

Consistency of Blood Pressure Control: a Useful Tool of Hypertension Assessment in a Vulnerable Population

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INTRODUCTION

There is strong evidence that treatment of hypertension reduces cardiovascular morbidity and mortality.¹ National Health and Nutrition Examination Survey (NHANES) and a national quality program, the Health Plan Employer Data and Information Set (HEDIS), use point prevalence of blood pressure with a cut point of less than 140/90 mmHg to assess control for the population and for clinical practices, respectively.^{2, 3}

There is compelling data showing that the proportion of visits with blood pressure control below 140/90 is a graded predictor of hypertension-related outcomes.⁴ The implication of this study is that beyond point prevalence of hypertension control, consistency of control below 140/90 may be an important patient-centered goal of care.

METHODS

We conducted an electronic medical record (EMR) review of patients in a primary care clinic at John H. Stroger, Jr. Hospital of Cook County approved by our institutional review board. Patients seen over a 2-week period of a random month of the year were selected using a random sampling method. An established primary care patient was defined as one with five or more clinic visits in the three preceding years. A diagnosis of hypertension was determined from the problem list. The last five clinic blood pressures recorded by the clinic nursing staff were abstracted for established clinic patients with hypertension.

Blood pressure control was defined as < 140/90 mmHg. For each participant, we evaluated the number of visits with blood pressure control and control at the last visit. Consistent control was defined as control on 4 or 5 of the visits. We defined inconsistent control as those with 3 or fewer of the five visits with controlled blood pressure.

The distribution of clinical predictors was compared between subjects with consistent and inconsistent control with chi-square tests. Independent predictors were identified using multivariate logistic regression. We developed multivariate

models defining the race/ethnicity as a dichotomous variable (African-American vs. other race/ethnicity) because the sample size of each non-African-American race/ethnicity was small. We used the number of visits during the 3-year timeframe as a dichotomous variable with a cut-point of 9 visits, as this bivariate association with consistency of

Table 1 Baseline Characteristics of Patients with Inconsistent and Consistent BP Control

	Inconsistent control (n = 87)	Consistent control (n = 63)	p value
Demographics			
Age			
≤ 54	31 (35.63%)	15 (23.81%)	0.3
55–64	16 (18.39%)	17 (26.98%)	
65–74	22 (25.29%)	20 (31.75%)	
≥ 75	18 (20.69%)	11 (17.46%)	
Gender			
Female	49 (56.32%)	38 (60.32%)	0.62
Male	38 (43.68%)	25 (39.68%)	
Race/ethnicity			
African-American	67 (77.01%)	36 (57.14%)	0.01
Others	20 (22.99%)	27 (42.86%)	
Current smoking			
Yes	8 (9.2%)	8 (12.7%)	0.49
No	79 (90.8%)	55 (87.3%)	
BMI (CDC categories)			
Normal	18 (20.69%)	9 (14.29%)	0.6
Overweight	26 (29.89%)	21 (33.33%)	
Obese	43 (49.43%)	33 (52.38%)	
Comorbidities			
Diabetes mellitus	52 (59.77%)	34 (53.97%)	0.48
Chronic kidney disease	27 (31.03%)	12 (19.05%)	0.1
Coronary artery disease	11 (12.64%)	12 (19.05%)	0.28
Stroke	6 (6.9%)	6 (9.52%)	0.56
Congestive heart failure	14 (16.09%)	15 (23.81%)	0.24
Dyslipidemia	67 (77.01%)	51 (80.95%)	0.56
Number of visits			
5–6	30 (35.29%)	13 (21.31%)	0.23
7–8	16 (18.82%)	10 (16.39%)	
9–10	18 (21.18%)	13 (21.31%)	
11–12	9 (10.59%)	12 (19.67%)	
≥ 13	12 (14.12%)	13 (21.31%)	
Number of visits			
< 9	48 (55.17%)	25 (39.68%)	0.06
≥ 9	39 (44.83%)	38 (60.32%)	
Number of hypertensive medications			
0–1	12 (13.79%)	15 (23.81%)	0.19
2	25 (28.74%)	14 (22.22%)	
3	26 (29.89%)	23 (36.51%)	
≥ 4	24 (27.59%)	11 (17.46%)	

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hypertension control approached statistical significance at this level. We used backward elimination with a threshold of $p < 0.05$ for eliminating variables in the model. The outcomes were adjusted for age and gender in the model. We report the risk as an odds ratio with 95% confidence intervals. The statistical analysis was conducted using SAS 9.2 (English).

RESULTS

We reviewed 258 charts; 150 (58%) met the inclusion criteria. Among the 108 excluded patients, 62 had hypertension but fewer than five clinic visits. The mean age was 63 years (range 23–90), 58% were women, and 69% were African-American

(13% Hispanic, 11% White, and 5% Asian). The most common comorbidities were dyslipidemia (79%) and diabetes (57%). Table 1 describes additional variables of the study population.

Eighty-three subjects (55%) had controlled blood pressure at the last visit. Figure 1 shows the subject's consistency of blood pressure control. Sixty-four individuals (43%) met the study definition of consistent control. Fifty individuals (33%) had control at 2 or 3 visits (sometimes controlled) and 36 individuals (24%) had control at 0 or 1 visits (never/rarely controlled). Among those with controlled hypertension at the last visit, 68% ($n = 53$) had consistent control. Among those with uncontrolled hypertension at the last visit, 10% ($n = 7$) had consistent control.

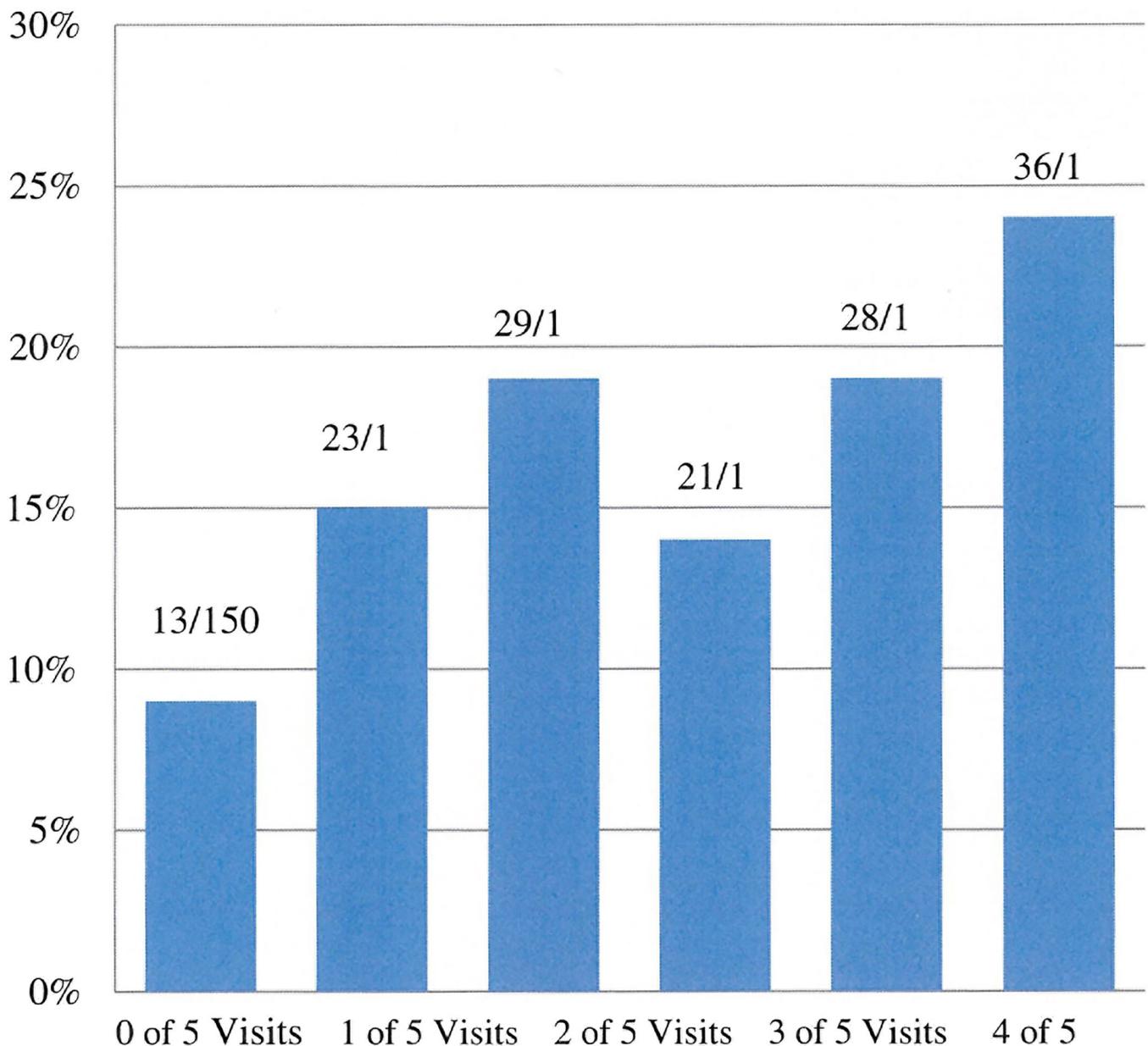


Figure 1 Proportion of patients with blood pressure controlled to $< 140/90$ at the five recorded visits.

DISCUSSION

In this retrospective chart review in a public hospital primary care clinic, the point prevalence of control on treatment (55%) is below the NHANES US population rate. We found that 43% met our definition for consistent control.

Using the frame of consistency of hypertension control may provide clinically meaningful information beyond the point prevalence of hypertension control. Given the known variability of blood pressure,⁵ it stands to reason that point prevalence would not fully predict consistent control. In our population, one-third of patients with point prevalence of control did not have consistent control. These are patients in whom we would recommend on-going careful monitoring. The frame of consistency may influence clinical decision-making, helping overcome clinical inertia.⁶ The hypotheses that integration of consistency of blood pressure control alters clinical judgment, provider-patient communication, and is of value to aggregate assessment and clinical quality improvement are each testable.

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Compliance with Ethical Standards:

We conducted an electronic medical record (EMR) review of patients in a primary care clinic at John H. Stroger, Jr. Hospital of Cook County approved by our institutional review board.

Conflict of Interest: The authors declare that they do not have a conflict of interest.

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