

Blood Pressure Control and Continuity of Care in an Urban, Academic Family Medicine Practice

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Citation

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Abstract

Continuity of Care and Blood Pressure Control in an Urban, Academic Family Medicine Practice

The purpose of this study was to determine the effect of continuity of care on blood pressure control among hypertensive patients in a multi-provider, urban, academic family medicine practice.

Eligible patients had an ICD-9 diagnosis of hypertension without concomitant ICD-9 codes for diabetes, congestive heart failure, or end-stage renal disease, and at least five total visits to the practice. The blood pressure and provider were recorded for the most recent five visits. Blood pressure was defined as being "at goal" using JNC VI criteria of <140/90. Continuity of care was defined as seeing the same provider at all five visits.

A total of 340 charts of patients with hypertension were randomly selected, of which 287 charts met the study criteria. Of these, 61.3 percent showed blood pressures at goal. The percentage of patients with continuity was 41.5 percent. No difference was seen in blood pressure control regardless of whether a patient saw only one provider or more than one provider. Multivariate analysis controlling for age and co-morbidities did not change outcomes.

Although continuity of care has been shown to improve several health outcomes, our results did not indicate a significant association between continuity of care and blood pressure control. More research is needed to examine the role of continuity of care and its relationship with blood pressure control.

INTRODUCTION

Hypertension affects 24 percent of the adult population in the United States, or nearly 50 million Americans, and is among the most common reasons for an outpatient visit in a primary care setting.¹ Although uncontrolled hypertension is a major risk factor for cardiovascular and renal disease, most patients identified with hypertension have poorly controlled blood pressure. According to the most recent National Health and Nutrition Examination Survey (NHANES), only 34% of patients with diagnosed hypertension have achieved blood pressure control (systolic blood pressure of less than 140 mm Hg and diastolic blood pressure of less than 90 mm Hg).^{1,2}

Multiple factors contribute to low rates of blood pressure control including lack of awareness about hypertension, poor patient adherence to medications and lifestyle changes, and physician failure to adhere to published treatment guidelines.^{3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18} Limited access to medical care and financial barriers to obtaining medications

are also significant obstacles to achieving blood pressure control.⁵ However, several studies have demonstrated that blood pressure control is deficient even among patients who receive regular care and affordable medications.^{10,19, 20} Few studies have analyzed actual dimensions of care that may impact desired blood pressure outcomes.^{21,22,23,24,25} For instance, unique characteristics of the doctor-patient relationship may result in improved blood pressure control. We investigated the effect of continuity of care on blood pressure outcomes.

Continuity of care is considered a core value in family medicine²⁶ and has been identified by the Institute of Medicine as a defining characteristic of primary care.²⁷ A wide variety of positive health outcomes have been shown to be associated with continuity of care.^{28,29,30,31,32,33,34,35,36} Still, several studies have failed to substantiate a relationship between continuity of care and better health outcomes.^{37,38,39} Few studies have examined the relationship between continuity of care and blood pressure control. Provider

continuity may benefit blood pressure control by fostering provider-patient trust⁴⁰, understanding and communication⁴¹, thus enabling providers to offer ongoing support, education and partnership in the management of hypertension.

The purpose of this study was to determine if continuity of care was associated with improved blood pressure control among hypertensive patients in a large, multi-provider family practice.

METHODS

The practice is an urban, University-based facility staffed with faculty and trainees of various levels. The medical staff at the time of the study included 28 attending physicians, a nurse practitioner, 27 resident physicians, and 6 fellows. The 40,000 outpatients in the practice made nearly 70,000 office visits in 2003 to the patient facility. All of the providers have their own patient panels. Patients are scheduled with their own physician as much as possible depending on availability. Patient demographics are representative of the urban practice setting, with adults (18 and older) 53 percent African American, 36 percent Caucasian, 6 percent Asian, 5 percent Hispanic, mixed race and other.

Patients eligible for this study were greater than 18 years of age, had at least one visit to the office between January 1, 2001 and January 1, 2004, and had an ICD-9 diagnosis of hypertension documented during any visit (ICD-9: 401.x, 402.x codes, excluding pregnancy related HTN) without concomitant ICD-9 codes for diabetes, congestive heart failure, or end-stage renal disease. We excluded patients with diabetes, congestive heart failure, and end-stage renal disease in order to simplify our definition of goal blood pressure to the same number. Charts were excluded if the patient had made fewer than five visits to the practice. This study was approved by the Institutional Review Board.

Data were manually abstracted from paper charts. In addition to demographic information, extracted data included the visit date, blood pressure reading, and provider seen in each of the last five office visits (regardless of reason for visit). If two blood pressures were recorded, the manually obtained pressure was used over the digitally obtained one. The manual pressure was discernible since it was written above the digital reading, and because it was recorded in handwriting that matched the provider's note.

Blood pressure goals were defined as <140/90 mm Hg as per JNC VI guidelines (patient visits were mostly before the publication of JNC VII guidelines). Whether a blood

pressure reading was at goal or not at goal was determined using three different calculations: 1. the average of all five blood pressures; 2. the most recent blood pressure value; 3. whether the majority (at least three out of five) of blood pressures were at goal.

We defined continuity of care as a patient seeing the same provider for all five office visits. Lack of continuity was defined as a patient seeing more than one provider.

Data were analyzed using the statistical analysis program (SASTM) version 8.1 for Windows. P-values were determined by the Fisher exact test. Odds ratios were calculated by the Cochran-Mantel-Haenszel test.

RESULTS

A total of 340 patient charts, which met the initial inclusion criteria were randomly selected in the spring of 2004. Of these, 53 were excluded because they contained less than five visits. Therefore, 287 patient charts were reviewed.

The percentage of hypertensive patients with their blood pressure controlled, or "at goal," was 59.9 percent (n=172), 63.4 percent (n=182), and 60.6 percent (n=174), using the three determinations (Table 1). The percentage of patients meeting the definition of continuity of care was 41.5 percent (Table 2). Seventy-three percent of patients saw one or two providers over five visits.

Figure 1

Table 1: Percentage of hypertensive patients with blood pressure "at goal" (

Blood pressure at goal (average of readings over 5 visits <140/90)	172/287 (59.9%)
Blood pressure at goal (3 or more visits with readings <140/90)	182/287 (63.4%)
Blood pressure at goal (most recent visit reading <140/90)	174/287 (60.6%)
Average percentage of blood pressures at goal (average of above rates)	176/287 (61.3%)

Figure 2

Table 2: Number of providers seen by patients over 5 office visits

Number of providers seen	Number of patients
1	119/287 (41.5%)
2	91/287 (31.7%)
3	45/287 (15.7%)
4	22/287 (7.7%)
5	10/287 (3.5%)

Patients with blood pressure at goal were similar to patients with blood pressure not at goal in terms of demographics and comorbidities (Table 3).

Figure 3

Table 3: Comparing patients with blood pressure at goal versus patients with blood pressure not at goal.

	Blood pressure at goal	Blood pressure not at goal	P-value
Mean age	56.8	55.2	0.3861
Race	29% Caucasian	27% Caucasian	0.6018
Gender	36% male	34% male	0.6563
Time from first to fifth visit	1.3 years	1.3 years	0.6767
Number of medications	1.7	1.7	0.8552
Number of co-morbidities	1.2	1.4	0.2102
Family history of hypertension	44%	46%	0.8086
Elevated lipids	39%	43%	0.5389
CAD/MI/CVA	14%	17%	0.6166
Tobacco	18%	17%	0.7550
Drug use	3%	1%	0.4086
Thyroid disease	5%	14%	0.0076

Patients with continuity were generally older (average age 60.8 yrs versus 52.8 yrs), had less time between office visits, were more likely to have the diagnosis of hyperlipidemia, and had a higher percentage of CAD (coronary artery disease), MI (myocardial infarction), or CVA (cerebrovascular accident) than patients without continuity of care. However patients with continuity did not differ from patients without continuity in regards to race, gender, number of medications, total number of co-morbidities, family history of hypertension, tobacco use, drug use, and thyroid disease (Table 4).

Figure 4

Table 4: Comparing patients with continuity of care versus patients without.

	Continuity	No continuity	P-value
Mean age	60.8	52.8	<0.0001
Race	59% African Amer.	69% African Amer.	0.1120
Gender	40% male	45% male	0.4536
Time from first to fifth visit	1.1 years	1.3 years	0.0671
Number of medications	1.8	1.7	0.4370
Number of co-morbidities	1.4	1.2	0.0757
Family history of hypertension	43.7%	45.8%	0.8097
Elevated lipids	51.3%	33.3%	0.0033
CAD/MI/CVA	20.2%	11.9%	0.0674
Tobacco	16.8%	18.5%	0.7561
Drug Use	0.8%	3.0%	0.4061
Thyroid disease	8.4%	8.33%	1.0

Blood pressure control was not different between patients who had continuity and those who did not (Table 5). Blood pressure control also did not differ significantly between patients who saw one or two providers and those who saw three or more providers. The numbers of patients who saw 3, 4, or 5 providers were each too small to meaningfully compare blood pressure control.

Figure 5

Table 5: Comparing blood pressure control in patients with and without continuity of care.

	Number (%)	Average BP over 5 visits at goal	3 or more visits with BP at goal	Last visit BP at goal
With continuity (one provider over five visits)	119 (41.5%)	69 (58.0%)	68 (57.1%)	77 (64.7%)
No continuity (two or more providers)	168 (58.5%)	103 (61.3%)	114 (67.9%)	97 (57.7%)
P-value		0.6252	0.0814	0.2701

Odds ratios correlating blood pressure control with presence of continuity were not statistically significant (Table 6).

Figure 6

Table 6: Odds ratios for presence of continuity of care and achieving blood pressure control.

	Odds ratio	95% CI
Average BP at goal over 5 visits	0.8709	0.5397-1.4052
BP at goal in 3 or more visits	0.6316	0.3883-1.0273
Last BP at goal	1.3419	0.8264-2.1791

DISCUSSION

This study did not find an association between continuity of care and improved blood pressure control. However, a variety of positive health outcomes have been shown to be associated with continuity of care, including increased likelihood of cancer screening²⁸, better communication between patients with chronic disease and their physicians²⁹, increased patient adherence with follow-up appointments³⁰, improved glycemic control in diabetic patients³¹, enhanced recognition of diabetes³², decreased emergency room and hospital utilization³³, and lower health care costs³⁴. Continuity of care may also have a positive effect on both physician and patient satisfaction with care^{35,36}. On the other hand, other studies have failed to substantiate a relationship between continuity of care and positive health outcomes such as completion of recommended monitoring tests for diabetes³⁷, recognition of hypertension and hyperlipidemia³², early detection and stage of diagnosis for persons diagnosed with breast and colorectal cancer³⁸, cancer screening in women, patient satisfaction ratings, and ambulatory costs³⁹. Such inconsistent evidence may raise doubt as to whether continuity of care uniformly improves quality of care and health outcomes.

A clear relationship between continuity of care and improved blood pressure control remains to be defined. Multiple factors have been identified as contributing to poor blood pressure control^{3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18}. The

provider-patient relationship is central to the process of mediating these factors to achieve better blood pressure outcomes^{1,7,8,11,12,22}. Data from NHANES suggest that rates of blood pressure control are higher among people who see the same provider or visit the same facility for their health care⁵. More recently, continuity of care was found to be associated with enhanced recognition of hypertension and greater likelihood of receiving medication for hypertension in older African American and white patients²⁵. Another study identified lack of physician continuity as a barrier to adequate follow-up for hypertension treatment⁶. Still, other studies have not supported the association of continuity of care and improved blood pressure outcomes^{10,19,20, 32}.

Our study may be limited by the single site and small sample size. In addition, a relatively small percentage of patients in the practice had continuity of care. We found that the rate of continuity in our large, multi-provider practice was 41.5 percent, which is low compared to rates reported in other studies ranging from 42-75 percent³⁹. This low percentage of continuity may have affected our ability to measure its effect. However, our low rate of continuity may largely be a result of the definition we used rather than the actual degree of continuity present. There are multiple methods described in the literature for defining or measuring continuity and a lack of consensus regarding which approach is best^{42,43}. We defined continuity as seeing the same provider for all five office visits and lack of continuity as seeing more than one provider. Continuity of care in prior studies has been defined by a wide range of parameters including consistent location for medical care as well as reliable access to patient information^{42,43}.

Other common measures of continuity, which focus on provider-continuity, include the Continuity of Care Index (COC) or the Usual Provider Continuity Index (UPC)⁴². These measures quantify continuity as a proportion and are more useful when there is a large number of office-visits or when visits to various sites (primary care and specialist) are included. Had we expanded our definition of continuity to include patients seeing one or two providers over the five visits, the rate of continuity would be 73.2%. Still, blood pressure values were not significantly different whether patients saw one or two providers versus three or more providers.

Studies of the effect of continuity including ours have not assessed the quality of the doctor-patient relationship. Measurements of continuity focus on visit patterns that do

not necessarily represent the interpersonal dimension of continuity⁴². Future studies about continuity may use a qualitative approach and offer more insight into how the doctor-patient relationship develops and influences health outcomes.

In contrast to national statistics, a majority of our patients had their blood pressure at goal. According to some authors, continuity of care is unlikely to have a measurable impact on patients who already are in good health or on populations receiving high quality of care⁴⁴. Since a majority of patients had their blood pressure under control, it may be difficult to accurately measure and generalize about the impact of continuity on hypertensive patients in our practice.

Our study found a higher rate of continuity of care in patients who are older, have a history of other co-morbid medical conditions such as hyperlipidemia, CAD, MI or CVA, and who visit a physician more frequently. In their work, Nutting et al, demonstrated that continuity of care was more important to patients who are female, at either extreme of age, less educated, have Medicare or Medicaid insurance, have more health problems, require more medications, and report lower health status⁴⁵. Other studies similarly suggest that continuity of care has a greater effect on health outcomes in vulnerable populations³⁰, including uninsured minority women²⁸, patients at the extremes of age, and patients with chronic medical problems²⁹. Therefore, the impact of continuity of care may vary depending on the characteristics of the individual patient, which may at least partially explain why there are inconsistencies regarding its measured effect.

Evaluating the impact of continuity of care on health outcomes like blood pressure control may be particularly prudent in the wake of a changing American healthcare system^{46,47}. There has been a renewed interest in continuity of care in part because many believe the current healthcare system undermines continuity in the relationship between physicians and their patients. Many physicians see continuity as an integral part of what they do, and feel that the quality of patient care will suffer without the development of a sustained partnership^{48,49}. Finally, the prevalence and consequences of common, under-treated conditions like hypertension compel us to examine ways to improve the process and quality of care.

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Table 7: Summary Table

What is known about the relationship between blood pressure control and continuity of care?

- Blood pressure control among hypertensive patients is inadequate.
- Continuity of care has been associated with a wide variety of positive health outcomes.
- Few studies have examined the impact of continuity of care on blood pressure control.

What does this study add?

- This study investigates a unique process variable in the provision of care for hypertensive patients.
- This study raises questions about how the doctor-patient relationship influences blood pressure outcomes.

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