneficial.[22] Hispanic households generally also have higher rates of food insecurity,[23] which, in turn, is associated with having hypertension.[24] Consequently, patients who elect to focus on dietary changes may experience some challenges with access to healthier ingredients that they can integrate into their meal planning. Free clinic leaders may collaborate with community leaders to create referral pathways to food banks and similar resources to increase patient awareness and use.[25] Our study also suggests that patients with insurance were less likely to receive an antihypertensive prescription than patients without insurance. Although this finding may appear surprising, it may be important to highlight that having an insurance plan does not always translate to access or use of health services.[26–29] Several factors, such as types of services covered and monthly premium, deductible, and out-of-pocket limit amounts, may also be important factors that drive the decision to access or use health care. Within the context of our study, our findings may underscore a potential treatment gap for patients who are underinsured (i.e., plans that do not cover prescription benefits, prohibitively high cost-sharing). Further research is needed to qualitatively understand the reasons for the use of SRFCs among patients who are underinsured. Interventions may also need to be identified and tested to improve the reach of medication therapy to patients who have hypertension and are underinsured. Strategies that may be beneficial for patients without insurance (e.g., patient assistance programs) may be less effective for patients who are underinsured since some pharmaceutical companies may have criteria that applicants cannot hold any insurance. One strategy may be to improve patients' awareness of discounted pharmacy prescription programs, such as the $4 generic programs offered by participating pharmacies.

Our findings should be interpreted under some limitations. First, data were only acquired from a single site from one SRFC network, limiting generalizability to other SRFCs. Initial patient visits and follow-up visits were unable to be delineated, resulting in an inability to assess for antihypertensive switching or de-escalation between patient groups. Additionally, our chart review precluded us from controlling for other patient-level variables (e.g., patient knowledge/attitudes about medications) that may influence anti-hypertensive prescribing. Lastly, our study was unable to account for clinician-level factors since the SRFC uses numerous volunteering clinicians, with many volunteering infrequently. Additional research should examine both patient- and clinician-level factors together to account for the multiple variables that may influence prescribing decisions. Notwithstanding, our study adds to the literature on disparities in hypertensive prescribing rates using a student-run free clinic setting.

Conclusions

At one SRFC network, we found differences in antihypertensive prescribing by comorbidities, race, and insurance status that suggest patient-level disparities exist when treating and managing hypertension in this specific patient population. Our study suggests the need for qualitative research to identify reasons for these trends to guide intervention design to address these disparities in the SRFC setting.

Disclosures

The authors have no conflicts of interest to disclose.

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