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## Measuring Adherence to Evidence-Based Practice Guidelines for the Management of Hypertension in Women

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Cristina M. Jorgensen, Student

Dr. Sharon Lock, Advisor

MEASURING ADHERENCE TO EVIDENCE-BASED PRACTICE GUIDELINES FOR THE  
MANAGEMENT OF HYPERTENSION IN WOMEN

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Capstone Report

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A Capstone Report submitted in partial fulfillment  
of the requirements for the Doctorate Degree of Nursing Practice in the  
College of Nursing at the University of Kentucky

by

Cristina M. Jorgensen, BSN, RN

Sharon Lock, PhD, APRN— Committee Chair

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## Dedication

This final Capstone Report is dedicated to my husband, who has given me his unconditional love, support, and encouragement throughout my doctoral studies. Thank you for pushing me beyond my comfort zone and pushing me to be the best I can be. You truly are an inspiration in all you do.

## Acknowledgement

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## Final Capstone Report Overview

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## Introduction

Approximately 1 in 3 adults In the United States (U. S.) with approximately half being women have hypertension, a significant risk factor for cardiovascular disease (CVD) and stroke (Nwankwo, Yoon, Burt, & Gu, 2013). Nearly 70% of people who had a first heart attack, 80% of those who had a first stroke, and 75% of those who had congestive heart failure (CHF) have hypertension (Mozaffarian et al., 2013). Hypertension was the underlying or contributing cause of more than 375,000 deaths in 2011. Despite multiple publications of national hypertension guidelines, only 50% of adults with hypertension have their blood pressure under control (Nwankwo et al., 2013). One possible explanation for such a high rate of uncontrolled blood pressure is providers may not be adhering to hypertension guidelines.

This capstone report is comprised of three manuscripts that focus on providers and their adherence to hypertension guidelines for women. The first manuscript presents a literature review pertaining to providers and their adherence to hypertension guidelines while discussing factors that affect their adherence such as patient age, gender, and comorbidities. The second manuscript presents an analysis of the *2014 Evidence-Based Practice Guideline for the Management of High Blood Pressure in Adults: Report from the Panel Members Appointed to the Eighth Joint National Committee (JNC 8)*, using an adapted version of the Appraisal of Guidelines for Research and Evaluation (AGREE) Instrument (2001). The content used to compile the first two manuscripts led to a descriptive study, which examined providers and their adherence to the 2014 JNC 8 evidence-based practice

guideline primarily in women at a primary care university clinic. The third and final manuscript consists of the details of this study, and presents some practical implications for improving provider adherence to these evidence-based guidelines.

Evaluating Provider Adherence to Evidence-Based Guidelines in the Management of

Hypertension:

A Review of the Literature

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## Abstract

**Purpose:** The aim of this literature review is to evaluate provider adherence to evidence-based practice guidelines in the management of hypertension in women.

**Methods:** A literature search was conducted using CINAHL, EBSCOhost, and PubMed with no regard to the date range. An Internet search using Google and Google Scholar was also performed using the same terms. The reference lists of chosen articles were also reviewed for additional applicable citations.

**Findings:** The literature revealed that providers are not adhering to evidence-based practice guidelines, which may be one possible explanation for poor blood pressure control. There are still a number of providers that remain unaware or unfamiliar with the JNC guidelines.

**Conclusion:** A provider's knowledge of the guidelines doesn't necessarily lead to better guideline implementation, nor does adhering to evidence-based guidelines necessarily guarantee blood pressure control (Milchak et al., 2008).

# Evaluating Provider Adherence to Evidence-Based Guidelines in the Management of Hypertension in Women:

## A Review of the Literature

### **Introduction**

An estimated 80 million adults aged 20 years and older have hypertension, with approximately half being women (Nwankwo, Yoon, Burt, & Gu, 2013). Despite multiple publications of national hypertension guidelines since 1977 by the National Heart, Lung, and Blood Institute (NHLBI) and Joint National Committee (Kotchen, 2011), only 50% of adults with hypertension have their blood pressure under control (Nwankwo et al., 2013). Hypertension is defined by the recently published *2014 Evidence-Based Guideline for the Management of High Blood Pressure In Adults: Report From the Panel Members Appointed to the Eighth Joint National Committee (JNC 8)* as a systolic blood pressure (SBP) of 140 mm Hg and above and a diastolic blood pressure (DBP) of 90 mm Hg and above (James et al., 2014). One possible explanation for such a high rate of uncontrolled blood pressure is providers may not be adhering to hypertension guidelines.

### **Objective**

The aim of this literature review is to evaluate provider adherence to evidence-based practice guidelines in the management of hypertension in women.

### **Methods**

A literature search was conducted using CINAHL, EBSCOhost, and PubMed with no regard to the date range. The terms “provider,” “adherence,” “guideline,” “hypertension,” “blood pressure,” “barriers,” “women” were used in combination

during the search. An Internet search using Google and Google Scholar was also performed using the same terms. The reference lists of chosen articles were also reviewed for additional applicable citations.

Articles were included if they mentioned guideline adherence in the management of hypertension, discussed gender-related differences in hypertension management, pertained to barriers in guideline adherence in general, and evaluated interventions to improve general guideline adherence. Exclusion criteria included articles discussing guideline adherence to conditions other than hypertension.

## **Literature Review**

### **Evaluating Adherence to Guidelines**

Providers are not adhering to evidence-based practice guidelines, which may be one possible explanation for poor blood pressure control (Abdulameer et al., 2012; Ardery et al., 2007; Cabana et al., 1999; Hyman & Pavlik, 2000; Mehta, Wilcox, & Schulman, 1999; Milchak et al., 2008; Thier et al., 2008). Several studies have examined provider adherence and have come up with relatively similar conclusions (Abdulameer et al. 2012; Ardery et al., 2007; Cabana et al., 1999; Hyman & Pavlik, 2000; Mehta et al., 1999; Milchak et al., 2008; Thier et al., 2008). In a study by Ardery et al. (2007), guideline adherence among providers was nearly 54%, and there was no significant improvement over time. Despite the fact that the JNC has been publishing evidence-based guidelines since 1976, there are still a number of providers that remain unaware or unfamiliar with the JNC guidelines. A significant number of providers are also using much higher blood pressure thresholds than the recommended 140/90 mm Hg to diagnose and treat hypertension (Hyman & Pavlik,

2000; Milchak et al., 2008). In one study, some providers didn't initiate therapy for their patients unless the SBP was greater than 160 mm Hg or the DBP was more than 95 mm Hg (Hyman & Pavlik, 2000). In addition, a significant number of providers have continued to disregard the guidelines when treating those with other comorbidities (Mehta et al., 1999), who are aged 65 years and older (Hyman & Pavlik, 2000; Milchak et al., 2008), or of a specific gender (Daugherty et al., 2011; Gu et al., 2008; Ong, Tso, Lam, & Cheung, 2008).

### **Treating the elderly and guideline adherence.**

When it comes to treating adults aged  $\geq 65$  years, providers tend to be more conservative in treatment plans and less likely to adhere to evidence-based practice guidelines (Hyman & Pavlik, 2000; Milchak et al., 2008). One study showed that during hypertension-related patient visits, uncontrolled blood pressures were often documented and antihypertensive drug therapy either increased in dosage or changed more frequently in adults under 65 years of age when compared to adults aged  $\geq 65$  years (43% vs 59%) (Milchak et al., 2008). In the study by Hyman and Pavlik (2000), 67% of providers would not intensify drug therapy in patients aged  $\geq 70$  years for a consistent elevated SBP of 159 mm Hg and under and 48% would not intensify drug therapy for a DBP of 94 mm Hg and under. Those aged  $\geq 65$  years had more comorbid conditions, such as diabetes and chronic kidney disease (CKD), which may have been a factor not only in their blood pressure control, but also in the providers' tendency to be less aggressive in their treatment of hypertension in that age group (Milchak et al., 2008). Nevertheless, when it comes to treating the

older adult, providers often disregard the evidence-based guidelines and are more conservative in treating them.

### **Comorbidities and guideline adherence.**

When it comes to patients with uncontrolled blood pressures and additional comorbidities, providers have not been following the recommended guidelines, despite the fact that the JNC guidelines have specific recommendations for treating those patients with diabetes, CKD, and other cardiovascular diseases (Abdulameer et al., 2012; Mehta et al., 1999; Thier et al., 2008). However, the lack of blood pressure control in patients with comorbidities may also be due to patient factors such as nonadherence to medications along with physiological differences due to the chronic conditions (Thier et al., 2008). In a study by Ardery et al. (2007), the most frequently seen factors for nonadherence to the guidelines were the presence of comorbidities and patient noncompliance. Another study found that providers were more aggressive in the treatment plans of hypertensive patients with diabetes, yet providers remained nonadherent to the practice guidelines. The barriers and reasons why providers are not following the guidelines must be identified especially when treating those with chronic conditions, as their hypertension contributes to the state of their comorbidities.

### **Barriers to Guideline Adherence**

Provider adherence is crucial in translating recommendations into improved quality of care and outcomes. However, a number of barriers make this process a challenge and may be a factor in whether a provider follows practice guidelines. Studies have identified many barriers and include lack of awareness/familiarity,



disagreement with the recommendations, lack of self-efficacy, lack of outcome expectancy, inertia of previous practice or lack of motivation, and external barriers (Cabana, Rand, Powe, Wu, Wilson, Abboud, & Rubin, 1999; Lugtenberg, Burgers, Besters, Han, & Westert, 2011). External barriers can be categorized into three types: guideline-related barriers, patient-related barriers, and environmental barriers. Guideline-related barriers are described as not being easy to use or not convenient (Cabana et al., 1999). Patient-related barriers include the inability to resolve patient preferences or the patient's inability to follow or comply with the recommendation (Cabana et al., 1999; Lugtenberg et al., 2011). And lastly, environmental factors include lack of time, lack of resources, organizational constraints, or lack of reimbursement (Cabana et al., 1999; Lugtenberg et al., 2011).

What may be a barrier in one setting may not be present in another. However, some of the most common barriers among providers include patient factors such as the inability to reconcile with patients over a treatment plan followed by provider perception that hypertension wasn't a clinical priority during that visit (Cabana et al., 1999; Lin et al., 2006; Lugtenburg et al., 2011). Lugtenberg et al.'s (2011) cross-sectional survey revealed that nearly 90% of 264 providers believed that following practice guidelines leads to improved quality of care and patient outcomes, yet not all of them do.

### **Interventions to Promote Guideline Adherence**

There are a number of studies that have evaluated provider incentives to follow evidence-based practice guidelines and increase blood pressure control in their patients (Bonds et al., 2008; Petersen et al., 2013; Roumie et al., 2006). In a

study by Petersen et al. 2013, financial incentives were used to reward providers who gave guideline-recommended care. Although financial incentives significantly increased the use of guideline-recommended antihypertensive medications and controlled blood pressure among the patients, the effect of this incentive did not last long after completion of the study. Roumie et al. (2006) performed a randomized control trial (RCT) to evaluate both provider and patient education to improve guideline adherence and blood pressure control. Of the 975 patients who were in the group that received patient education, provider education, and provider alerts, nearly 60% reached their SBP goal, when compared with just over 40% of patients in the group that only received provider education. This study concluded that patient education improved blood pressure control among hypertensive patients more so than providers adhering to guidelines without educating patients. A similar study testing a provider continuing education intervention also did not improve guideline adherence nor did patient blood pressure control improve over time (Bonds et al., 2009). Further studies are needed to identify the barriers providers face even when given incentives to change behavior.

### **Gender Differences in Hypertension Management**

Whether blood pressure is better controlled in women compared to men remains a question. Ong, Tso, Lam, and Cheung (2008) found that blood pressure control in women with hypertension compared with men wasn't significantly different, whereas Daugherty et al.'s (2011) study revealed overall that women had better hypertension control over the course of 1-year than men. Though, age may be a major factor in blood pressure control as Daugherty et al. discovered that

women specifically 65 years and older had worse hypertension control than men in that age group. Daugherty et al. also found that in patients aged 65 years and older with hypertension, women were more likely to have their hypertension go unrecognized and less likely to have medications initiated than men (Daugherty et al., 2011). This suggests that providers' processes of care are contributing to the rates of uncontrolled hypertension in women compared to older men, and providers are clearly not adhering to the evidence-based guidelines.

Several studies, however, have found that women with uncontrolled blood pressure had a higher incidence of concomitant cardiovascular risk factors such as elevated total cholesterol (Ong et al., 2008), low high-density lipoprotein cholesterol [HDL] (Ong et al., 2008), hyperglycemia (Ong et al., 2008), CKD (Daugherty et al., 2011; Gu, Burt, Paulose-Ram, & Dillon, 2008), central obesity (Gu et al., 2008; Ong et al., 2008), and smoking (Ong et al., 2008). Despite this higher incidence in women, practice guidelines, such as the *2014 Evidence-Based Guideline for the Management of High Blood Pressure in Adults: Report from the Panel Members Appointed to the Eighth Joint National Committee (JNC 8)*, have recommendations with preferred drug classes for those with coexisting medical conditions such as diabetes and CKD (Gu et al., 2008). This again suggests that not only patient factors, but also provider actions, may be playing a large role in the rates of uncontrolled hypertension.

## **Discussion**

There are limitations to this review as many of the studies used in this literature review were dated and refer to older versions of the JNC hypertension guidelines, as the most recent JNC 8 was just recently published in 2014. Some of

the studies also didn't address provider adherence to the guidelines specifically, but analyzed only gender differences in blood pressure control. However, those studies did reveal the disparities in gender when it came to diagnosing and treating hypertension. Further research is needed to determine whether a patient's gender plays a role in whether providers are adhering to the guidelines. There also needs to be studies that focus on adherence to the recent JNC 8 guidelines. In addition, studies evaluating other types of providers are needed, as all the literature in this review looked at physicians only.

### **Conclusion**

A provider's knowledge of the guidelines doesn't necessarily lead to better guideline implementation (Karback, Suchubert, Hagemeister, & Ernstmann, 2011). Mehta, Wilcox, & Schulman's (1999) descriptive survey study revealed that younger physicians were more likely to comply with the guidelines. Nevertheless, adhering to evidence-based guidelines doesn't necessarily guarantee blood pressure control (Milchak et al., 2008). Although providers' responses on surveys or questionnaires about management of hypertension may be consistent with the JNC guidelines, there is no assurance that the patient will receive the recommended therapy (Mehta et al., 1999).

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Table 1.  
*Summary of the Studies Reviewed*

Reference	Design	Sample	Purpose	Findings	Implications
Abdulameer et al. (2012)	Cross-sectional chart review	313 patients with hypertension	To determine adherence of providers to guidelines, prescribing trends, and impact of drug expenditure on drug utilization	<ul style="list-style-type: none"> <li>• 85.3% of providers adhered to guidelines regarding antihypertensive therapy</li> <li>• 20.8% of patients received monotherapy while 79.2% were using polytherapy</li> <li>• Diuretics were lowest price drug class while angiotensin-receptor blockers were highest priced</li> </ul>	The use of diuretics should be encouraged due to being very affordable and being a well-tolerated medication. ACEI should also be used for their cardio- and renoprotective properties.
Ardery et al. (2007)	Retrospective chart review	345 patients with uncontrolled hypertension	To evaluate physician adherence to the JNC 7 guidelines in 6 community based clinics using a set of explicit criteria and evaluate adherence in subgroups with specific comorbidities	<ul style="list-style-type: none"> <li>• Guideline adherence was 53.5% and did not improve over time</li> <li>• Nonadherence was counted as justifiable in 6.6% of the cases</li> </ul>	Adherence to the JNC 7 was modest even barriers that may have affected adherence were taken into consideration.

Bonds et al. (2008)	Randomized control trial	61 primary care practices	To test a multifactorial intervention aimed to improve providers' adherence to hypertension guidelines	<ul style="list-style-type: none"> <li>• No difference was found between the intervention and control group in patients at blood pressure goal (49.2% and 50.6%), those with undiagnosed hypertension (18% vs. 29.5%), average SBP (126 vs 125.1 mm Hg), or DBP (73.1 vs. 73.4 mm Hg).</li> <li>• Continuing education intervention had no difference in provider adherence to recommendations</li> </ul>	The continuing medical education session and multifactorial approach did not improve guideline adherence in a community of primary care providers.
Cabana et al. (1999)	Systematic review	76 published studies describing at least one barrier	To review the barriers that affect provider adherence to practice guidelines	<ul style="list-style-type: none"> <li>• 76 articles identified over 293 barriers some of which include awareness/familiarity, lack of agreement, lack of self-efficacy, lack of outcome expectancy, and external barriers</li> </ul>	This review provides a list of differential diagnoses as to why providers may not follow practice guidelines. However, what may be a barrier in one setting may not be in another.

Daugherty et al., (2011)	Descriptive correlational study	152,561 patients within three integrated healthcare systems	To compare the rates of how well hypertension was being controlled between women and men in relation to age	<ul style="list-style-type: none"> <li>• Overall, men had worse hypertension control over the course of 1-year than women (41.2% vs. 45.7%, <math>p &lt; 0.001</math>).</li> <li>• Women <math>\geq 65</math> years old had worse hypertension control than men</li> </ul>	A combination of provider actions and patient factors may influence the age dependent gender differences
Gu, Burt, Paulose-Ram, & Dillon (2008)	Cross-sectional, nationally representative survey	2593 men and 2817 women participants in the NHANES 1999 - 2004	To estimate among US adults with hypertension the prevalence of antihypertensive medication use, to compare utilization trends between men and women, and to examine the impact of antihypertensive medications on blood pressure control rates	<ul style="list-style-type: none"> <li>• Women were less likely to have controlled blood pressure but more likely to be treated for hypertension than men</li> </ul>	Significant gender disparities exist in the treatment of hypertension and in blood pressure control in the US

Hyman & Pavlik (2000)	Descriptive questionnaire	379 general and family practice physicians from the American Medical Association's master file	To determine the number of physicians who report treatment practices consistent with the JNC recommendations and to analyze the relationship between familiarity with the guidelines, evidence-based methods in medicine, and reported treatment practices	<ul style="list-style-type: none"> <li>• 33% of physicians would not start antihypertensive medications in patients unless the diastolic blood pressure was higher than 95 mm Hg, while 65% wouldn't start treatment unless the systolic blood pressure was above 160 mm Hg</li> <li>• 25% of physicians would not intensify medication dosages for diastolic blood pressures of 94 mm Hg, and 33% would not with systolic blood pressures of 158 mm Hg</li> </ul>	Further improvements in patient hypertension control will require provider behavior change
Lin et al. (2006)	Randomized control trial	46 clinicians	To analyze feedback from clinicians and identify reasons why medications aren't intensified when it is recommended	<ul style="list-style-type: none"> <li>• Recommendations were not followed due to barriers such as the patient barriers or hypertension not being a clinical priority for the visit.</li> </ul>	Provider feedback at point-of-care provides insight into various factors and challenges faced at the time of medical decision.

Lugtenberg, Burgers, Besters, Han, & Westert (2011)	Cross-sectional electronic survey	264 general practitioners in the Netherlands	To assess perceived barriers to following guidelines by focusing on key recommendations within guidelines	<ul style="list-style-type: none"> <li>The most common perceived barriers were external barriers, in particular patient behavior and ability (mean: 30%), and patient preferences (mean: 23%).</li> </ul>	Perceived barriers differed between different recommendations
Milchak et al. (2008)	Retrospective chart review	179 patients, aged 21 – 85 years	To compare provider adherence to the JNC 8 guidelines for patients younger than 65 years of age with those aged 65 years and older	<ul style="list-style-type: none"> <li>Providers were significantly more adherent to guidelines for those under 65 years of age than for those 65 years and older (59,3% vs. 56.1%)</li> </ul>	No significant relationship was found between overall adherence and blood pressure control.
Mounier-Vehier et al. (2012)	Cross-sectional, multicentre study	3440 adult patients with hypertension and referred to 654 cardiologists	To examine the management of hypertensive patients according to gender in a cardiologist office in France	<ul style="list-style-type: none"> <li>76% of men and 69% of women had uncontrolled hypertension and had multiple cardiovascular disease risk factors</li> <li>No major differences in regards to gender were observed regarding medication management</li> <li>Medication changes in over 50% of patients, with no significant difference based on gender</li> </ul>	Antihypertensive medications were prescribed with no regard to gender. It is imperative that healthcare providers be encouraged to familiarize themselves with clinical practice guidelines for improving the management of hypertension in men and women separately

Ong, Tso, Lam, & Cheung (2008)	Cross-sectional, nationally representative survey	3475 participants in the NHANES 1999 – 2004 ≥ 18 years old with diagnosed hypertension	To analyze trends in gender in the control of hypertension and the prevalence of other cardiovascular risk factors	<ul style="list-style-type: none"> <li>• The age-adjusted prevalence of uncontrolled hypertension between men and women were not significantly different nor did it change significantly over time.</li> <li>• Women had higher rates of concomitant cardiovascular risk factors</li> </ul>	It is important to take cardiovascular risk factors into consideration when treating hypertension in women
Petersen et al. (2013)	Randomized control trial	83 VA primary care physicians and 42 nonphysician members	To test the effect of a financial incentive to reward guideline adherence in hypertension care	<ul style="list-style-type: none"> <li>• Individual incentives, but not practice-level incentives, resulted in greater blood pressure control and guideline adherence in medications prescribed</li> <li>• The effects of the financial incentive did not last after the use of this intervention</li> </ul>	The financial incentive did not result in greater use of the recommended guidelines on antihypertensive medications.
Skelding et al. (2006)	Cross-sectional analysis	5789 patients treated with a single antihypertensive medication	To examine the correlates of guideline adherence in a population with healthcare access	<ul style="list-style-type: none"> <li>• Women were more likely than men to receive guideline adherent therapy</li> <li>• Medicare coverage had a positive association with guideline adherence</li> <li>• Patient age wasn't a significant correlate</li> </ul>	Understanding the correlates of guideline adherence may lead to strategies to improve guideline adherence among providers and improve quality of care and patient outcomes

Thier et al. (2008)	Retrospective analyses of claims data	4 million members of a large national health plan in the US	To determine the prevalence provider adherence to guidelines and patient adherence to medications for a variety of chronic diseases	<ul style="list-style-type: none"> <li>• 59% of providers adhered to evidence-based guidelines</li> <li>• 26.2% patients adhered to medications prescribed</li> </ul>	Adherence is poor for providers to guidelines and patients to medications in chronic disease
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The Eighth Report of the Joint National Committee on the Management of High

Blood Pressure in Adults:

An Analysis of the Clinical Practice Guideline

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## Abstract

**Purpose:** to analyze *The 2014 Evidence-Based Guideline for the Management of High Blood Pressure in Adults: A Report from the Panel Members Appointed to the Eighth Joint National Committee (JNC 8)*

**Methods:** using the Appraisal of Guidelines for Research and Evaluations (AGREE) Instrument.

**Conclusion:** The much-anticipated update in hypertension guidelines is based on the latest randomized control trials (RCTs) and expert opinion. The guideline is concise and offers different drug treatment strategies to aid in achieving blood pressure goals based on evidence from RCTs. In addition, the JNC 8 includes an algorithm to help facilitate implementation of these guidelines in a busy clinical setting. Overall, the JNC 8 guideline is simply that, recommendations that providers may choose to follow.

The Eighth Report of the Joint National Committee on the Management of High  
Blood Pressure in Adults: An Analysis of the Clinical Practice Guideline

**Introduction**

Approximately 1 in 3 adults In the United States (U. S.) have hypertension, a significant risk factor for cardiovascular disease (CVD) and stroke (Nwankwo, Yoon, Burt, & Gu, 2013). Nearly 70% of people who had a first heart attack, 80% of those who had a first stroke, and 75% of those who had congestive heart failure (CHF) have hypertension (Mozaffarian et al., 2013). Of those with hypertension, 82.7% are aware of their condition, 75.6% are taking an antihypertensive medication, and 51.8% have their blood pressure controlled to less than 140/90 mmHg (Nwankwo et al., 2013). In 2011, more than 375,000 deaths included hypertension as the underlying or contributing cause (Mozaffarian et al, 2013), which equates to nearly 1,000 deaths per day.

The prevalence of hypertension increases with age, with 7.3% among those aged 18 to 39, 32.4% in those 40 to 59, to 65% in those 60 years of age and older (Nwankwo et al., 2013). Hypertension rates also vary by race, as it is considerably higher in non-Hispanic blacks (42.1%) than in non-Hispanic whites (28%) and Hispanics (26%), but similar among men and women (Nwankwo et al., 2013). Location also plays a role in hypertension, with Kentucky rating fourth in the nation for hypertension behind West Virginia, Mississippi, and Alabama (Mendes, 2011). In 2009, approximately 30% of Kentuckians had high blood pressure, which was a major contributor of the nearly 26% of total deaths due to cardiovascular – related diseases (University of Kentucky Prevention Branch Research Center, Chronic

disease Prevention and Control Branch, Division of Adult and Child Health Improvement, & Kentucky Department of Public Health, 2009).

*The 2014 Evidence-Based Guideline for the Management of High Blood Pressure in Adults: A Report from the Panel Members Appointed to the Eighth Joint National Committee (JNC 8)* was released with the overall purpose of integrating the most recent available scientific evidence and offering nine key recommendations to help guide busy primary care clinicians. Although not a comprehensive guideline, application of these recommendations should fulfill the clinical needs of most hypertensive patients. The purpose of this paper is to analyze the JNC 8 guideline using the Appraisal of Guidelines for Research and Evaluations (AGREE) Instrument (The AGREE Collaborative, 2003).

### **Stakeholder Involvement**

The panel members appointed to the JNC 8 are the major stakeholders of this clinical guideline. “Panel members were selected based on their expertise in hypertension, primary care, cardiology, nephrology, clinical trials, research methodology, evidence-based medicine, epidemiology, guideline development and implementation, nutrition/lifestyle, nursing, pharmacology, systems of care, and informatics” (James et al., 2014b, p. 45). The National Heart, Lung, and Blood Institute (NHLBI) initially led the development of the JNC 8 guideline until June 2013, when it discontinued its involvement with the guideline, and decided to instead partner with specific organizations that develop clinical guidelines (James et al., 2014a). The withdrawal of the NHLBI has led many to question the integrity of the JNC 8 guidelines (Finks & Ripley, 2015; Reisin, Harris, & Rahman, 2014;

Sherman, 2014). While the NHLBI does not reflect its views in the JNC 8 report, it still is a financial stakeholder, as it funded the evidence review needed to develop the report (James et al., 2014b).

Organizations that are involved in the prevention, treatment, and management of hypertension that could have contributed to developing this guideline include the U.S. Department of Health and Human Services (USDHHS), National Institutes of Health (NIH), and National High Blood Pressure Education Program (NHBPEP). These three organizations, in addition to the NHLBI, were a part of developing JNC 7 in 2003. The lack of their involvement, and any national organization at all, may lead some to question the validity and strength of the recommendations mentioned in the JNC 8 guideline.

### **Rigor of Development**

#### **Questions Guiding the Evidence Review**

Panel Chairs, members, and NHLBI staff developed a set of questions to help guide their evidence search. Revision and review of the process resulted in 23 questions the panel members thought were the most important to hypertension (James et al., 2014b). After ranking the top 5 questions, members chose the three highest ranked questions to focus on in developing the JNC 8 guideline (James et al., 2014, b). The questions are as followed:

- (1) In adults with hypertension, does initiating antihypertensive pharmacologic therapy at specific blood pressure thresholds improve health outcomes?
- (2) In adults with hypertension, does treatment with antihypertensive pharmacologic therapy to a specified BP [blood pressure]

goal lead to improvements in health outcomes? (3) In adults with hypertension, do various antihypertensive drugs or drug classes differ in comparative benefits and harms on specific health outcomes? (James et al., 2014b, p. 51)

These questions were then submitted to the evidence review team to aid in searching the literature.

### **Inclusion/Exclusion Criteria**

The focus of the evidence review was on adults aged 18 years or older who have hypertension. Studies were included if they addressed the following prespecified subgroups: coronary artery disease, peripheral artery disease, diabetes, proteinuria, chronic kidney disease (CKD), heart failure, history of stroke, men and women, older adults, smokers, and racial and ethnic groups (James et al., 2014a). Studies were excluded if they had sample sizes smaller than 100 and if follow up periods were less than 1 year, as such studies of brief duration are unlikely to come up with health-related outcome data (James et al., 2014a). Studies were included if they reported effects of the interventions being examined on any of the following specific health outcomes:

- Overall mortality, cardiovascular disease (CVD)-related mortality, CKD-related mortality
- Myocardial infarction, heart failure, hospitalization for heart failure, stroke
- Coronary revascularization (includes coronary artery bypass surgery, coronary angioplasty and coronary stent placement),

other revascularization (includes carotid, renal, and lower extremity revascularization)

- End-stage renal disease (ESRD) (i.e., kidney failure resulting in dialysis or transplantation), doubling of creatinine level, halving of glomerular filtration rate (GFR). (James et al., 2014a, p. 508)

The evidence review was limited to include only randomized control trials (RCTs), as these types of studies are subject to less bias compared to other types of clinical studies (James et al., 2014a). The panel conducted their own systematic reviews using original publications of RCTs, and, chose to exclude systematic reviews and meta-analyses published by others in the evidence review (James et al., 2014a). Other types of studies excluded were pilot studies and observational studies.

### **Literature Search**

The literature search was conducted using NHLBI's Virtual Collaborative Workspace (VCW), which was a technology platform that was developed specifically for the NHLBI guideline initiative (James et al., 2014b). The VCW platform integrated a central repository "...of 1.9 million citations and 71,000 full text articles related to cardiovascular disease risk reduction" (James et al., 2014b, p. 53), an integrated set of search engines, and search results (James et al., 2014b). The databases used to collect citations include PubMed, CINAHL, Cochrane, Embase, PsycINFO, Biological Abstracts, and Wilson Science (James et al., 2014b). The search engines were used to conduct literature searches and included TeraText, Collexic,

Content Analyst, and Lucene (James et al., 2014b). Initial search dates of January 1, 1966 through December 31, 2009 were used for the literature search.

Selected studies were then rated for quality using NHLBI's standardized rating tool, which was developed using the approaches used by the United States Preventive Services Task Force (USPSTF), AHRQ's Evidence-Based Practice Centers, the National Health Service Centre for Reviews and Dissemination, and The Cochrane Collaborative. Studies were rated to be "good," "fair," or "poor," and were used to assess the risk of bias due to study design or execution (James et al., 2014b). A study rated good had the least risk of bias and its findings were considered valid, while a poor rating indicated a significant risk of bias and was excluded from the body of evidence. Studies rated good or fair were included.

### **Methods to Formulate Recommendations**

An outside methodology team conducted the literature search, summarized the evidence from the selected studies, and created evidence tables (James et al., 2014a). The panel then created evidence statements for each question, voted on agreement or disagreement of each statement, followed by voting on the quality of the approved statements. Once evidence statements were created for each of the questions, panel members reviewed each statement to create the clinical recommendations, and then voted on each recommendation and on its strength (James et al., 2014a). Although the goal was to achieve 100% consensus when possible, a two-thirds majority was considered approved, except for recommendations based on expert opinion, which needed a 75% majority agreement to be approved (James et al., 2014a).



## **Procedures for Updates**

To ensure that significant studies published after December 31, 2009 were not excluded, two independent literature searches of PubMed and CINAHL were conducted between December 2009 and August (James et al., 2014b). However, the inclusion criteria of this second search was limited to (1) major studies in hypertension, (2) had at least 2000 participants, (3) was a multicentered study, and (4) met all other inclusion/exclusion criteria from the original search. In addition, all panel members were to identify and contribute any newly published studies that met the criteria above (James et al., 2014a). Studies were selected and included if rated as good or fair using NHLBI's quality rating tool. According to James et al. (2014b), additional literature search updates until the publication of this report were not possible.

## **Clarity and Presentation**

The JNC 8 guideline consists of nine key recommendations (Table 1.) that are clearly presented in a highlighted box following the evidence review section of the document. The text discusses each recommendation and includes how each was formulated from the evidence review. The JNC 8 guideline also includes an algorithm, which summarizes the nine recommendations, though; this algorithm has not been validated in terms of achieving improved patient outcomes (James et al., 2014a).

The recommendations are specific in terms of addressing age groups, race, and those with chronic illnesses, specifically diabetes and chronic kidney disease. However, not all the recommendations are unambiguous, but allow for different

options for the management of hypertension. An example is Recommendation 1, which contains a corollary recommendation due to changing the BP threshold of when to initiate pharmacologic treatment in those aged 60 years and older. The Corollary Recommendation, which is based on expert opinion, states the following:

In the general population aged 60 years or older, if pharmacologic treatment for high BP results in lower achieved SBP (for example, <140 mm Hg) and treatment is not associated with adverse effects on health or quality of life, treatment does not need to be adjusted. (James et al., 2014a, p. 510)

The reasoning behind this is that there are many hypertensive patients 60 years and older who are already treated to a SBP lower than 140 mm Hg, based on previous guideline recommendations, and the panel believes there is no need to adjust medications to allow BP to increase if the patient is tolerating the lower BP without adverse effects.

Different options for the management of hypertension are clearly outlined in Recommendation 1 and in Recommendation 9. This last recommendation was developed as a guide for implementing recommendations 1 through 8, and is based on strategies used in RCTs that revealed improved patient outcomes as well as expert opinion (James et al., 2014a). Recommendation 9 describes three different ways to titrate and combine antihypertensive medications. Three different strategies are mentioned in this recommendation since there were no RCTs that compared the strategies to each other. Thus, it is unknown if one of the strategies is better than another. These strategies are summarized in a table following the recommendation in the document.

## **Application**

### **Organizational Barriers**

A potential barrier to implementing the JNC 8 guideline would be the lack of organizational endorsement. What may be worse is that the NHLBI and NIH were initially involved but withdrew their involvement. With their involvement in the past seven JNC reports and then to no longer be involved in the eighth, the credibility of the guideline has been put into question (Finks & Ripley, 2015; Reisin, Harris, & Rahman, 2014; Sherman, 2014). Another potential barrier is the evidence review was limited to RCTs only and didn't include any systematic reviews, meta-analysis, or observational studies, which should be considered in an evidence-review. Although these potential barriers are mentioned in the guideline, they are not referred to as barriers or limitations in the report.

### **Cost Implications**

Hypertension is costing the nation nearly \$46.5 billion in health care visits, medications, and missed days of work (Mozaffarian et al., 2015). In 2010 alone, over 43 million ambulatory visits, including emergency department and office visits, were for hypertension (Mozaffarian et al., 2013). Despite how costly the management of hypertension has been in the past, cost-savings are possible with the implementation of the JNC 8 guidelines. Two recent studies demonstrate how these guidelines have the potential for cost-savings.

Moran et al. (2015) conducted a study that projected the cost-effectiveness of this 2014 guideline in treating adults in the U.S. with hypertension. A Cardiovascular Disease Policy Model was used to simulate medication treatment

and monitoring costs, costs diverted for the treatment of cardiovascular disease, and quality-adjusted life years (QALYs) gained by treating adults between the ages of 35 and 74 years who previously have been untreated from 2014 through 2024 (Moran et al, 2015). The results suggest that applying the 2014 guidelines to untreated patients with hypertension between the ages of 35 and 74 years would prevent around 56,000 cardiovascular events 13,000 deaths annually, and end in cost savings (Moran et al., 2015). Moran et al. (2015) concludes that controlling hypertension in all adults with cardiovascular disease and those with stage 2 hypertension (SBP  $\geq$  160mm Hg and DBP  $\geq$  100 mm Hg) without cardiovascular disease will most likely provide the most cost-savings.

Sheppard, Fletcher, McManus, and Mant (2014) conducted a cross-sectional analysis to estimate the prevalence of uncomplicated stage 1 hypertension (SBP 140-159 mm Hg and DBP 90-99 mm Hg) in an untreated population and assess the potential cost of initiating therapy. This retrospective study analyzed the primary care records of 19 anonymous general practices over a 1-year period and found that 1 in 12 patients between the ages of 40 to 74 years have untreated stage 1 hypertension. The cost of treating these patients as recommended by these guidelines was estimated between \$180-389 million (Sheppard et al., 2014). This included all health care costs including office visits and prescription medication costs over the course of one year.

### **Editorial Independence**

The authors alone, without any major organization, sponsored the development and publication of this guideline. As mentioned earlier, the NHLBI

financially supported the evidence review for this report, however, chose not to continue in the development and publication process of this and any other guideline. There is a disclaimer at the end of the report that clearly states the report does not reflect the views of the NHLBI, the National Institute of Diabetes and Digestive and Kidney Diseases (NIDDKD), the NIH, or the federal government. Suzanne Oparil, M.D., William C. Cushman, M.D., Raymond R. Townsend, MD, and Jackson T. Wright Jr., MD disclosed conflicts of interest. The other authors reported no disclosures.

### **Recommendations for Practice**

Today, there are many evidence-based practice guidelines for hypertension along with those for other chronic diseases that also address hypertension. Guidelines for the management of hypertension include the JNC 8 in addition to the European Society of Hypertension/European Society of Cardiology's (ESH/ESC) guideline as well as the Canadian's Hypertension Education Program guideline. These three guidelines have very similar recommendations with only a few differences. The goal blood pressure thresholds for the general population and for the elderly are the same in each of these guidelines, with the general population goal blood pressure being <140/90 mm Hg and <150/90 mm Hg for the elderly. All three guidelines also agree that those with CKD should be at a goal blood pressure of <140/90 mm HG and be treated with either an ACEI or an ARB. There are some differences in the recommendations, however, when it comes to initial drug treatment options and the recommendations for diabetes and those with CKD. The JNC 8 recommends using only four drug classes as the initial drug treatment option

and includes thiazide-type diuretic, ACEI, ARB, or CCB. Beta-blockers are no longer recommended as an initial drug choice in the JNC 8 due to some research findings of high rate of myocardial infarction, stroke, and cardiovascular death, and also found that beta-blockers perform similarly to the other four classes of drugs. The ESH/ESC and CHEP guidelines, however, still recommend the use of beta-blockers as an option in the treatment of hypertension.

Despite the few differences among other hypertension guidelines, I would recommend that the JNC 8 guidelines be used by nurse practitioners in practice. Not only has this been a long awaited update of the hypertension guidelines, but it also includes some seminal studies that are important to consider in practice such as ACCORD-BP, ALLHAT, HYVET, JATOS, VALISH, and CARDIO-SIS. The guideline is concise and offers different drug treatment strategies to aid in achieving blood pressure goals based on evidence from RCTs. In addition, the JNC 8 includes an algorithm to help facilitate implementation of these guidelines in a busy clinical setting. Overall, the JNC 8 guideline is simply that, recommendations that providers may choose to follow. But based on the evidence provided in this latest update, the guideline appears to be complete until further evidence presents itself.

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Table 1.  
Summary of JNC 8 Hypertension Guidelines

	Populatio n	BP	Recommendation
<b>Recommendation 1</b> (Strong – Grade A)	≥ 60 years old	SBP ≥ 150 mm HG or DBP ≥ 90 mm HG	Initiate pharmacologic treatment (Goal SBP < 150 mm HG and DBP < 90 mm HG)
<i>Corollary Recommendation</i> (Expert opinion – Grade E)			Do not adjust treatment if BP in lower SBP if well tolerated and without adverse effects
<b>Recommendation 2</b> (Ages 30 – 59 years, Strong – Grade A; Ages 18 – 29 years, Expert opinion – Grade E)	< 60 years old	DBP ≥ 90 mm HG	Initiate pharmacologic treatment (Goal DBP < 90 mm HG)
<b>Recommendation 3</b> (Expert opinion – Grade E)	< 60 years old	SBP ≥ 140 mm HG	Initiate treatment (Goal SBP < 140 mm HG)
<b>Recommendation 4</b> (Expert opinion – Grade E)	≥ 18 years old, with CKD	SBP ≥ 140 mm HG or DBP ≥ 90 mm HG	Initiate treatment (Goal SBP < 140 mm HG and DBP < 90 mm HG)
<b>Recommendation 5</b> (Expert opinion – Grade E)	≥ 18 years old, with diabetes	SBP ≥ 140 mm HG or DBP ≥ 90 mm HG	Initiate pharmacologic treatment (Goal SBP < 140 mm HG and DBP < 90 mm HG)
<b>Recommendation 6</b> (Moderate – Grade B)	Nonblack, including diabetics		Initiate with thiazide – type diuretic, CCB, ACEI, or ARB
<b>Recommendation 7</b> (Weak – Grade C)	Black, including diabetics		Initiate with thiazide – type diuretic or CCB
<b>Recommendation 8</b> (Moderate – Grade B)	≥ 18 years, with CKD		Initiate (or add) ACEI or ARB to improve kidney function
<b>Recommendation 9</b> (Expert opinion – Grade E)			If in one month goal BP is not achieved, increase dose of initial drug or add a second drug (thiazide – type diuretic, CCB, ACEI, or ARB) If goal BP is not achieved with two drugs, add a third drug. Do not use an ACEI and ARB together in a patient. If goal BP is not achieved using thiazide – type diuretics, CCB, ACEI, or ARBs due to a contraindication or need to use more than three drugs, other antihypertensive drugs from other classes may be used. If BP cannot be controlled using the above recommendations and strategies, referral to a hypertension specialist may be needed.

Note. BP = blood pressure; SBP = systolic blood pressure; DBP = diastolic blood pressure; CKD = chronic kidney disease; CCB = calcium channel blockers; ACEI = angiotensin converting enzyme inhibitor; ARB = angiotensin receptor blocker

Measuring Adherence to Evidence-Based practice Guidelines for the Management of

Hypertension in Women

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## Abstract

**Purpose:** The aim of this study was to evaluate provider adherence to evidence-based practice guidelines for the management of hypertension in women in a primary care setting.

**Methods:** This was a retrospective electronic medical record review. Women between the ages of 18 to 59 years with a diagnosis of hypertension or history of elevated blood pressures, who were seen between July 1, 2013 and June 30, 2014, were included in the study. The frequency and percentage of providers who adhered to the evidence-based practice guidelines was determined.

**Results:** The overall rate of provider adherence to the JNC 8 guidelines was 72.4%. Of the 87 patients medical records included in this study, 32.2% had a documented SBP greater than or equal to 140 mm Hg, and 17.2% with a DBP greater than or equal to 90 mm Hg. Providers were more likely to change a medication dosage (4.6%) than changing the antihypertensive medication (2.3%) and adding an additional medication (2.3%).

**Conclusion:** The majority of providers generally adhered to the JNC 8 evidence-based practice guidelines for hypertension in women. However, the reasons why providers may not adhere to the guideline for some patient and not others needs to be identified.

# Measuring Adherence to Evidence-Based Practice Guidelines for the Management of Hypertension in Women

## **Background**

Over 77 million adults in the United States (U.S.) have hypertension (Go et al., 2014), which increases the risk for stroke, myocardial infarction (MI), renal failure, and death if not identified early and treated appropriately (James et al., 2014). In 2009, hypertension was the primary or contributing cause of death to nearly 350,000 Americans, equating to almost 1,000 deaths per day (Go et al., 2013). Hypertension is the most commonly seen condition in primary care (James et al., 2014), and costs the nation an estimated \$51 billion each year in healthcare costs, medications, and missed days of work (Go et al., 2014).

Though the prevalence of hypertension is similar among men and women, 29.7% and 28.5% respectively (Nwankwo et al., 2013), the percentage of women with hypertension increases significantly in those 65 years of age and older (Hage, Mansur, Xing, & Oparil, 2013; Go et al., 2014). Specifically, the prevalence of hypertension in non-Hispanic black women in the U.S. is among the highest in the world, and continues to increase (Go et al., 2013). Hypertension is also more likely to occur in women taking oral contraceptives, who are pregnant, or in menopause, than in those who are not (Hage et al., 2013). Data from the National Health and Nutrition Examination Survey (NHANES) 2011 – 2012 show that more women than men reported treating their hypertension with medication, and that women have a slightly higher percentage of controlled hypertension than for men, 55.2% and 49.3% respectively (Nwankwo et al., 2013).

Despite recommendations of evidence-based clinical practice guidelines, there are still thousands of women who have untreated hypertension and who are unaware of their hypertension (Nwankwo et al., 2013). In early 2014, the *Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure (JNC 7)* was updated and entitled the *2014 Evidence-Based Guideline for the Management of High Blood Pressure in Adults Report From the Panel Members Appointed to the Eighth Joint National Committee (JNC 8)*. The overall purpose of this report was designed to provide clinicians with updated, clear recommendations for the management of hypertension that are based on the most recent systematic reviews of the literature. The JNC 7 guidelines include recommendations for medication management and lifestyle changes related to physical activity and nutrition, whereas the JNC 8 focuses solely on medication management. Both guidelines recommend a blood pressure goal of less than 140/90 mmHg for both men and women ages 18 to 59 years old in the general population without diabetes or chronic kidney disease. The major change in the JNC 8 is the increased blood pressure threshold for those ages 60 years and greater, which are now systolic blood pressures (SBP) equal to or greater than 150 mm Hg and diastolic blood pressures (DBP) equal to or greater than 90 mm Hg.

One of the many reasons for such poor blood pressure control is the lack of provider adherence to guidelines. Several studies have investigated provider adherence and all resulted in varying conclusions (Abdulameer et al., 2012; Ardery et al., 2007; Asch, Kerr, Lapuerta, Law, & McGlynn, 2001; Cabana et al., 1999; Cloher & Whelton, 1986; Cuspidi et al., 2002; Dickson et al., 2013; Henderson, S. O., Bretsky,

DeQuattro, Henderson, B. E., 2003; Hyman & Pavlik, 2000; Karbach et al., 2011; Manolio et al., 1995; Monane, et al., 1995; Naiman & Barker, 1999; Nelson & Knapp, 2000; Siegel & Lopez, 1997; Xu, Moloney, & Phillips, 2003). According to the Dickson et al. (2013) survey, physicians self-reported that their most frequent barrier was time. Mehta et al. (1999) conducted a direct mail survey that revealed younger physicians were more likely to prescribe according to the guidelines than older physicians. However, according to Karbach et al.'s (2011) exploratory study, the preliminary findings implied that physicians' knowledge of the guidelines doesn't always lead to better guideline implementation, as those physicians who did not know the guidelines performed significantly better than those who did.

Despite the vast amount of data addressing provider adherence to hypertension guidelines, the studies don't address adherence to the guidelines specific to women. Also, there's a lack of more recent evidence, as a considerable number of these studies were published over a decade ago. The primary purpose of this study is to evaluate provider adherence to evidence-based practice guidelines for the management of hypertension in women in a primary care setting.

### **Objective**

The aim of this study was to (1) determine the percentage of adult female patients ages 18 to 59 years old diagnosed with hypertension who are at the evidence-based recommended goal blood pressure (< 140/90 mmHg) at their last visit; (2) if not at goal, identify whether there was a new medication added, medication change, or dosage change at their last visit; (3) identify if dietary and physical activity counseling was done at their last visit.

## **Methods**

### **Design**

A retrospective electronic medical record review was completed in March 2015 to measure provider adherence to the JNC 8 hypertension guidelines. A random sample of 100 medical records was selected using a random sampling method.

### **Study Population**

This study was conducted in a primary care clinic in a university setting that sees primarily women. The clinic was comprised of nurse practitioners and physician providers. A random sample of 100 electronic medical records was selected for review. Inclusion and exclusion criteria were based on the 2014 Provider Quality Reporting System (PQRS) measures for hypertension: Blood Pressure Control and Dietary and Physical Activity Modifications. PQRS is a Centers for Medicare and Medicaid Services reporting program that provides incentives to providers to report satisfactory data on quality measures. Electronic medical records were reviewed for patients who met the following criteria: females of all races between the ages of 18 and 59 years old; had a diagnosis of hypertension documented by the ICD-9 codes 401.0 essential hypertension, 401.1 benign hypertension, 401.9 unspecified hypertension, and 796.2 elevated blood pressure without diagnosis of hypertension, and were seen by a provider between July 1, 2013 and June 30, 2014. Patient records were excluded for females less than 18 and greater than 59 years old, who were pregnant, and who had a diagnosis of diabetes or chronic kidney disease.



## **Data Collection**

Information technology personnel at the university assisted with obtaining the electronic medical records for those that met the inclusion criteria. Once records of patients who met the inclusion criteria were obtained, 100 records were randomly selected using Research Randomizer© software. Records were reviewed and data collected on the following: age, race, and ethnicity; type of provider seen (physician or nurse practitioner); blood pressure at the last office visit; ICD-9 code for hypertension; and new medications prescribed, medication changes, dosage changes, and dietary and physical activity counseling. Data were then entered into RedCAP<sup>1</sup> (Harris et al., 2009), a secure web based application for building and managing online databases.

## **Human Subject and Research Approval Procedures**

Approval to conduct this study was obtained from the university Institutional Review Board (IRB) prior to any data collection. Informed consent was waived in compliance with IRB protocols, as this study was a retrospective review and data were collected without patient identifiers. Therefore, consent could not be reasonably obtained in this scenario.

## **Data Analysis**

Data from the retrospective electronic medical review were analyzed using Microsoft Excel. Frequencies were used to assess age, race, and ethnicity; type of

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provider seen (physician or nurse practitioner); new medications prescribed, medication changed, dosage changed, and dietary and blood pressure readings at the last office visit; ICD-9 code for hypertension; documented medications taken for hypertension; and documented physical activity counseling.

## **Results**

Progress notes from 87 patient records met the inclusion criteria for this retrospective chart review. Of these, 12 charts were excluded as the progress notes were incomplete, and one chart was excluded because the patient was pregnant. Three of the incomplete charts did not have blood pressure values documented, nor did six charts have hypertension related ICD – 9 codes documented. Many of the charts (64%) included in this review had the provider signature missing from the note, therefore this study could not assess adherence based on the type of provider. Patients' ages and race were also not assessed, as they were not part of the progress notes unless mentioned in the notes.

The overall rate of provider adherence to the JNC 8 guidelines was 72.4% (n = 63), and was determined by looking at the documented blood pressure, determining whether the provider needed to address the blood pressure based on the JNC 8 recommendations, and seeing if the patient's hypertension was mentioned in the management plan of the progress note. Of the 87 charts reviewed, 36.8% (n = 32) patients had an uncontrolled blood pressure documented. Twenty-eight of the 32 patients with uncontrolled blood pressure had SBP greater than or equal to 140, while 15 of these patients had a DBP greater than or equal to 90 mm Hg. Of the patients with uncontrolled blood pressure, 4.6% had their medication dosage

Table 1.  
*Summary of Retrospective Chart Review Findings*

	No. of Records (n = 87)	%
Goal BP documented	55	63.2
SBP ≤ 140 mm Hg	59	67.8
DBP ≤ 90 mm Hg	72	82.8
Uncontrolled BP documented	32	36.8
SBP ≥ 140 mm Hg	28	32.2
DBP ≥ 90 mm Hg	15	17.2
Medication dosage change	4	4.6
Medication change	2	2.3
New medication added	2	2.3
Dietary and lifestyle modifications discussed	7	8.0
Adherence to guidelines	63	72.4

*Note.* No. = number; BP = blood pressure; SBP = systolic blood pressure; DBP = diastolic blood pressure

increased, 2.3% has a change in their medication changed, and 2.3% has an additional medication added.. Although diet and lifestyle counseling is not mentioned in the JNC 8 guidelines, yet has been included in several previous JNC guidelines, only 8% of all charts reviewed had documentation that counseling was done. A summary of these findings is listed in Table 1.

### **Discussion**

Providers are not adhering to evidence-based practice guidelines, which may be one possible explanation for poor blood pressure control (Abdulameer et al., 2012; Ardery et al., 2007; Cabana et al., 1999; Hyman & Pavlik, 2000; Mehta, Wilcox, & Schulman, 1999; Milchak et al., 2008; Thier et al., 2008). Several studies have examined provider adherence and have come up with relatively similar conclusions (Abdulameer et al. 2012; Ardery et al., 2007; Cabana et al., 1999; Hyman & Pavlik, 2000; Mehta et al., 1999; Milchak et al., 2008; Thier et al., 2008). In a study by

Ardery et al. (2007), guideline adherence among providers was nearly 54%, and there was no significant improvement over time. This study had similar results with only 72.4% of hypertensive patients received care that adhered to the 2014 JNC 8 guidelines.

Despite the fact that the JNC has been publishing evidence-based guidelines since 1976, there are still a number of providers that remain unaware or unfamiliar with the JNC guidelines. A significant number of providers are also using much higher blood pressure thresholds than the recommended 140/90 mm Hg to diagnose and treat hypertension (Hyman & Pavlik, 2000; Milchak et al., 2008). This study found that 36.8% of the charts had either SBPs greater than or equal to 140 mm Hg or DBPs greater than 90 mm Hg documented.

Previous studies have identified many barriers as to why providers do not adhere to the guidelines (Cabana et al., 1999; Dickson et al., 2013; Gagliardi, Brouwers, Palda, Lemieux-Charles, & Grimshaw, 2012; Khatib et al., 2014; Lin et al., 2006; Lugtenberg, Burgers, Besters, Han, & Westert, 2011). Some of the most common barriers among providers include patient factors such as the inability to reconcile with patients over a treatment plan followed by provider perception that hypertension wasn't a clinical priority during that visit (Cabana et al., 1999; Lin et al., 2006; Lugtenburg et al., 2011). However, what may be a barrier in one setting may not be present in another. Although there are a number of studies (Bonds et al., 2008; Petersen et al., 2013; Roumie et al., 2006) on interventions addressing common barriers, it too is dependent on the setting. Further studies are needed to identify the barriers providers face even when given incentives to change behavior.

## **Limitations**

There are a number of possibilities as to why the medical record examined didn't adhere to the guidelines when in actuality the provider may have. If a patient had a hypertension follow up visit the week prior to the progress note analyzed, a medication or dosage change at that previous visit most likely wouldn't show much of a change in the blood pressure reading within a week. Hence, in this study the last visit would be documented as the provider being nonadherent to the guideline due to not addressing the elevated blood pressure, even though it was addressed the week prior. It is also unknown if the patient has a history of consecutive high blood pressure readings other than having the ICD-9 code 796.2 documented. Therefore, if the provider didn't address or advise the patient to start a blood pressure log, the visit would be documented as nonadherent to the guideline unless there was documentation in the progress note of a management plan. Further research is needed to determine what providers would do in these scenarios. There was a limited amount of data recorded in the progress notes. As a result, patient race, ethnicity, age, and type of provider in relation to JNC 8 evidence-based practice guideline adherence was not reviewed.

## **Implications for Research**

Future research is needed to determine whether provider adherence is dependent on race or ethnicity. Further studies are also needed to see if there is a difference in adherence between nurse practitioners versus physicians. The majority of studies in the past have measured provider adherence to hypertension guidelines, but only examined physicians (Abdulameer et al., 2012; Ardery et al.,

2007; Cabana et al., 1999; Hyman & Pavlik, 2000; Mehta et al., 1999; Milchak et al., 2008; Thier et al., 2008). If differences in provider adherence occur in relation to patient race, ethnicity, and type of provider, identification of the correlation would help in creating targeted interventions to address this disparity.

### **Implications for Practice**

Although a good number of providers adhered to the JNC 8 guidelines, the barriers providers face are dependent on the setting. Studies (Bonds et al., 2008; Petersen et al., 2013; Roumie et al., 2006) have tested different interventions to address common barriers, but it too is dependent on the setting. In order to improve provider adherence to the JNC 8 guidelines, providers need to assess their practice setting and address the specific barriers they face. Interventions can then be put in place to eliminate the barriers, and, hence, improve adherence.

### **Conclusion**

Providers are adhering to the JNC 8 evidence-based guidelines for hypertension in women; however, there is room for improvement. Associations between race, ethnicity, and type of provider in relation to guideline adherence need to be assessed. The barriers providers face in their specific practice setting must also be identified in order to create interventions to improve adherence to the guidelines. Identifying interventions that improve provider adherence to the JNC 8 guidelines will then, not only, improve patient blood pressure goals but quality of care.

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Capstone Report Conclusion

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## Conclusion

Over 77 million adults in the United States (U.S.) with approximately half being women have hypertension (Go et al., 2014), which increases the risk for stroke, myocardial infarction (MI), renal failure, and death if not identified early and treated appropriately (James et al., 2014). Despite multiple publications of national hypertension guidelines since 1977 by the National Heart, Lung, and Blood Institute (NHLBI) and Joint National Committee (Kotchen, 2011), only 50% of adults with hypertension have their blood pressure under control (Nwankwo et al., 2013). Providers are not adhering to hypertension guidelines, which is one possible explanation for such a high rate of uncontrolled blood pressure.

A comprehensive review of the literature on providers and their adherence to evidence-based hypertension guidelines is presented in the first manuscript of this Capstone Report. The literature revealed that providers are not adhering to evidence-based practice guidelines, which may be one possible explanation for poor blood pressure control. Despite the fact that the JNC has been publishing evidence-based guidelines since 1976, there are still a number of providers that remain unaware or unfamiliar with the JNC guidelines. Nevertheless, adhering to evidence-based guidelines doesn't necessarily guarantee blood pressure control (Milchak et al., 2008).

The second manuscript presented a critical analysis of the *2014 Evidence-Based Clinical Practice Guidelines for the Management of High Blood Pressure in Adults: Report From the Panel Members Appointed to the Eighth Joint National Committee (JNC 8)* using a modified version of the Appraisal of Guidelines for

Research and Evaluation (AGREE) Instrument (2001). These recommendations were a much-anticipated update of the JNC 7 guidelines, and are based on the most recent RCTs and expert opinion. The guideline is concise and offers different drug treatment strategies to aid in achieving blood pressure goals. Overall, the JNC 8 guideline is simply that, recommendations that providers may choose to follow.

The final manuscript detailed the descriptive study, examining provider adherence to the JNC 8 guidelines at a primary care university health clinic that primarily sees women. Overall, providers adhered to the guidelines when providing care to women with a history of elevated blood pressure and those diagnosed with hypertension. Future research is needed to identify the barriers providers face in their specific practice setting in order to create interventions to improve adherence to the guidelines. By utilizing the JNC 8 evidence-based practice guidelines, recognizing barriers, and creating interventions to improve overall adherence to the practice guidelines, primary care providers can make a significant improvement in the blood pressure control and overall cardiovascular health of women.



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