



Review of Hypertension Management at University of South Florida BRIDGE Clinic

Brian Atkinson¹; Lauren Uichanco¹; Zein Kattih¹; Yohan Perera¹; Erin Angell¹; Courtney Uhlar¹; Valeria Martinez¹; Alex Roetzheim¹; Jesus Lopez¹; Lucy Guerra, MD, MPH¹; Eduardo Gonzalez, MD¹

¹University of South Florida Morsani College of Medicine, Tampa, Florida, USA

Corresponding Author: Brian Atkinson; email: brian.andrew.atkinson@gmail.com

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Abstract

Background: Hypertension is one of the most prevalent diseases in the United States, and proper disease management is essential in preventing multi-system organ damage. The BRIDGE Healthcare Clinic is a student-run free clinic that cares for a primarily uninsured, immigrant population in Tampa, Florida. This retrospective study aimed to assess the quality of hypertension management provided at BRIDGE Clinic and compare our hypertension outcomes with the 8th Joint National Committee (JNC8) guidelines and national rates of blood pressure (BP) control.

Methods: Chart reviews of all patients seen at BRIDGE Clinic from May 1, 2012 to May 1, 2017 were performed. Patients with hypertension, defined by JNC8 as a previous diagnosis of hypertension, a BP >140/90 mmHg for patients <60 years old, or BP >150/90 for patients >60 years old, on ≥ 2 occasions, were included in the study. Information collected included patient demographics (age, race, gender, body mass index, comorbidities), BP at initial visit, BP at most recent visit, total number of visits, dates of initial and most recent visits, and types of antihypertensive medications being used. Data were analyzed using SPSS statistics software.

Results: Of the 599 patients reviewed, 97 patients (between the ages of 29 and 89 years) were found to have a diagnosis of hypertension per JNC8 criteria. Compared to the national average of 53%, 55.7% of BRIDGE Clinic had BPs at goal (defined as BP <140/90 in patients <60 years old, and BP <150/90 in patients >60 years old). There was also a significant decrease in systolic BP by 10.9 mmHg ($p < 0.0001$, 95% confidence interval [CI] 6.9-14.9 mmHg) and diastolic BP by 5.4 mmHg ($p < 0.0001$, 95% CI 3.3-7.5 mmHg) from initial visit to most recent visit.

Conclusions: As a student-run free clinic dependent on volunteers and donors, BRIDGE Clinic has been able to achieve clinically and statistically significant decreases in BP, along with rates of BP control that are comparable to national averages for both insured and uninsured Americans.

Background

Hypertension poses a major public health burden in the United States (US), especially since an estimated 46% of the seventy-five million Americans with hypertension are not adequately controlled per Joint National Committee (JNC) guidelines.¹ Hypertension is a major risk factor for stroke, cardiovascular disease, kidney disease, and other end-organ damage. Lower socioeconomic status and fewer years of education have been associated with both increased risk of

hypertension and poorer blood pressure (BP) control.² Free clinics, which tend to serve patients with these demographic factors, have performed studies on the quality of their hypertension care, comparing their clients' BP control to JNC guidelines and national averages.³⁻⁵ One study also measured patients' trends in BP since beginning antihypertensive treatment to see if there was a significant reduction in BP.⁵ These studies showed that the free clinics assessed were following JNC guidelines, and showed a nonsignificant trend toward decreased BPs.

BRIDGE (Building Relationships and Initiatives Dedicated to Gaining Equality) Healthcare Clinic is a student-run free clinic that provides services to a patient population surrounding the University of South Florida area in Tampa, Florida. Services provided by BRIDGE Clinic include care from medical doctors, pharmacists, social workers, physical therapists, psychologists, and nutrition counselors. BRIDGE Clinic only treats patients who are uninsured and who fall below 200% of the national poverty line in the surrounding University of South Florida area. Since most of our patients identify as Hispanic or were born outside of the US, our patients are particularly vulnerable to well-described disparities in basic healthcare, such as access to regular medical visits, affordability of medications, difficulty with language barriers, and more.

The goals of this analysis were to determine (1) if patients' BP decreased since beginning treatment at BRIDGE Clinic, (2) if patients' BP are at JNC goals, and (3) if BRIDGE Clinic's rates of BP control are comparable to national averages. Given that many of the patients at BRIDGE Clinic were establishing care with a healthcare professional for the first time, and the majority of patients return for regular visits, average BPs were expected to decrease upon establishing care at our clinic. However, due to the clinic's limited resources and the unique circumstances of many of our patients (poverty, uncertain immigration statuses, etc.), rates of BP control were expected to fall short of the national average.

Methods

This study was a retrospective analysis of the medical records of patients at BRIDGE Clinic. Two medical students and three undergraduate students performed chart reviews of all patients seen at from May 1, 2012 to May 1, 2017. Prior to beginning data extraction, all chart reviewers received 90 minutes of training on how to complete the chart reviews. Patients' charts were distributed randomly. Two senior medical students reviewed all recorded information a second time in order to ensure accuracy of the entered data.

Patients with hypertension, defined as a previous diagnosis of hypertension or BP >140/90 mmHg for patients <60 years old or BP >150/90

for patients >60 years old on ≥ 2 occasions, were included in the study. Patients were included if either systolic or diastolic was above these levels. Patients who did not have either a previous diagnosis of hypertension or two separate BP measurements above the aforementioned levels were excluded from the study. Baseline BP was the second reading which established the patient with hypertension, or the first reading on record for patients already diagnosed with hypertension. All BP measurements were done at the clinic by clinic staff. Because the large majority of patients did not have medical records and there was therefore no way to assess previous antihypertensive medication regimens, patients previously diagnosed with hypertension were included regardless of whether they were taking antihypertensive medications upon establishing with the clinic.

Information collected included patient demographics (age, race, gender, body mass index [BMI], comorbidities), BP at initial visit, BP at most recent visit, total number of visits, dates of initial and most recent visits, and number of antihypertensive medications.

BP control was defined as documented BP measurements within the recommended range based on age and risk factors as outlined by the 8th JNC treatment guidelines (JNC8) which were the most recent guidelines at the time of study.

Data were analyzed using SPSS statistics software.

This quality improvement project did not require institutional review board approval.

Results

We reviewed the records of 599 patients at BRIDGE Clinic. Ninety-seven (16.2%) patients met criteria for hypertension, and they were between the ages of 29 and 89 years. The average age was 55.6 years. Of these patients, 64% were female and 36% were male. Seventy percent were Hispanic, 8% were white, 8% were black, 1% were Asian, and 13% did not specify or did not fall into those categories. Seventy-two percent of patients had a pre-existing diagnosis of hypertension prior to presentation to BRIDGE Clinic (Table 1).

There were statistically significant decreases in systolic BP by 10.9 mmHg ($p < 0.0001$, 95% confi-

Table 1. Characteristics of BRIDGE Patients with Hypertension

| Characteristic | N = 97 |
|--|-------------|
| Age, mean years (SD) | 55.6 (10.3) |
| Race/Ethnicity, N (%) | |
| Hispanic | 68 (70.1) |
| White | 8 (8.3) |
| Black | 8 (8.3) |
| Other | 13 (13.4) |
| Female, N (%) | 62 (63.9) |
| Smoker, N (%) | 6 (6.2) |
| Known hypertension diagnosis, N (%) | 69 (71.1) |
| Diabetes, N (%) | 35 (36.1) |
| Body mass index, mean (SD) | |
| Initial | 31.9 (6.3) |
| Final | 31.9 (6.1) |
| Time between initial and final blood pressure measurement, mean years (SD) | 2.1 (1.5) |
| Number of antihypertensive medications, mean (SD) | |
| Initial | 1.3 (0.7) |
| Final | 1.3 (0.7) |

SD: standard deviation

Table 2. Changes in Blood Pressure Over Time

| | Initial | Final | Change |
|--------------------------------|---------------------|---------------------|------------------------|
| Systolic Mean (95% CI) | 148.3 (144.6-152.0) | 137.4 (134.6-140.2) | -10.9* (-6.9 to -14.9) |
| Diastolic Mean (95% CI) | 87.6 (85.5-89.7) | 82.2 (80.8-83.6) | -5.4* (-3.3 to -7.5) |

*p<0.0001

dence interval [CI] 6.9-14.9 mmHg) and diastolic BP by 5.4 mmHg (p<0.0001, 95% CI 3.3-7.5 mmHg) from initial visit to most recent visit (Table 2).

Bivariate analysis comparing patients whose BP was controlled with patients whose BP was not controlled can be seen in Table 3. This analysis shows that there was not a significant difference between the two groups in the variables measured during this study.

Fifty-four of 97 (55.7%) patients were controlled based on JNC8 guidelines. By gender, 35 of 62 (56.5%) females and 19 of 35 (54.3%) males were controlled. By race, 35 of 68 (51.5%) Hispanic patients, 6 of 8 (75%) white patients, 5 of 8 (62.5%) black patients, and 8 of 13 (61.5%) unspecified pa-

Table 3. Bivariate Analysis of Hypertension Control (N=97)

| Characteristic | Above goal, N (%) | At goal, N (%) | p |
|--|-------------------|----------------|------|
| Race/Ethnicity | | | 0.27 |
| Hispanic | 33 (24.0) | 35 (36.1) | |
| Non-Hispanic | 10 (10.3) | 19 (19.6) | |
| Gender | | | 1.00 |
| Female | 27 (27.8) | 35 (36.1) | |
| Male | 16 (16.5) | 19 (19.6) | |
| Smoking status | | | 1.00 |
| Smoker | 3 (3.1) | 3 (3.1) | |
| Nonsmoker | 40 (41.2) | 51 (52.6) | |
| Known hypertension diagnosis | | | 0.10 |
| Yes | 33 (34.0) | 36 (37.1) | |
| No | 10 (10.3) | 18 (18.6) | |
| Diabetes | | | 0.67 |
| Yes | 17 (17.5) | 18 (18.6) | |
| No | 26 (26.8) | 36 (37.1) | |
| Age, mean years (SD) | 56.3 (10.3) | 55.0 (10.3) | 0.52 |
| Body mass index | | | |
| Initial | 31.6 (6.3) | 32.2 (6.4) | 0.67 |
| Change | 0.55 (1.8) | -0.33 (3.0) | 0.08 |
| Time between initial and final blood pressure measurement, mean years (SD) | 2.4 (1.5) | 1.9 (1.4) | 0.07 |
| Number of medications | | | |
| Initial | 1.4 (0.7) | 1.3 (0.8) | 0.46 |
| Change | 0.07 (0.4) | -0.02 (0.2) | 0.21 |
| Number of visits | 10.5 (6.1) | 8.6 (6.1) | 0.14 |

At goal or above goal status determined by blood pressure measurement at final visit. Change defined as difference in value between final and initial visits. SD: standard deviation.

tients were controlled. There was no significant difference in age between patients at and above goal. Compared to national averages, rates of BP control at BRIDGE Clinic were similar to or above that of the general US population (Table 4).

Discussion

Hypertension is a major public health concern in the US. The National Center for Health Statistics reports that 29% of Americans have hypertension, and only 53% of those with hypertension are

Table 4. BRIDGE Clinic Hypertension Control Compared to National Averages

| Demographic | BRIDGE, % controlled | National, % controlled |
|-------------------|----------------------|------------------------|
| Total | 55.7 | 53.0 |
| Gender | | |
| Male | 54.3 | 50.6 |
| Female | 56.5 | 56.3 |
| Race | | |
| Hispanic | 51.5 | 47.4 |
| White | 75.0 | 55.7 |
| Black | 62.5 | 48.5 |
| Other/Unspecified | 61.5 | — |

controlled based on JNC guidelines.⁶ This analysis of patients at BRIDGE Clinic shows that, compared to national averages, our patients have a lower prevalence of hypertension (16.2%) and a comparable rate of BP control (55.7%).

It is unclear why the BRIDGE Clinic has a lower prevalence of hypertension than the general population. This could be because the chosen criteria for hypertension, which required a prior diagnosis or two elevated BP readings, may have underestimated the prevalence among a population with minimal prior healthcare contact. Specifically, cases of undiagnosed hypertension would be misclassified as normal.

Other studies of student-run free clinics have shown BP control near or above national averages.^{3,5} Our findings are consistent with prior studies but contrary to our expectations. There are a number of possible reasons that observed control was higher than expected. First, BRIDGE Clinic is a program in which patients regularly see interdisciplinary teams including attending physicians, residents, pharmacists, and students. This increases the likelihood that these patients' hypertension will be detected early and that management will be adherent to the latest guidelines. BRIDGE Clinic also provides help in gaining access to necessary medications for controlling hypertension. This increased access to quality healthcare and medication likely increases proper management of patients' hypertension and their ability to comply with medical advice. Second, people who establish care at a free clinic despite additional barriers to accessing care

conventionally may be more self-driven or concerned about their health than the general population. More research is needed in this area to determine the reasons for observed levels of control in these populations, such as randomized trials evaluating specific interventions. This study aimed only to assess the outcomes of the BRIDGE Clinic as a whole rather than the specific separate interventions occurring within it.

This study also showed a statistically significant decrease in systolic BP by 10.9 points ($p < 0.0001$, 95% CI 6.9-14.9 mmHg) and diastolic BP by 5.4 points ($p < 0.0001$, 95% CI 3.3-7.5 mmHg). Given that reductions of 10/5 mmHg are associated with a 41% reduction in stroke and a 22% reduction in coronary heart disease, the BP reductions observed in this patient population appear clinically significant as well.⁷ There are many possible explanations for this decrease. Establishment with a provider, proper medication management, increased adherence to medications, and nutrition-based education during visits at BRIDGE Clinic may have all had an effect. There was no significant effect from the amount of time between the initial and final visit or total number of visits, and BMI did not change over the course of the study. Additional factors to consider include artificially elevated BP secondary to "white coat hypertension" and regression to the mean for initially high BP measurements.

A limitation of the retrospective nature of this study is that the information extracted was limited to data already in the medical record. In addition, the BRIDGE Clinic population included was a small sample, which limits ability to accurately examine specific subgroups. Finally, given that the initial and final BP values were two individual measurements from two distinct points in time, there is the possibility that they are not representative of the patient's usual BP.

The goal of this study was to assess how effective BRIDGE Clinic is in managing our hypertensive patients. Overall, these study results indicate that many BRIDGE Clinic patients experience clinically meaningful reductions in systolic BP, and that rates of BP control at BRIDGE Clinic are on par with national averages. On the other hand, the results also show that many BRIDGE Clinic patients are not reaching the recommended BP goals. We hope to use these results to further in-

crease the rates of BP control at BRIDGE Clinic.

These results further support student-run free clinics as a model for providing high-quality healthcare to low income populations. Prospective analysis for the future may include determining which interventions are leading to this decreased BP, as well as the reason for such a low rate of hypertension in this population.

Disclosures

The authors have no conflicts of interest to disclose.

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