The Utilization of Behavioural Counselling for Hypertension Within a Primary Care Context

by

Jill Finney

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Abstract

Hypertension is a global health issue with over one billion people affected worldwide. The etiology is likely due to a combination of genetic, environmental and lifestyle factors. Current evidence supports lifestyle modification either as stand alone or adjunct therapy. However, evidence is lacking in how to approach lifestyle modification in the primary care setting. Motivational interviewing (MI) is one technique that has shown promise in diverse clinical settings. The purpose of this literature review is to address the utility of using MI in primary care with hypertension. Using a comprehensive approach, a literature search was conducted which included the following databases: CINAHL, Medline OVID, PUBMED, and COCHRANE Reviews, as well as applicable guidelines. Eight papers were selected for inclusion. A critical appraisal of the literature revealed that MI has clinical utility when addressing lifestyle modification in the context of hypertension in primary care. However, there are large methodological gaps illustrating the necessity for further research.

TABLE OF CONTENTS

List of Tables

Acknowledgment

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Dedication

I would like to dedicate this work to my daughter, Halle Brindle, who gives me purpose and the desire to succeed, as well as my mom and dad who enabled it all to happen.

Chapter I: Introduction

Hypertension places a vast burden on individual health and the healthcare system, largely due to its direct relationship to cardiovascular disease, cerebral vascular disease, peripheral vascular disease, chronic kidney disease, and death (Daskalopoulou et al., 2015; Public Health Agency of Canada [PHAC], 2010). As per the PHAC (2010), in 2007 hypertension accounted for 21.1 million patient visits to a physician, making it the most common reason to see a doctor. In addition, a Canadian population-based cohort study estimated the cost of hypertension in 2010 at 13.9 billion dollars, with a projected increase to 20.5 billion dollars by 2020 (Weaver et al., 2015). Despite the significance of this data, hypertension is often a silent disease that can be perceived as benign, despite its potential to cause insidious damage (Hammer & McPhee, 2014; Wang & Ramachandran, 2005). However, the current evidence reflected in national and international hypertension treatment guidelines (Daskalopoulou et al., 2015; James et al., 2014; World Health Organization [WHO], 2003) recommend that hypertension, at least in the early stages, may be controlled with lifestyle modifications such as weight loss, dietary changes, exercise, and stress reduction.

Although there is pharmacological treatment for hypertension, medications have the potential for multiple side effects and interactions. Furthermore, many of the modifiable risk factors for hypertension are the same risk factors implicated in other cardiovascular and chronic diseases such as coronary artery disease, congestive heart failure, type II diabetes, and metabolic syndrome (Fisher et al., 2011). As such, non-medical approaches to hypertension management should also be considered. Family nurse practitioners practice within a mandate of primary healthcare, and as such recognize the value of emphasis on lifestyle modification in collaboration with their clients. As part of this, strategies to support behaviour change could be used to modify

risk factors and improve clinical outcomes. Motivational interviewing (MI) is one therapeutic approach that could be employed in the primary care setting when addressing lifestyle modification within the context of essential hypertension.

The aim of this project is to answer the question, “Is MI within a primary care context an effective method in eliciting change relating to modifiable risk factors associated with hypertension?” To address this, a comprehensive review of the literature will be undertaken. To contextualize this further, an overview of hypertension along with the associated modifiable risk factors, behavioural counselling, nurse practitioners, and primary care will be first presented to illustrate the significance and relevance of this issue in practice. Following the background, the review methods and findings of this comprehensive literature review will be presented.

Chapter 2: Background

One in five Canadian adults have hypertension and one in six Canadians are unaware of being hypertensive (Robitaille et al., 2012). It is estimated that by eliminating hypertension, the incidence of strokes would be decreased by 35% and the incidence of heart attack would be decreased by 18% (Warburton, Charlesworth, Ivey, Nettlefold & Bredin, 2010), which would undoubtedly increase quality of life and reduce healthcare expenditures. The following section will discuss the definition and pathophysiology of blood pressure and hypertension followed by a discussion regarding lifestyle modification and MI within the context of hypertension in the primary care setting.

Definition of Hypertension

Hypertension, as defined by *The 2015 Canadian Hypertension Education Program Recommendations for Blood Pressure Measurement, Diagnosis, Assessment of Risk, Prevention, and Treatment of Hypertension* (CHEP) (Daskalopoulou et al., 2015), is a systolic reading greater than 135 mmHg and a diastolic reading greater than 85 mmHg in serial daytime readings. Ideally, as per current guidelines, hypertension is measured using an ambulatory blood pressure monitor or as home blood pressure measurements. If ambulatory or home blood pressure monitoring is unavailable, hypertension is diagnosed by repeated elevated blood pressures greater than or equal to 140/90 mmHg within three to five office visits (Daskalopoulou et al., 2015). The exception to this is if the blood pressure is greater than or equal to 180/110 mmHg on the first visit, thus signifying hypertensive urgency that is treated as an emergency and would require immediate review and management.

Hypertension is further broken down into stages; prehypertension, stage one hypertension, and stage two hypertension. Prehypertension is defined as a systolic reading between 120-139

mmHg or a diastolic reading between 80-89 mmHg. Stage one hypertension is defined as a systolic reading between 140-159 mmHg or a diastolic reading between 90-99 mmHg; and stage two hypertension is a systolic reading greater than or equal to 160 mmHg or a diastolic reading greater than or equal to 100 mmHg (Basile & Bloch, 2014). Hypertension may be systolic and diastolic or isolated systolic or diastolic and typically depends on age. In younger adults, diastolic hypertension prevails because the mechanism is most often a high cardiac output as opposed to increased peripheral vascular resistance. In those 50 and older, systolic hypertension is more common because the mechanism is usually an increase in peripheral vascular resistance due to prolonged excess stress on the vasculature with a decrease in the effect of cardiac output most likely due to left ventricular hypertrophy (Lee, Williams & Lilly, 2011).

Prevalence

Hypertension is already the most common reason to see a physician in Canada (PHAC, 2010) and the percentage of hypertensive adults is predicted to increase by 60% within the next 20 years (Hermann, Flammer & Luscher, 2006). The PHAC (2010) reports data on hypertension gathered via the Canadian Chronic Disease Surveillance System (CCDSS), a collaborative network between provinces and territories linking the health insurance registry databases to physician billing and hospitalization databases. In 2009, the CCDSS expanded its scope to track the prevalence of hypertension. The criteria for inclusion in the registry are two or more physician claims within two years or one inpatient hospital separation abstract listing hypertension as a diagnosis using the ninth or tenth international classification of disease codes (2010). Cases are excluded if the hypertension is pregnancy-induced or is categorized as pulmonary hypertension. Other exclusions include groups or facilities under federal jurisdiction, such as federal correctional facilities, full-time employees of the Canadian Forces, and members

of the Royal Canadian Mounted Police. The CCDSS reports the incidence of hypertension in 2006/2007, as being 22.7 % or greater than one in five adult Canadians 20 years of age or older. Furthermore, they state this does not account for the estimated 17% of adults unaware of being hypertensive (PHAC, 2010).

Statistics Canada (2015) cites different numbers but their statistics are gathered from the Canadian Community Health Survey (CCHS), which collects self-reported health data at sub-provincial levels of geography. Initially data was collected every two years with 130,000 participants but changed to annual collection of 65,000 people in 2007. In 2011, Statistics Canada (2013) states that 17.6% of Canadians 12 years of age or older reported having hypertension, which represents no significant change from 2010. Statistics Canada (2015) covers the population in ten provinces and three territories and excludes people living on reserves and other Aboriginal settlements in province, full-time members of the Canadian Armed Forces, institutionalized populations and two Quebec health regions. They state that this exclusion represents less than 3% of the Canadian population.

Statistics Canada (2013) and the PHAC (2010) both include gender differences when addressing the prevalence of hypertension. The PHAC reports similarities in age-specific prevalence rates between male and females up to age 50 with rates for hypertension in woman increasing after the age of 55. Statistics Canada reports that males within the age groups 35-44 and 55-64 had higher rates of hypertension but at ages 75 and older, female rates were higher than males. Furthermore, rates increased for each successive age group for females but stopped for males at 65.

The main difference between the above sources of statistics is that the CCHS is self-reported whereas statistics from PHAC only include individuals diagnosed with hypertension. It

is suggested that self-reporting rates may be lower and this is reflected in the self-reported rate for 2007/08 through the CCHS as 19.4% versus the CCDSS rate for 2006/07 of 22.7%. It is postulated that this is due to people believing that their hypertension has been cured through medication or lifestyle changes (PHAC, 2010).

In 2008, the worldwide prevalence of diagnosed hypertension in adults 25 years of age and above was 40%. This had increased from 600 million in 1980 to one billion in 2008 (WHO, 2013). As per the WHO (2013), this increase is attributed to population growth, aging, and behavioural risk factors such as an unhealthy diet, harmful use of alcohol, lack of physical activity, excess weight, and exposure to persistent stress. The highest prevalence of hypertension is in the African Region at 46% of adults and the lowest prevalence is in the Americas at 35% of adults, illustrating a discrepancy between high and low income countries (WHO, 2013).

Pathophysiology

As per Lee et al. (2011), blood pressure is measured by a manometer reading using millimetres of mercury (mmHg) to measure the flow of blood through the arteries. Blood pressure is calculated by multiplying cardiac output by total peripheral resistance. Cardiac output is determined by the heart rate in beats per minute and stroke volume or the amount of blood ejected from the heart with each beat (Brashers, 2010). This is determined by cardiac contractility, the preload (venous return to the heart), and afterload (the resistance the left ventricle must overcome to eject blood into the aorta). With each heartbeat, there are two phases known as systole and diastole, which correspond to the systolic blood pressure and the diastolic blood pressure. Systole occurs when the cardiac muscle contracts with a strong enough force to pump blood out of the left ventricle into the aorta to be dispersed throughout the body. Diastole occurs when the left ventricle relaxes allowing blood to fill the chamber in preparation for

systole. Peripheral vascular resistance (PVR) is the resistance or opposition that the heart must pump against in order to supply oxygenated blood throughout the body. Although many variables affect PVR, in the context of the cardiovascular system, it is mainly the diameter of blood vessels that will affect blood pressure because the length of the vessels remains relatively constant (Brashers, 2010).

Blood pressure can change and react to a broad range of internal and external stimuli, including fluid balance, blood flow, heart and renal function, stress, diet, medications, and physical activity. The body monitors blood pressure via the kidneys and the baroreceptor reflexes in the walls of the aortic arch and the carotid sinuses. A body in homeostasis regulates blood pressure using four systems: the heart that supplies pumping pressure, the blood vessels whose tone determines systemic resistance, the kidney which regulates blood volume, and many hormones which help to regulate all of these systems above (Lee et al., 2011). Each mechanism employs a complex set of responses to control blood flow, fluid balance, and heart rate. These systems typically work in harmony to maintain a stable blood flow and thus blood pressure.

The baroreceptor reflexes are not involved in long-term maintenance of blood pressure but fine-tune it moment-by-moment. Receptors are located in the walls of the aortic arch and carotid sinuses and sense changes in stretch. If arterial pressure rises, receptors in the aortic arch send impulses via the vagus nerve to the central nervous system (CNS) and receptors in the carotid sinus send impulses via the glossopharyngeal nerve to the CNS (Lee et al., 2011). A negative feedback system responds by dampening the sympathetic nervous system and exciting the parasympathetic nervous system. The parasympathetic system acting through the neurotransmitter acetylcholine binding to parasympathetic receptors on blood vessels and in the

heart lowers peripheral vascular resistance and cardiac output (Rang, Dale, Ritter, Flower & Henderson, 2012).

If the renal system detects a drop in perfusion pressure, the juxtaglomerular cells of the afferent arterioles in the nephron release renin. Renin causes angiotensinogen, which is produced in the liver, to convert to Angiotensin I and then Angiotensin converting enzyme (ACE), produced and released by the lungs, causes angiotensin I to convert to Angiotensin II. Angiotensin II acts on the vascular system to induce systemic vasoconstriction and on the kidneys to increase sodium reabsorption at the proximal convoluted tubule, thus also causing a passive increase in water reabsorption. Angiotensin II also acts on the adrenal glands to produce and secrete aldosterone, which further increases sodium reabsorption in the distal tubule and collecting duct of the nephron. The Renin-Angiotensin-Aldosterone System (RAAS) is essential to blood pressure homeostasis and if the cardiac output or the total peripheral resistance increases, the kidneys have the ability to return blood pressure to normal by reducing intravascular volume through excretion of sodium and water. This mechanism, termed pressure natriuresis, becomes less sensitive in hypertensive patients and requires higher pressures to respond (Brashers, 2010; Lee et al., 2011). At least two mechanisms may be responsible for this decreased sensitivity: First, microvascular and tubulointerstitial injury within the kidneys impairing sodium excretion and secondly, a defect in hormonal factors related to the RAAS (Lee et al., 2011).

Primary Hypertension. Blood pressure is classified as primary or secondary, with 90-95% of cases falling within the primary category (Brashers, 2010). Primary hypertension is a diagnosis of exclusion and thought to be a result of multiple compounding genetic and environmental factors. Whilst no definite genetic markers have been found, several loci on genes represent positive associations such as “defects of renal sodium channels and polymorphisms in

the gene for angiotensinogen" (Lee et al., 2011, p. 305). Other experimental findings associated with primary hypertension include sympathetic overactivity of the heart and blood vessels causing an increase in cardiac output and PVR; abnormalities in the regulation of vascular tone; ion channel defects affecting the vessels and kidneys; defects in regulation of renal blood flow; and inappropriate hormonal regulation (Brashers, 2010; Lee et al., 2011). Insulin may also play a role in hypertension as it is postulated that people with type two diabetes or obesity that have insulin resistance and subsequent high serum glucose levels will release more insulin. This hyperinsulinemic state may contribute to hypertension "via increased sympathetic activation or by stimulation of vascular smooth muscle cell hypertrophy, which increases vascular resistance" (Lee et al., 2011, p. 306). Obesity is also strongly associated with hypertension. Adipocytes, or fat cells, secrete leptin, which under normal circumstances helps to control body weight through appetite inhibition and fat deposition. However, this function goes awry in obese individuals as chronically high levels of leptin have been found to increase sympathetic nervous system activity, decrease renal sodium excretion, promote inflammation, and stimulate myocyte hypertrophy (Brashers, 2010). Furthermore, a protein produced by adipose tissue called adiponectin is found to be decreased in obesity and this reduction is associated with insulin resistance, a decrease in endothelial-derived nitric oxide (vasodilator), activation of the sympathetic nervous system and the RAAS (Brashers, 2010). Together these changes contribute to many of the complex mechanisms that are implicated in the development and sustainment of hypertension.

Other risk factors associated with primary hypertension include age as the lifetime risk of hypertension for normotensive adults between the ages of 55-65 is 90% (PHAC, 2010); family history as a first-degree family history of hypertension doubles the risk for the offspring; race, as

it is more common in black people; high sodium diet; excessive alcohol consumption; sedentary lifestyle; diabetes and dyslipidemia; personality traits and depression (Basile & Bloch, 2015).

Secondary Hypertension. Secondary hypertension is attributable to an identifiable cause, usually structural or hormonal in nature. It is imperative that those with secondary hypertension are identified and treated to prevent "adaptive cardiovascular changes" (Lee et al., 2011, p. 308), as well as treat the underlying condition associated with the hypertension. Some clues that the hypertension may be secondary include the development of hypertension before age 20 or after 50 years of age, a higher severity of hypertension with an abrupt onset, other associated signs and symptoms, and lack of a family history of essential hypertension. Some common causes of secondary hypertension include sleep apnoea and medication use. For example, oral contraceptives may affect the RAAS and non-steroidal anti-inflammatory drugs may affect renal reabsorption of sodium and water (Basile & Bloch, 2015; Lee et al., 2011). Renal causes of hypertension include renal parenchymal disease, whereby damage to the nephrons inhibits normal filtration and renal artery stenosis through mechanisms of atherosclerosis (most common in older males) or fibromuscular dysplasia (characteristic in young women). Other structural causes include coarctation of the aorta, causing reduced blood flow to kidneys, and changes to the baroreceptor response in the aortic arch. Finally endocrine causes of secondary hypertension include pheochromocytomas (catecholamine-secreting tumors), adrenocortical hormone excess (tumor or Cushing Syndrome), and thyroid hormone abnormalities (Basile & Bloch, 2015; Lee et al., 2011).

Outcomes

Although hypertension may result in a diverse range of symptoms, including headaches, epistaxis, dizziness, flushing, sweating, and blurred vision, it can also be asymptomatic.

Unfortunately depending on the chronicity and degree of hypertension, damage to organs, notably the cardiovascular system, cerebrovascular system, the kidney, and retina may be occurring insidiously (Hammer & McPhee, 2014). Overall, hypertension can be associated with serious organ dysfunction, morbidity, and mortality and to understand this further, a brief overview of the physiological manifestations of hypertension will be presented in the following section.

Heart. Hypertension affects the heart by increasing the afterload against which the heart must contract. Like other muscles of the body, this increased workload results in cardiac muscle growth, however this growth, termed left ventricular hypertrophy, negatively affects functioning (Lee et al., 2011). Left ventricular hypertrophy causes a stiffening of the chamber, which increases the left ventricular filling pressure during diastole. This can result in pulmonary congestion and may progress to systolic dysfunction. These cardiac changes can lead to greater physiological dysfunction and left ventricular hypertrophy is a strong indicator of cardiac morbidity, correlating with development of congestive heart failure, angina, arrhythmias, myocardial infarction, and sudden cardiac death (Lee et al., 2011).

Blood Vessels. Damages to the blood vessels themselves due to chronic high pressures cause smooth muscle hypertrophy, endothelial cell dysfunction, and loss of elasticity (Lee et al., 2011). Hypertension also hastens atherosclerosis in the vessels, likely through local injury and the loss of protective functions such as endothelial secretion of nitric oxide. In humans, nitric oxide is well accepted as a vasodilator with anti-inflammatory effects that prevent platelet adhesion and aggregation and provides protection against atherosclerosis (Brandes, 2014; Hermann, Flammer & Luscher, 2006). In their 1995 study, Huang et al., focused on the relationship between nitric oxide and hypertension by disrupting the gene responsible for

endothelial nitric oxide synthase in mice; they subsequently found that halting the production of nitric oxide led to hypertension in the subjects. Whilst it is more complex than a simple causal relationship between nitric oxide and the development of hypertension, the increased susceptibility to vessel damage and atherosclerosis increases the risk for aneurysms in the cerebrovascular system and aorta as do the risk of thrombotic events such as myocardial infarction and atherothrombotic strokes from emboli or direct occlusion of local vessels (Lee et al., 2011).

Kidneys and Retinas. In the kidneys, nephrosclerosis can result from damage to the local vasculature. Specifically, hyaline arteriosclerosis and fibrinoid necrosis of capillary walls can occur resulting in ischemic atrophy of tubules and glomeruli (Lee et al., .2011). Hypertensive retinopathy is a term describing a number of clinically visible signs on fundoscopic examination of the eyes, such as arterial venous nicking and arterial sclerosis, and although it may be asymptomatic these changes are indicative of chronic hypertension (Lee et al., 2011).

Overall, hypertension is linked to global physiological changes, which in turn can give rise to significant morbidity involving multiple organ systems and mortality. The effects on the body described above illustrate the necessity of aggressive management of hypertension and the associated risk factors and co-morbid conditions for the benefits on individual wellness, the healthcare system and society.

Treatment

In many instances, hypertension may require treatment with antihypertensive medications. According to the CHEP guidelines (Daskalopoulou et al., 2015), average diastolic blood pressures of equal to or greater than 100 mmHg or average systolic blood pressures of equal to or greater than 160 mmHg without macrovascular target organ damage or other cardiovascular risk

factors requires treatment. In the presence of macrovascular target organ damage, the cut-off numbers recommended for treatment are lower at 90 mmHg diastolic and 140 mmHg systolic respectively. In the recent large randomized SPRINT trial, sponsored by the National Heart, Lung, and Blood Institute (The SPRINT Research Group, 2015), authors have found that intensive control of systolic blood pressure reduced rates of cardiovascular events by almost one third and mortality by almost one quarter. First line monotherapy without specific indications includes the thiazide diuretics, long-acting calcium channel blockers, angiotensin-converting enzyme inhibitors or angiotensin II receptor blockers (B.C. Guidelines, 2015).

Despite four million antihypertensive medication prescriptions being written every month (PHAC, 2010), the proportion of controlled disease is only 68.1 percent (Padwal, Bienek, McAlister & Campbell, 2016). Although this represents one of the suspected highest global rates, it still leaves room for improved treatment and effective prevention. Pharmacological therapy is important but represents one factor in the treatment of hypertension. Medication non-adherence is a significant phenomenon contributing to treatment failure in hypertensive patients. A longitudinal database study by Vrijens, Vincze, Kristanto, Urquhart and Burnier (2008) report that about one half of patients prescribed an antihypertensive drug stopped taking it within a year and on any given day about 10% of scheduled doses are omitted, further illustrating the necessity of risk factor modification in reducing the morbidity and comorbidities associated with hypertension.

The most current recommendations from the B.C. Guidelines (2015) are to treat hypertension according to cardiovascular disease risk factors and not solely to blood pressure targets. Treatment should include assessment and modification of risk factors related to hypertension and for those patients with borderline normal/high blood pressure, lifestyle

modification may be all that is required to bring their blood pressure into a normal range (B.C. Guidelines, 2015). The following section will explore evidence-based lifestyle changes associated with hypertension treatment, followed by a discussion of MI.

Lifestyle Modification

According to the CHEP guidelines (Daskalopoulou et al., 2015), health behaviour management should form the foundation of a treatment regimen to prevent or treat hypertension including exercise, dietary modification, weight reduction, alcohol consumption, sodium intake, and stress management. According to B.C. Guidelines (2015), 30-40 minutes of physical activity four to seven days per week can lower systolic blood pressure readings by 3.1 mmHg and diastolic blood pressure by 1.8 mmHg. Exercise should be of moderate intensity and include activities such as walking, jogging, cycling or swimming. In a small randomized controlled study by Higashi et al., (1999), the effects of long-term aerobic exercise on endothelial function showed a favourable response associated with increased release of nitric oxide on vessel relaxation.

Dietary recommendations include eating a diet low in processed foods and high in nutrients. One eating plan consistently recommended in the literature is the "Dietary Approaches to Stop Hypertension" or DASH eating plan, which emphasizes fruits, vegetables, whole grains, poultry, fish, and nuts with low amounts of fats, red meats, sweets, and sugared beverages (National Institutes of Health, 2015). B.C. Guidelines (2015) attributes following the DASH diet to a possible 11.4 mmHg reduction in systolic blood pressure and a 5.5 mmHg reduction in diastolic blood pressure. Furthermore, lowering sodium to less than two grams per day can help lower systolic blood pressure by 5.4 mmHg and diastolic blood pressure by 2.8 mmHg. Often a further benefit of exercise and diet is weight loss, which is also a behavioural modification

identified by the B.C. Guidelines (2015) that can lower systolic blood pressure by up to 6 mmHg and diastolic blood pressure by 4.8 mmHg. A healthy body mass index is considered 18.5 kg/m^2 to 24.9 kg/m^2 with a waist circumference of less than 102 centimetres for men and 88 centimetres for woman.

Finally, minimizing alcohol consumption in heavy drinkers to less than or equal to two drinks per day may reduce both systolic and diastolic blood pressure by 3.4 mmHg. Relaxation therapy may also lower systolic blood pressure by 3.7 mmHg and diastolic blood pressure by 3.5 mmHg (B.C. Guidelines, 2015).

As stated, health behaviour management or lifestyle interventions are routinely recommended as first-line therapy in reducing hypertension and its adverse effects on the body. The CHEP guidelines (Daskalopoulou et al., 2015) discuss physical exercise, weight reduction, alcohol consumption, dietary changes, sodium intake, and stress management as lifestyle modification targets in hypertensive patients and the 2014 Joint National Committee guidelines (James et al., 2014) in the United States endorse the potential benefits of healthy diet, weight control, and regular exercise in blood pressure control. However, these guidelines do not address mechanisms to encourage these lifestyle changes in the clinical setting. Approaching lifestyle modification through the traditional methods of persuasion, advice-giving, scare tactics, and "expert power" do not encompass the values inherent in nursing and furthermore have not been shown to be effective in promoting change (Elder, Ayala & Harris, 1999; Hall, Gibbie & Lubman, 2012; Ren, Yang, Browning, Thomas & Liu, 2014). As such, more effective strategies to address lifestyle modification are urgently needed in the primary care setting. One such strategy of burgeoning interest is MI, which accordingly will be discussed in the following section.

Motivational Interviewing

Described in 1983 by William R. Miller and originally utilized in alcohol addiction, MI is based on partnership, empathy and support, and addresses ambivalence to change by having the client voice their motivations for change and in turn listen to the counsellor reflect these motivations back to them (Hettema, Steele & Miller, 2005). As opposed to a set of skills, MI requires a way of being that encompasses the fundamental approach of collaboration, evocation, and autonomy within the interaction (Miller & Rollnick, 2002). Collaboration promotes partnership and an environment conducive to change as opposed to hierarchy and coerciveness. Evocation pertains to the interviewer provoking intrinsic motivation for change by drawing on the patient's own perceptions, goals, and values. This contrasts sharply with the interviewer providing advice or insight often utilized in counselling. Autonomy respects self-determination and the patient's desire to engage in the discussion regarding the behaviour in question. As Miller and Rollnick (2002) state, "when MI is done properly, it is the client rather than the counsellor who presents the arguments for change" (p. 34).

Although some authors have discussed MI as a brief intervention ideal for the clinical setting, it is not a set of techniques that can be employed quickly and without investing time into mastering the skill. Miller and Rollnick (2002) recognize that within the clinical healthcare setting, practitioners often desire a simpler technique useful in addressing patient reluctance to lifestyle change relevant to their health challenge. Some of the barriers that they identify in utilizing MI in the clinical setting include the time requirement of the intervention, the need for repeat sessions, and the lack of training in healthcare providers who often have no counselling background. In addressing this, Miller and Rollink describe adaptations of MI, such as brief advice and behaviour change counselling, that can be realistically applied in practice without mastering the overall method of MI.

According to Miller and Rollnick (2002), brief advice is an opportunistic encounter commonly used within the healthcare setting whereby a patient presents with a problem and the practitioner recommends a lifestyle change. The patient may not be directly seeking advice but the healthcare advice may be helpful. An example of brief advice in the context of hypertension is a patient coming in for a medication refill for an antihypertensive medication and the practitioner recommending that the patient reduce their dietary sodium. Whilst there is a role for brief advice in the healthcare setting, particularly in regards to time management, it tends to be practitioner-led and doesn't explore the patient's motivation, values and/or ambiguity related to lifestyle change. However, with a small shift of emphasis placed on respectful interactions and eliciting permission prior to offering information, the spirit of MI can be elicited even in this brief exchange.

Behaviour change counselling is another adaptation of MI described by Miller and Rollink (2002). This is an egalitarian, collaborative approach that may encompass advice giving within the process but is patient-centered and incorporates therapeutic skills, such as the use of open questions and reflective listening, in order to explore the patient's point of view. Behaviour change counselling is similar to MI with regards to the use of open questions and reflective listening; however, they differ in regards to the overall goal of the session. MI requires the practitioner to effectively utilize specific psychotherapeutic methods to "diminish resistance, resolve ambivalence, develop discrepancy, and trigger behaviour change" (p. 279); whereas the focus of behavioural change counselling is to understand the person's readiness to change and negotiate an agenda based on this.

Primary Healthcare and Nurse Practitioner Role

The above discussion on MI and adaptations of MI illustrate the potential utility of this behavioural counselling therapy within the context of hypertension treatment in the primary care setting. Approaching the treatment of essential hypertension with MI geared towards modifiable risk factors fits within a primary healthcare philosophy of respect for client autonomy. Furthermore, the impact of an aging population on the current healthcare system necessitates innovative change to meet the increased capacity (Romanow, 2002). Part of this transformation includes a shift to self-management of health conditions whereby nurse practitioners (NP) bring distinctive value in primary care, supporting people to live their best lives in health and illness (Pogue, 2007).

The family NP is in an ideal position to enrich chronic disease management across all populations because of on-average longer office visit times (Donald et al., 2010), and the focus of health promotion, preventative care, and management of chronic health conditions acquired from the nursing curriculum. Health promotion is foundational to the NP's practice; therefore, addressing hypertension beyond pharmacological treatment will help to lessen the burden of chronic illness on individual health and the healthcare system and meet our commitment to "focus on promoting, improving and restoring health" (College of Registered Nurses of British Columbia, 2011, p. 14).

As highlighted, the significance of hypertension on time and financial expenditures in relation to the healthcare system cannot be overemphasized. Furthermore, although it may not be given the necessary attention due to its widespread incidence and subtle presentation, hypertension contributes significant morbidity and mortality to the adult population throughout the world. The pathophysiology of essential hypertension is such that the cause appears to be

complex and multifactorial involving interplay between environment and genetics. Lifestyle modifications, such as weight loss, dietary changes, and physical activity are consistently woven into current recommendations regarding treatment. However, how to approach these lifestyle modifications with patients in the clinical setting is an important area of inquiry. Therefore, the aim of this integrative literature review is to answer the question, "Is MI within a primary care context an effective method in eliciting change relating to modifiable risk factors associated with hypertension?" MI is the focus of this review because it is a flourishing strategy being researched in many different areas of care and it has the potential to integrate seamlessly within the holistic, client-centered approach of NPs practicing in primary care settings.

Chapter 3: Methodology

The purpose of an integrative review of the literature is to answer a targeted clinical question by systematically identifying and then synthesizing available research on the topic in question (Crawford, 2012). Undertaking an integrative review requires assembling the literature related to a topic, including quantitative and qualitative evidence, and then comparing and contrasting the research in order to provide a synopsis of the knowledge base and identify any gaps in the knowledge (Davies & Logan, 2008; Whittemore & Knafl, 2005). The primary objective is to identify gaps in the literature and to provide recommendations for clinical practice and/or the need for more research. An integrated review was undertaken to respond to the question: Is MI within a primary care context an effective method in eliciting change relating to modifiable risk factors associated with hypertension? The following section will provide an overview of this process.

Integrative Review Process

The review process followed a step-wise approach with 1) the development of the research question 2) a preliminary search of the literature 3) a focused search with the development of inclusion and exclusion criteria and 4) analysis and reporting. An overview of each stage will be presented in the following sections.

Development of the Research Question

In order to develop the research question, the PIE acronym (population, intervention, evaluation) was utilized as a framework to guide the process of clinical inquiry (Davies & Logan, 2008).

Population: People With Hypertension

Intervention: MI

Evaluation: Risk Factor Modification

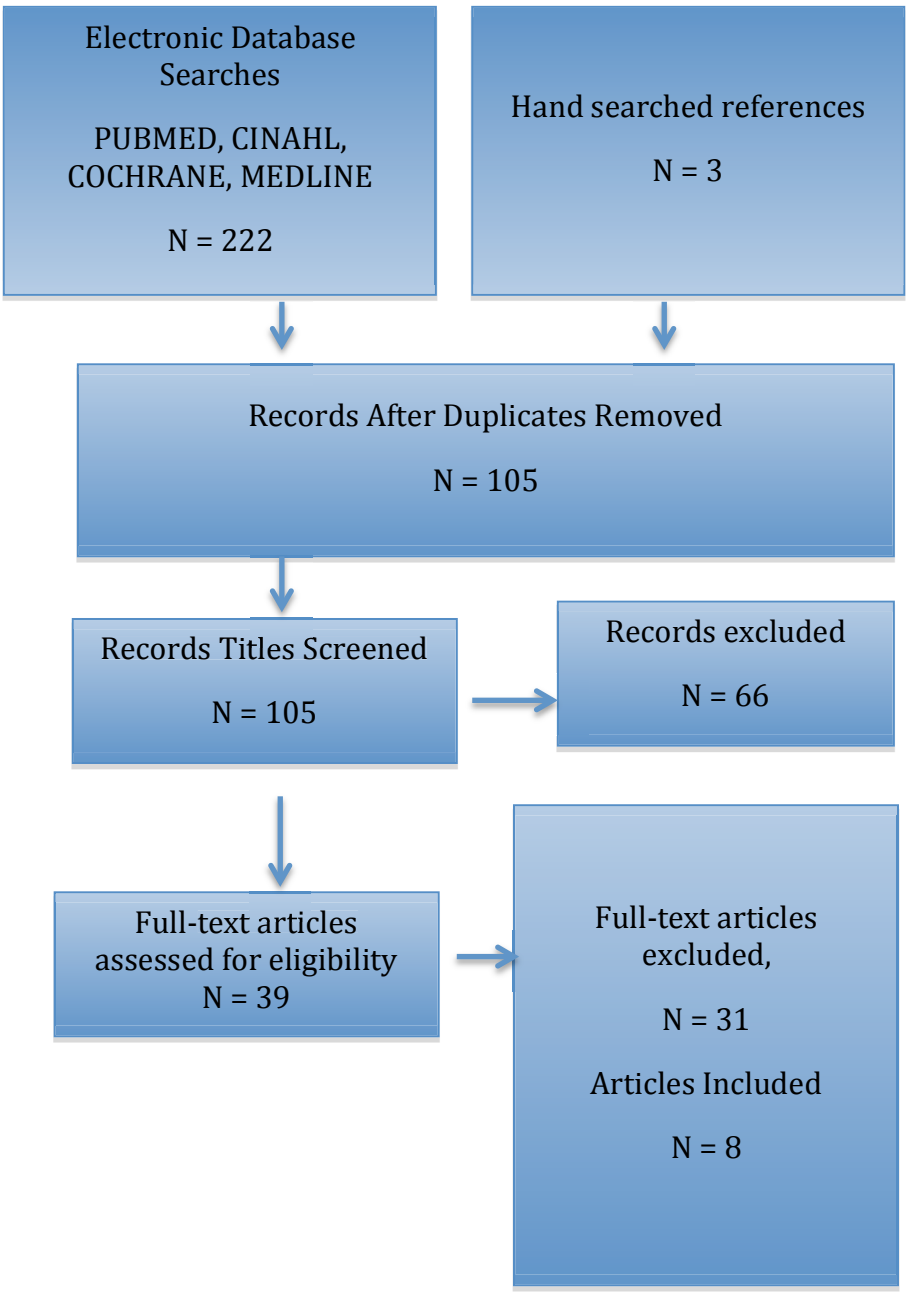
Search terms were extracted from the question with the addition of broader terms in order to ensure a wide search strategy. For example, although hypertension is the diagnosis of concern, the search strategy paired "hypertension" with "cardiovascular disease" as search terms. The search term "MI" was also paired with "counselling" and "cognitive behaviour" in order to uncover studies that may have used techniques consistent with the spirit of MI. The following sections will further discuss search terms, databases and eligibility criteria.

Preliminary Search

While completing the preparatory work, prior to formally undertaking the integrative review, local, national and global guidelines related to hypertension were sought and reviewed in order to assess the literature for current recommendations regarding lifestyle modification and hypertension. Specifically, The Canadian Hypertension Education Panel guidelines (Daskalopoulou et al., 2015), B.C. Guidelines (2015), the World Health Organization hypertension guidelines (2013), Heart and Stroke Foundation (2016) and Canadian Hypertension Association (2016) websites were reviewed. This type of literature is a consensus of research that has been studied and processed in order to facilitate best practice guidelines based on current evidence. These literature recommendations provided a basis for the feasibility of the research question examining the non-pharmacologic treatment of hypertension. A preliminary search of MI was also undertaken using Google Scholar in order to increase background knowledge of the technique and to identify other potential search terms to facilitate a comprehensive search.

In May of 2016, a search of the University of Northern British Columbia's library database was compiled. CINAHL, Medline OVID, PUBMED, and COCHRANE Reviews were accessed and searched using combinations of the following terms: Hypertension OR cardiovascular disease AND MI OR Cognitive therapy OR counselling AND cardiovascular risk factors AND primary healthcare. Appendix one is a table of the search strategy indicating the number of articles found per database as well as the search terms and BOOLEAN operators used. Table one is a schematic of the search strategy combining databases and total search results with subsequent numbers of relevant articles included once duplicates were removed and inclusion/exclusion criteria were applied.

Table one: Detailed Database Search Results



Focused Search

After the preliminary search was conducted a focused search was performed with the intent of eliminating articles not applicable to the integrative review. This was undertaken by screening title and abstract data using specific inclusion and exclusion criteria.

Inclusion Criteria. During the title and abstract search, eligibility was assessed based on an article's relevance to the research question. To be included, articles were to be focused on an adult population with MI or adaptation of MI as the main intervention and primary hypertension or unspecified cardiovascular risk factors as the main focus. The measurement of blood pressure as a primary or secondary outcome must have been included and the studies must be applicable to the primary care setting. Original peer-reviewed research was included with no limits on dates set due to the small volume of articles found.

Exclusion Criteria. Articles were excluded if they were not published in English and not available as full text from the University of British Columbia's online database. Further, articles that did not specify the use of MI, or otherwise adequately describe the philosophy as being consistent with the spirit of MI as discussed in the background section of this paper, were also excluded to preserve the integrity of the review. Likewise, articles that focused on another discipline (such as pharmacy), inpatient care, or other chronic illness (such as addictions, heart failure, or diabetes) were not eligible for inclusion. Finally, articles were excluded if blood pressure readings were not a measured outcome. After this first stage of elimination was completed, and duplicate articles were removed, 39 full-text articles remained. These articles were then assessed for eligibility. Studies that were highly relevant to the review question were identified and a hand search of reference lists were undertaken to ensure the thoroughness and rigor of the search. A final count of eight articles was selected to be included in this review.

Analysis and Reporting

A total of eight articles met the criteria for the purposes of answering the topic in question. Using the Critical Appraisal Skills Programme (CASP) tools (CASP UK, 2013), each article was assessed separately with the tool appropriate for it's design, methodological strengths, and outcomes. The CASP tools provide a framework from which to assess the quality of research and determine strengths and limitations of each study. Analysis from each article was then organized into a literature matrix in order to identify current themes related to the topic in question. Headings included in the literature matrix are as follows: research aim, study design & population, intervention/interventionist, measured outcomes, key findings, strengths/limitations, and miscellaneous. After a critical appraisal of each study was conducted and reviewed, four overall themes integrating the research emerged. These themes are as follows: support staff as interventionists; MI and treatment adherence; dose dependent effects of MI and physician adherence versus patient adherence. As such, the following section will report on these findings within the context of the above themes.

Chapter 4: Findings

The primary goal of this literature review is to examine the research regarding the effectiveness of using MI in the primary care setting to promote lifestyle change in hypertensive individuals. As such, a literature review was undertaken and as described in the previous section, eight research articles were selected and analyzed for quality and findings related to the above inquiry. The following discussion will examine and deconstruct the articles within the context of the emergent themes: clinic-based interventions; MI and medication adherence; dose dependent MI and hypertension; and physician adherence versus patient adherence. These will now be presented.

Clinic-Based Interventions

Clinic-based interventions using medical office assistants (MOAs) and Registered Nurses (RNs) was an unexpected theme that emerged from the analysis of the literature. Three articles were appraised that focused on the engagement of support staff as being a feasible mechanism to deliver MI in primary care. Support staff, for the purpose of this review, refers to office staff with varying degrees of autonomy and responsibility, such as MOAs and RNs, whom are employed in a primary care setting but are generally not the primary care provider. These three articles will be now be discussed.

The first article by Willard-Grace et al., (2015) describes a randomized controlled trial designed to test the effectiveness of using clinic-based MOAs trained in behavioural counselling in hypertensive patients. This study encompassed a 12 -month study of health coaching to hypertensive participants randomized to the intervention arm of the trial. The MOAs were each given 40 hours of training over six weeks with a curriculum designed by the study team; and although the authors do not use the term MI to describe the counselling approach; the curriculum

as described in the protocol for this study (Willard-Grace et al., 2013) is consistent with the philosophical underpinnings and processes of MI, specifically with regards to being patient-centered, eliciting patient knowledge and motivation, and exploring ambivalence within the counselling sessions.

The intervention consisted of the MOAs meeting with the patients prior to each office visit with their primary care provider. This pre-visit consisted of medication reconciliation, whereby reviewing patient knowledge and compliance and identifying barriers to medication adherence were discussed; agenda-setting, whereby the patient identified issues and priorities and the MOA shared (with permission) the issues of concern relevant to the patient; and lastly, laboratory results were reviewed with the patient. The MOAs then attended the office visit with the patient, where their role was to take notes, advocate for the patient, help prompt patients to remember questions or concerns, or alert the clinician to issues identified during the pre-visit. Finally, the MOA and the patient had a "post-visit" whereby the action plan was discussed and summarized. The MOAs were also required to check in with patients monthly and meet in person at least once every three months.

The study sample size was based on power calculations for the primary outcome and included 441 participants (mean age 52.7, SD 11.1, male n = 197) enrolled from two primary care clinics that serve San Francisco's low-income population. Randomization was undertaken by random binary sequence, stratified by diabetes diagnosis but not by site, whereby patients opened sequentially numbered envelopes after research assistants conducted a verbal interview and took updated clinical measures. Descriptive and inferential statistics were used to analyze the data with comparisons between groups, including *t* tests and Chi tests for continuous and categorical data with a p-value equal to 0.05 and a 95% confidence interval.

The primary outcome studied in this research was a composite of the proportion of patients who met at least one of the following targets for control for which the patient was uncontrolled at baseline: HbA1c of less than eight percent, a systolic blood pressure less than 140 mmHg if non-diabetic or less than 130 mmHg if diabetic, and predetermined cholesterol targets. Composite goals can be difficult to interpret but in this case all three outcomes could be deemed comparable and logically grouped. Secondary outcomes include the proportion of participants in each arm meeting the above goals for all uncontrolled conditions at baseline, the proportion meeting each of the individual goals, and finally the mean change in measured values. The analysis of the data revealed that the participants receiving the intervention were more likely to meet the primary composite measure of one of the clinical goals (46.4% vs. 25.4%, $p = 0.04$) and secondary composite measure of reaching all clinical goals (34% vs. 24.7%, $p = 0.05$) but in reviewing blood pressure as an individual goal, there was no significant change to readings.

Strengths of this study include the attention given to the fidelity of the MOA's training as discussed in the study protocol, although it is important to note the authors express concern regarding the quality of the intervention specific to one of the MOAs who was absent for eight weeks during the study and had reported difficulty establishing trusting relationships. One limitation of this study is that the researchers were not blinded to the patient assignment at the 12-month follow-up. However, the authors address this and state that there is low likelihood for bias due to the objective nature of the measurements. Another limitation of this study is that the population was largely Latino and African American people with low-incomes, which is important to consider when applying findings as it may limit the generalizability.

The second article by Ma, Zhou, Zhou and Huang (2014), describes a randomized controlled trial involving twelve Registered Nurses delivering MI to Chinese patients with

essential hypertension taking at least one antihypertensive medication. The aim of the study was to test the effectiveness of MI counselling compared to usual care for these patients. The twelve nurses were responsible for five patients each and met with their assigned patients for 30-40 minutes per session for eight sessions over six months. The nurses followed an MI-based counselling protocol and the patients were required to keep daily diaries recording information on medication adherence, dietary habits, physical activity, drinking and smoking, illness perception, physical, and mental health. Subsequent goals were developed based on the content of the diary during the counselling sessions.

The study included a convenience sample of 120 adult patients (mean age 58, SD 11. 68; male n = 59) with no significant baseline differences recruited from two community health centres in Guangzhou City, China. Randomization was achieved by having the eligible participants select a numbered envelope depicting which group the patient would be assigned to. The following clinical and laboratory outcomes were measured at baseline and post intervention: blood pressure, serum creatinine, cholesterol, and blood glucose; and treatment-adherence, quality of life, and self-efficacy were also measured at baseline and post intervention using the Treatment Adherence Questionnaire of Patients with Hypertension (TAQPH), the General Self-Efficacy Scale (GSES), and the Medical Outcomes Study 36-item Short Form (SF-36). The authors report that these questionnaires have been validated in previous studies. Analysis of the data was performed using descriptive and inferential statistics with independent samples *t*-test to examine differences between groups and paired samples *t*-test to examine differences within groups.

The analysis of the study data identified that there were significant ($p < 0.05$) differences in adherence related to medication use, dietary habits, smoking and alcohol use and physical

activity between the intervention and control groups. Additionally, there were significant decreases in systolic and diastolic blood pressure between the intervention and control group ($p = 0.011$; $p = 0.027$), and a significant drop between the baseline versus the post-intervention BP values for the MI group. There were no statistical differences in laboratory indices (serum creatinine, total cholesterol, triglyceride, low density lipoprotein, high density lipoprotein, fasting blood-glucose, and postprandial blood-glucose) between the two groups and within the subjects in the groups. The General Self-Efficacy Scale (GSES) scores were higher in the MI group, but they did not reach statistical significance ($p = 0.261$). However, the total scores of the SF-36 scale were higher in the MI group and did reach statistical significance ($p = 0.048$).

Strengths of the study include the authors description of the philosophy of MI used in the study, the quality of the nurses training in delivering the intervention as well as how fidelity was ensured during the trial by having each interaction audiotaped and reviewed by a trainer, who then provided written feedback on the audiotaped consultations to help the nurses improve their counselling skills. Although participating nurses could not be blinded, outcome assessors were not part of the study thus limiting potential measurement bias. Having said that, the authors do note that the nurses performing the intervention were acquainted with the nurses performing the usual care, which could lead to potential bias.

Limitations of this study include relying on only one blood pressure reading per visit instead of the recommended averaging of two to three readings per visit that most studies describe, and the short length of the intervention as Registered Nurses met with their assigned patients for 30-40 minutes per session for eight sessions over six months. This study was also underpowered as it was calculated that 110 participants were needed with a projected 10% attrition rate for a total of 120 patients; however, 14 participants left the study resulting in a

sample size of 106. The authors did use an intention-to-treat analysis but state that the missing cases most likely have an effect on MI results. Finally, this study population is limited to Chinese participants, illustrating a lack of sample diversity, which will impact upon the generalizability of the study findings.

The third study by Woollard et al., (1995) describes a randomized controlled trial that assessed whether a lifestyle modification program delivered by Registered Nurses in a general practice setting would improve blood pressure control in treated hypertensive patients. There were three arms to this trial: a control group, a low intervention group and a high intervention group. Over 18 weeks, the low intervention group had a single face-to-face appointment and then five 15-minute telephone counselling sessions versus the high intervention group that had six face-to-face counselling sessions lasting 45 minutes each. Both intervention groups also received a written educational manual to help reinforce goals and behaviour modification strategies. MI was specified as the counselling strategy used but the authors fail to discuss the training that the nurses' received or if there were any quality control interventions.

This Australian study had 166 participants (mean age 58, no SD reported, male n= 79) recruited from thirteen general practices with a wide socio-economic range, and the authors report no significant baseline differences. Sampling was by convenience and occurred with a practice audit of 13 general practices in the Perth metropolitan area identifying 566 treated hypertensive patients. These patients were sent a letter informing them of a practice BP programme and the first 219 patients available by telephone were invited to participate with 166 agreeing to enter the trial. Details of how randomization was obtained are not given. Statistical analysis was both descriptive and inferential using Chi-squared analysis of variance, Duncan's *t*-tests for post-hoc comparisons and linear regression. P-value was set at < 0.05 with 95%

confidence intervals. Measured outcomes include weight, urine sodium, alcohol use, and blood pressure. Interestingly, findings show that alcohol use and sodium intake were significantly lowered in the low intervention group and weight and blood pressure were significantly reduced in the high intervention group ($p<0.05$; exact p values not given).

This study uses the same interventions of MI at different doses delivered by nurses in a primary care setting. Strengths of the study include utilizing objective measurement data, such as height, weight, and 24-hour urine sodium. As well, recorded blood pressures were the mean of three measurements taken at three-minute intervals after sitting quietly for 10 minutes, which is consistent with current guidelines. However, there are several important limitations to this study. For example, the authors do not disclose who performed the baseline and post-intervention outcome assessments and whether these people were blinded, which could indicate potential for bias. Furthermore, there was no mention of rate of follow-up with study participants or attrition. Finally, there was no consideration of the use or initiation of antihypertensive medications during the study period.

The above three trials have the common theme of utilizing clinic staff as the interventionists delivering MI within the primary care setting. The studies differ in that two of them utilize Registered Nurses to deliver the MI, which is a professional role typically well versed in patient care and autonomy. The remaining study utilizes MOAs, which are generally not patient care providers. The similarity amongst these studies is that the interventionists are not the primary care providers but are providing the intervention in the primary care setting.

MI and Treatment Adherence

Many of the studies included in this review allowed patients to participate irrespective of whether taking antihypertensive medications. However, two studies examined the effects of MI

specifically on medication adherence. One of these studies is a randomized controlled trial by Ogedegbe et al. (2008) that looked primarily at the effect of MI on medication adherence and blood pressure. The authors of this study specify that the intervention delivered was MI conducted by trained research assistants. They briefly discuss measurements to ensure fidelity of the intervention through audiotaping and reviewing by a trained reviewer. The intervention was delivered over 30-40 minutes at three, six, nine, and twelve months. The primary outcome was adherence measured with electronic pill monitors and the secondary outcome was blood pressure from baseline to twelve months.

This randomized controlled trial included 190 hypertensive adult African American people (mean age 54, SD 11.35, male n= 12%) recruited from two community-based primary care practices in New York City. Eligible participants had to be on antihypertensive medication, have uncontrolled hypertension on two successive office visits and be fluent in English. A statistician undertook randomization, using sealed envelopes, with separate randomization schedules developed from a computerized random-number generator to assure equal numbers in each group. Descriptive and inferential statistics were used and following intent-to-treat principles, mixed effects regression models were used because missing data occurred in 16% of patients due to damage to the medication event monitoring system (MEMS) pill caps.

Overall results of the study show a significant decrease in medication adherence for the control group receiving usual care ($p = 0.006$) and an overall non-significant increase in adherence for the intervention group with a between-group difference of 13%. The results of the intervention on blood pressure showed a significant overall drop in systolic blood pressure of 5.1 mmHg between both groups and a further albeit non-significant drop in the intervention group of 6.1 mmHg ($p = .065$). There was also a significant drop in diastolic blood pressure of 3.5 mmHg

($p = .01$) overall, but no additional drop for the intervention group. In summary, the authors highlight that MI is a viable approach to increasing treatment adherence and improve outcomes in patients with hypertension.

Overall, strengths of the study include the twelve-month intervention interval and the use of the MEMS pill cap, which is considered a gold standard in objective medication adherence measurement. Furthermore, although research assistants and patients were not blinded, the outcome assessors were which is important in reducing the possibility of measurement bias. Limitations of this study include the limited generalizability because the population was predominantly low-income African American women. Furthermore, as discussed by the authors, the researchers did not have any mechanism in place to measure medication intensification, which is an important variable that could account for the lower systolic blood pressure. Finally, although the authors state that they didn't control the mechanism for blood pressure measurement to keep it realistic, inconsistency in measurement practices could influence results.

Similarly, the study by Ma et al. (2014) previously discussed under the heading, "clinic-based intervention" also examined treatment adherence as one aspect of their study. This was a randomized controlled trial with 120 participants. The intervention group received eight sessions of MI over six months by trained clinical nurses. However, with regards to medication adherence, instead of using an objective measurement such as the electronic medication cap, they used the Treatment Adherence Questionnaire of Patients with Hypertension (TAQPH) which the authors report has a content validity index of 0.93. This test uses a 4-point Likert-type scale and includes medication, diet, exercise, weight control, stimulation and relieving stress. Descriptive and inferential statistical analysis was done with independent *t*-tests and paired samples *t*-tests. Overall, the scores for medication adherence were significantly higher for the intervention group

versus the control group post-treatment with a p value of 0.039. There was also a significant increase in medication adherence from baseline to post-intervention within subjects of the intervention group. However as previously discussed, this study has many limitations such as only relying on one blood pressure measurement instead of the recommended averaging of a few and being underpowered for sample-size. Furthermore, recall for medication adherence relied on patient diaries, which may be susceptible to recall bias and a desire to report pleasing outcomes to healthcare providers, compared to an objective measure such as the MEMs cap utilized in the study by Ogedegbe et al. (2008).

The above two studies measured medication adherence after an MI intervention. The first study by Ogedegbe et al. (2008) measures medication adherence as a primary outcome and uses an objective measurement tool. The second study by Ma et al. (2014) measures medication adherence as a secondary outcome using a validated questionnaire. Both studies findings show a favourable effect of MI on medication adherence and subsequent blood pressure readings.

Dose Dependent Effects of MI

Another theme that emerged from the literature is dose dependent effects of MI on hypertension. Three randomized controlled trials examine if the "dose" of MI may affect the outcome. These three trials will each be discussed in the following section.

A randomized controlled trial published in 2013 by Hardcastle, Taylor, Bailey, Harley and Hagger using MI as the intervention had a number of aims, one of which was to determine the effect of counselling session attendance on maintenance outcomes. The study had two arms: an intervention group that received standard exercise and nutrition information plus up to five face-to-face counselling sessions versus a minimal intervention comparison group that received the standard information only. In keeping with the philosophy of MI, the researchers did not

assign a number of sessions to be attended for the intervention group but instead offered four opportunities over six months after the initial session. The other aims of the study included assessing if changes in outcomes lasted in a one year follow up (primary aim), as well as examining effects of the intervention on outcomes for subgroups presenting with specific cardiovascular disease risk factors; namely, a body mass index of 28 kg/m2 or above, hypertension or hypercholesterolemia. The interventionists in this trial included a physical activity specialist and a dietician who received training in MI techniques during two, four-hour sessions with one of the authors. The interventionists also audiotaped three consultations during the first two weeks of the trial, which formed the basis for a dialogue between the trainer and health professional on difficulties encountered. The authors state that the practitioners were trained to a minimally acceptable standard prior to commencement of the trial based on the established MI intervention protocol. However, a complete analysis of fidelity measures was not carried out during the intervention due to limited resources.

The trial used a convenience sample of 334 primary care patients (mean age 50.22, SD 0.58) recruited from a local primary care health centre database, whom were eligible if they had one of the cardiovascular risk factors as outlined above. The patients were randomized into the MI intervention and minimal intervention arms of the study by a statistician who developed a randomization protocol stratified by gender and age to ensure an even distribution of key demographic characteristics and to avoid groups that were unbalanced which may skew the analysis. There were no reported significant baseline differences in participants between the treatment and control groups, but when assessed for recruitment bias against those who declined participation, participants were found to be older with a mean age of 51, have a higher body mass index, and have lower systolic blood pressure and lower cholesterol levels. Outcome

measurements were performed at baseline, six months, and eighteen months and included: blood pressure, body mass index, fasting cholesterol, self-reported physical activity using the International Physical Activity Questionnaire, physical activity stage of change, and diet using the DINE scale to measure fat intake and the five-a-day community evaluation questionnaire. Statistical analysis was both descriptive and inferential with multiple steps undertaken. First the authors checked for bias in the samples arising from attrition with two one-way MANOVAs, followed by mixed model ANCOVAs for multiple comparisons in order to assess the effects of intervention on each of the variables separately followed by hierarchical linear multiple regression analyses to test for the effect of number of sessions attended on outcomes.

The analysis of the data for the primary aim of the trial showed significant increases in walking ($p=0.032$) and significant reductions in cholesterol ($p = 0.015$) that were maintained at 12 months post intervention for the intervention group; although the authors state that the mean difference of cholesterol of -0.16 mmol/l between groups cannot be interpreted as clinically significant. In relation to whether the dose of MI would increase the intervention effect, there were no significant effects for the dose of MI with the exception of triglyceride levels and hence there was no significant effect for the subgroup of people with hypertension identified in this study.

Strengths of this study included the collection of data at twelve months post intervention to assess for sustained effect. The authors also provided a thorough explanation of the key elements of the MI intervention. Furthermore, outcome assessors were blinded thus reducing bias. Limitations to this study include a low level of participation as only 28% of people contacted accepted the invitation to participate and as mentioned there were significant differences in those that joined the study. Furthermore, there was a low rate of attendance of the counselling sessions

with a mean attendance of two sessions and although this may mimic reality, the authors do acknowledge that with more resources the intervention may have had greater attendance if offered more frequently.

Similar to Hardcastle et al. (2013), the study by Schoenthaler et al. (2015) examines the dose dependent response to MI. However, this study evaluates a single session of counselling (SSC) enhanced with printed educational material versus an intervention of ten weekly group classes (intensive phase) on therapeutic lifestyle changes (TLC) followed by three individual MI sessions (MINT-TLC). The primary aim of this study focused on reduction of blood pressure between the two groups at six months and the secondary aim tested whether the intervention would result in greater improvements in blood pressure control over the single counselling group. The intervention was carried out by health educators trained in behavioural counselling techniques and the authors give a thorough description of the extensive training and fidelity measures taken in their study protocol (Schoenthaler et al., 2011).

The study population was hypertensive African American people and included a convenience sample of 194 participants (mean age 57, SD 10.2, males n = 96) recruited from a primary care practice out of Bellevue Hospital Center in New York City. Adult participants were eligible if they self-identified as African American, were fluent in English, and had uncontrolled blood pressure irrespective of antihypertensive medications. Participants were randomized under their primary care physicians; therefore an algorithm that has yielded balanced groups for multiple studies was used. Outcomes were measured at baseline, three, and six months and included blood pressure, medication adherence using a validated scale, and intervention adherence using attendance sheets.

The authors found that systolic and diastolic blood pressure declined significantly in both groups from baseline to six months with no significant differences between groups even with the addition of diabetes status and medication non-adherence as covariates. The net-adjusted reduction in systolic blood pressure by six months was 12.9 mmHg for the SSC group versus 9.5 mmHg for the MINT-TLC group and the reduction in diastolic blood pressure was 7.6 mmHg for the SSC group versus 7.2 mmHg for the intervention group. With regards to the secondary outcome, there were no significant group differences in the proportion of patients with adequate blood pressure control at 6 months ($p = 0.437$). Finally, the dose response analysis showed no significant dose-response effect, although only one third of patients randomized to the intervention group were considered "completers," which the authors define as attending eight or more sessions.

Limitations of this study include poor attendance levels specific to the MI arm of the trial, as only one third of participants attended eight or more group sessions and only 35% completed all three individual maintenance sessions with 32% not attending any session. In Contrast, 91% of patients randomized to the individual counselling session attended; however, the authors did show there was no significant dose-response effect upon analyses. Research assistants were not blinded to randomization assignment although the authors do state that there would be low potential for bias due to blood pressure readings taken on validated automated devices and hidden from research assistants and patients. There was also slight imbalance on baseline variables of diabetes and medication adherence between the two groups of participants, for example 38.5% of participants had diabetes in the SSC group versus 49.5% in the MINT-TLC group and 67.4% reporting medication non-adherence in the SSC group versus 79.6% in the MINT-TLC group. But as stated, these were calculated as covariates and sensitivity analyses

modeling these variables did not change overall findings. Finally, there was no usual care or "control" group although one could argue that an individual counselling session to a hypertensive individual should constitute usual care.

The third study by Miura et al. (2004) utilized a multicomponent program titled PACE (Patient-centered Assessment and Counselling for Exercise plus nutrition) adapted specifically towards the Japanese diet to test the effectiveness for treating patients with essential hypertension. The researchers recruited a convenience sample of 57 outpatients (mean age 62, SD 10, male n= 29) from the Department of Cardiology, Fukuoka University Hospital to one of three arms of the trial: 1) a PACE+ Japan follow-up group who were given an action plan sheet and also received systemic health counselling by a physician and counsellor every four weeks for 24 weeks, 2) a PACE+ Japan only group who were given an action plan sheet but did not receive the counselling, and 3) an age- and sex-matched control group for comparison. This trial does not specify that MI was the counselling technique utilized but the description of the characteristics of the counselling were deemed to be similar, such as patients identifying the areas that need work and controlling which targets he or she would like to improve. There were no investigations into the effectiveness of the counselling intervention either from an expert or participant opinion. Outcomes measured at baseline and post intervention include: height, weight, percentage of body fat, blood pressure, urine sodium, urine potassium, urine creatinine, and daily physical activity with an accelerometer.

Statistical analysis was descriptive and inferential using analysis of variance and Scheffe's multiple comparison test for continuous variables; Pearson correlation and Spearman correlation for correlations between variables; and multiple regression analysis for dependence on changes in systolic blood pressure on changes in other variables. $P = 0.05$ unless otherwise

indicated. The findings of this study show a significant drop in systolic blood pressure in the PACE + Japan follow-up group (-12+/-10 mmHg) versus the control group (-3+/-9 mmHg). There were no significant differences in diastolic blood pressure among the three groups (no p values given). There was also significant decreases in percentage of body fat, urine sodium and total energy intake and significant increases in total energy expenditure and exercise energy expenditure for the PACE + Japan follow-up group. Finally, changes in systolic blood pressure were positively correlated with changes in urine sodium in all patients ($p = 0.011$), leading the authors to state that their intervention may have been effective at reducing blood pressure by decreasing sodium intake in the PACE + Japan follow-up group.

Strengths of this study include the use of objective biophysical measurements as well as using an objective measure of physical activity. Limitations of this study include a small sample size of 57 participants as well as significant baseline differences in body mass index and percentage of body fat in the PACE + follow up group. Furthermore, the authors do not disclose how patients were recruited or how randomization was carried out, who the outcome assessors were or if blinding occurred, which highlights possible recruitment and/or measurement bias. Finally with the exclusion of p values, it was difficult to decipher results of the PACE+ Japan follow-up group compared to the PACE+ Japan only group, as these were not adequately discussed in the body of the paper.

In summary, the above three randomized controlled trials examined dose-dependent effects of MI on hypertension. The first study was unique in that five counselling sessions were offered and attendance was left open to the participants. The second study had a single session counselling group versus 10 weekly group classes followed by three individual MI sessions and the third study included 20 minutes of counselling at each hospital visit every 4 weeks for 24

weeks versus the low intervention group that received an action-plan sheet. Overall, MI had inconsistent dose-dependent effects on hypertension outcomes.

Physician Adherence versus Patient Adherence

In the review of the literature, one study was identified that sought to test interventions to increase physician adherence to national guidelines and interventions to increase patient adherence to lifestyle recommendations both as separate and combined interventions (Svetkey et al., 2009). The authors designed a nested two-by-two, randomized controlled trial where eight primary care practices composed of 32 physicians (mean age 48, SD of 10, male n = 21) were randomized to physician intervention or usual care. Within these practices, 574 patients (mean age 60.5, SD 11.4, male n = 39%) were randomized to patient intervention or usual care.

The physician intervention was comprised of two online training modules, a laminated summary of national guidelines to use in practice, self-monitoring, and quarterly feedback reports. Participants in the patient intervention group attended 20 weekly group sessions over six months using MI techniques by two experienced behavioural interventionists who are trained and certified in the use of MI techniques. Two community health advisors further followed up the patients with monthly phone calls for one year to offer brief lifestyle counselling after the initial intervention. Patients in the usual care group received one individual visit with an interventionist to receive advice and written materials on lifestyle modification to control hypertension.

The primary outcome was a change in systolic blood pressure from baseline to six months and the secondary outcomes were a change in diastolic blood pressure at six months, blood pressure change at 18 months, effect of treatment on weight loss, dietary pattern, physical activity, fasting blood glucose and lipids, and the proportion of patients with adequate blood pressure control. It should be noted that the original primary outcome was the proportion of

patients with adequate blood pressure control; however, due to an unanticipated 60% of participants being at goal blood pressure at baseline it was changed.

The findings of the study show an overall change of 0.3 mmHg on systolic blood pressure for those patients randomized to the physician intervention group, which did not reach statistical significance ($p = 0.72$). There was a significant reduction on systolic blood pressure of 2.6 mmHg for patients in the intervention group ($p=0.01$), which the authors attribute to dietary changes and weight loss based on significant improvements in these outcomes during the trial. The combined intervention group showed the greatest reduction of -9.7 +/- 12.7 mmHg ($p=0.03$) in systolic blood pressure illustrating that the interaction of the two interventions were the most effective. However, significant differences in blood pressure were not maintained at 18 months.

Strengths of this study include the nature of the combined intervention studying provider adherence to guidelines with an emphasis on lifestyle counselling and patient adherence to lifestyle modification. Limitations include physician self-reporting regarding lifestyle counselling which increases the risk of recall bias. Furthermore, patients that did not complete the study measurements were not included in analyses, although the authors note that the follow-up rate was greater than 91% at six months and 88% at 18 months and sensitivity analyses assuming no change in blood pressure in those that didn't complete demonstrated similar results. As mentioned, 60% of participants had controlled blood pressures at baseline, which highlights what the authors' state as a relatively healthy cohort with limited comorbidity. This coupled with the fact that only ten percent of eligible participants were randomized highlights the possibility of recruitment bias and limited generalizability of the result.

This study was unique in that it looked at both provider and patient interventions with regards to improving blood pressure. The study looked at each intervention as a separate entity

and then combined the interventions for the most effective result on blood pressure and furthermore the most reflective of a collaborative partnership in primary care.

Summary

A comprehensive review of the literature identified eight core articles that explored the use of MI for the management of risk factors relating to hypertension in the primary care setting. A critical appraisal of the articles was undertaken and a concise overview of the findings, in addition to the strengths and weakness of the evidence has been presented. As discussed in the methods section of this paper, these studies were chosen against a set of criteria as follows: adult population, MI or intervention with the "spirit" of MI, and blood pressure as an outcome. All of the studies have very unique features related to how MI is delivered, how many sessions of MI are used, ethnicity or socioeconomic status of population sample, and primary and secondary outcomes. However, four themes enabling these studies into groupings emerged upon review of the literature: clinic-based intervention; MI and treatment adherence; dose dependent effects of MI; physician adherence versus patient adherence. Hence the eight studies are presented and critically reviewed above with the context of these four themes. The following section will discuss these findings and will continue to identify recommendations for practice, research and education.

Chapter 5: Discussion and Conclusion

Hypertension places a burden both on the individual, with its potential for increased morbidity and mortality, and the healthcare system, with its heavy toll on human and economic resources (WHO, 2013). Hypertension accounts for over 20 million visits to primary care offices in Canada each year and consumes a vast amount of healthcare dollars (PHAC, 2010). Globally, hypertension is considered a major public health issue, as complications of hypertension account for 9.4 million deaths worldwide every year (WHO, 2013). Whilst the etiology of primary hypertension is considered multifactorial, it can partly be viewed within the context of lifestyle choices. Global rates of hypertension are rising and the WHO (2013) attributes this increase to population growth, aging and the presence of behavioural risk factors, notably unhealthy diet, harmful use of alcohol, lack of physical activity, excess weight, and exposure to persistent stress. Contemporary guidelines support health behaviour management as a key component in effectively treating hypertension (Daskalopoulou et al., 2015; James et al., 2014; WHO, 2013). However, clear guidelines on best practice related to how health behaviour management should be approached in primary care practice are lacking. MI has been identified as a potential mechanism to promote self-management and health lifestyle practices that can prevent and manage hypertension in the community context (Ma et al., 2014).

MI, originally developed for the field of addiction medicine, is being utilized in other areas of medicine such as asthma, diabetes, physical activity, weight loss, treatment adherence and follow-up. MI, based on collaboration, is a person-centered, non-authoritarian counselling style designed to strengthen a person's motivation for change towards a clearly identified goal (Hall, Gibbie & Lubman, 2012). Working in primary care involves collaborative delivery of healthcare with the forefront goals of health promotion and disease prevention.

Techniques that engage patients as partners in their healthcare and support the development of effective self-management are known to give rise to improved outcomes (Linden, Butterworth & Prochaska, 2010). MI is an evidence-based tool that is realistic for primary care practitioners to incorporate into the counselling component of their practice. Because primary hypertension is responsive to lifestyle modification, it is well within the NP role as primary care providers to utilize a behavioural change method such as MI in practice. It is this line of inquiry that led me to explore the research question: Is MI within a primary care context an effective method in eliciting change relating to modifiable risk factors associated with hypertension?

In a comprehensive search and review of the literature, MI was found to be a promising clinic-based model for the management of primary hypertension. Eight studies were identified and reviewed. Following a critical appraisal of the literature findings, five of the eight studies captured in the review highlight significant decreases in blood pressure related to the MI intervention (Ma et al., 2014; Ogedegbe et al., 2008; Schoenthaler et al., 2015; Svetkey et al., 2009; Woollard et al., 1995) and one study illustrated a non-significant decrease in systolic blood pressure (Miura et al., 2004). The remaining two studies showed no effect on blood pressure but did illustrate other efficacious effects on cholesterol, exercise capacity specifically minutes of walking per week and HbA1c levels (Hardcastle et al., 2013; Willard-Grace et al., 2015). The following section will discuss implications of these findings related to clinical practice, education and research.

Implications for Clinical Practice, Education, and Research

Outcomes gathered from the analysis of the literature serve to highlight recommendations to promote the transition from theory to clinical practice, inform educational guidelines, as well as highlight areas for further relevant research.

Discussion and Implications for Clinical Practice. The following section will discuss the key findings of this review and their implications for clinical practice. These will be discussed in relation to the four themes generated from the analysis of the literature: clinic-based interventions; MI and treatment adherence; dose dependent effects of MI; and physician adherence versus patient adherence.

Clinic-based interventions. The studies analyzed as part of this review incorporated MI interventions that varied in duration and format. For example, the time range of the MI intervention varied from 15-45 minutes and included interventions offered in person to those delivered remotely by telephone. In the real world setting, a primary care practitioner may have approximately ten minutes to address a behavioural change issue with a patient (Emmons & Rollnick, 2001); and Emmons and Rollnick (2001) acknowledge that even simplified adaptations of MI in the clinical setting will likely take longer than the traditional advice-giving approach, representing a potential limitation when delivering MI in this setting (Miura et al., 2004). Furthermore, the findings of the captured studies documented varied delivery processes. For instance, some were delivered by trained RNs (Ma et al., 2014; Woollard et al., 1995;), while others were delivered by trained research assistants (Ogedegbe et al., 2008) or health educators (Schoenthaler et al., 2015)). Despite this variation in approach, MI interventions had largely successful outcomes on blood pressure readings and could be included in clinical practice using an interdisciplinary approach. For instance, clinic-based interventions utilizing a collaborative interprofessional team approach, such as RNs and physicians, to co-deliver MI may be one way to overcome the time constraints in the primary care setting. Furthermore, a collaborative care model has the conceivable benefit of improving access, efficiency, and quality of care whilst "empowering patients to enhance their role in prevention and self-care" (Canadian Medical

Association, 2007, p. 5). Further, while the two studies utilizing RNs to deliver the MI showed a positive effect on blood pressure (Ma et al., 2008; Woollard et al., 1995), the study utilizing MOAs showed no effect on blood pressure (Willard-Grace et al., 2015). It is difficult to speculate the underlying reason for these different results, as the three studies reviewed are diverse in their delivery of MI regarding dose, intervention length, and follow-up.

In reviewing the global literature on MI, one large systematic review and meta-analysis of 72 randomized controlled trials using MI with various lifestyle problems and diseases (Rubak, Sandboek, Lauritzen & Christensen, 2005) states that psychologists and physicians obtained an effect in approximately 80% of the studies reviewed, while other healthcare providers (nurses, midwifes, dieticians, other healthcare providers) obtained an effect in 46% of the studies. However, similar to this review which identified the diverse nature of interventions and study processes, the authors acknowledge that some of this discrepancy is most likely due to the design of the studies relating to the frequency of encounters, intervention dosage, and short follow up periods. The authors further emphasize that effects of MI are likely related to duration and number of client-counsellor encounters, training and experience of MI methods, and client-counsellor relationships. If this is the case, the family NP would be in an ideal position to incorporate a behavioural counselling strategy such as MI into practice, given the NP's holistic focus on health promotion and prevention, longitudinal relationships in the family practice setting, and longer than average consultation times (College of Registered Nurses of Nova Scotia, 2016; Horrocks, Anderson & Salisbury, 2002). For example, studies have demonstrated high patient satisfaction associated with the NP role and practices (Stanik-Hutt et al., 2013). One Canadian study focused on chronic disease management among four different models of primary health care delivery in Ontario (Russell et al., 2009). The authors state that one of the key

findings across the whole sample was "high-quality chronic care delivery was more likely with the presence of a nurse-practitioner" (p. 315). These positive client-provider relationships may further support the success of MI interventions for those with primary hypertension and other chronic diseases. As such, NPs should harness their capacity when working with patients with chronic health challenges thus helping to cement the NP's unique contribution and value within the health care system.

MI and Treatment Adherence. Treatment adherence, particularly regarding medications, is a well-documented problem in the management of chronic diseases (Daskalopoulou et al., 2015). Medications often play an integral role in hypertension treatment with many patients requiring combination therapy of one or more pharmaceutical agents (WHO, 2003). As discussed in the background section of this paper, it is known that approximately 10% of antihypertensive doses are omitted daily (Vrijens et al., 2008) and Alhalaiqu, Deane, Nawafleh, Clark and Gray (2010) state that only 50-70% of patients take their prescribed antihypertensive medications. There are likely many contributing factors implicated in adherence behaviours, such as complexity of medication regimes, socioeconomic status, patient demographics, side effects, knowledge and illness beliefs (Alhalaiqu et al., 2010; Aslam & Feldman, 2015). The complex issue of adherence behaviour undoubtedly influences the efficacious control of hypertension (Alhalaiqu et al., 2010). Lack of control of blood pressure could give rise to unnecessary complications and increases in morbidity and mortality as highlighted in the landmark studies on blood pressure control, such as the SPRINT trial (The SPRINT research group, 2015).

Based on the two studies that explored medication adherence analyzed in this literature review, MI is likely a worthwhile counselling technique for medication adherence especially if related to perceived self-efficacy. Self-efficacy "refers to patients' perception of their ability to

follow a treatment plan" (Aslam & Feldman, 2015, p. 327) and MI in this case can help a patient reach his or her own conclusions regarding the link between medication and health. The results of the two adherence studies (Ma et al., 2014; Ogedegbe et al., 2008) that overall support the use of treatment adherence modalities (one significantly and one non-significantly) mirror other areas of study specific to HIV patients and highly active antiretroviral therapy (HAART), which requires strict adherence of 95% of doses to be taken correctly (Rapid Response Service, 2014). For example, in a two-arm, randomized, controlled trial by Golin et al. (2006), 140 adults with HIV were randomized to either a MI-based intervention or an HIV informational control program to assess improvement of adherence to antiretroviral therapy. An analysis of the study data revealed an overall, albeit non-significant increase in medication adherence in the intervention group using MI, in contrast to an overall decrease in the control group. Another retrospective study examined an interdisciplinary HIV-adherence program that utilized pharmacists to deliver the MI intervention as well as electronic drug monitoring to 104 patients (Krummenacher, Cavassini, Bugnon & Schneider, 2011). An analysis of the study data showed high adherence rates with persistence of therapy at 87% and an overall increase in undetectable viral loads in patients.

In summary, MI and medication adherence is an important area of inquiry and requires more research into optimal technique, duration, and measurement tools. For example, some studies utilize objective measurement tools, such as the MEMS pill caps, whereas other studies rely on more subjective tools, such as patient diaries. Another important area of inquiry includes the intensification of medications and how complicating medication regimes by increasing dosages or adding medications may impact adherence behaviours. Despite the need for further research in this area, NPs could utilize adaptations of MI in clinical practice by exploring the

patient's willingness to discuss the purpose of medication and the importance of adherence to medication regimes.

Dose Dependent Effects of MI. The clinical trials included in this literature review are all unique with regards to the delivery of the MI intervention. However, three randomized controlled trials looked specifically at the dose response of MI on measured outcomes (Hardcastle et al., 2013; Miura et al., 2004; Schoenthaler et al., 2015). All of these trials have similarities in that they provide written educational materials reinforcing lifestyle changes to the intervention groups. However, they differ with regards to the MI intervention: one trial offered up to five face-to-face counselling sessions of MI (Hardcastle et al., 2013); one offered a single counselling session versus an intervention of ten weekly classes followed by three individual MI sessions (Schoenthaler et al., 2015); and the last study offered six sessions of health counselling (Miura et al., 2004). The results of these trials are ambiguous as one study showed no significant effect on blood pressure outcomes (Hardcastle et al., 2013), while another indicated significant changes in both the high and low intervention groups with no significant difference between the two (Schoenthaler et al., 2015) and finally, the last trial showed significant difference in the MI group in comparison to usual care (Miura et al., 2004). An important factor in looking at these three trials specifically is that attendance was extremely variable. While this may mimic "real world" clinical practice, it makes it difficult to interpret which facets of these complex interventions are effective and give rise to improved clinical outcomes. For example, although the trial by Hardcastle et al. (2013) offered five sessions of MI, only a mean of two were attended. The trial by Schoenthaler et al. (2015) also had poor attendance specific to the high intervention arm and the trial by Miura et al. (2004) did not discuss attendance.

In looking at other literature, one systematic review and meta-analysis by Rubak et al. (2005) included 72 randomized controlled trials on MI in many different areas of disease, such as addictions, psychiatric illness, asthma, and weight loss. Review criteria included randomized control trials that had some description of the methods and delivery of the MI intervention as well as utilizing traditional advice giving as the control. The authors found that longer MI encounters of 60 minutes were more effective than shorter MI encounters of less than 20 minutes (81% versus 64%) but the authors further state that MI can be effective in brief encounters of 15 minutes and that more sessions attended increase the likelihood of effect. In contrast, a systematic review by Lundahl et al. (2013) critically appraised 51 studies utilizing MI as the intervention in medical settings. They reported that the number of MI sessions was unrelated to outcome. Further research that examine the impact of MI dose and duration of treatment would further solidify knowledge in this field and would provide important guidance for practitioners looking to integrate MI into their clinical practice.

Physician Adherence versus Patient Adherence. In this review, only one of the eight studies explored a physician quality control intervention, a patient lifestyle intervention and a combination of the two (Svetkey et al., 2009). This is an important area of inquiry because it acknowledges the responsibility of both the provider and the patient when working collaboratively towards a health goal. The results of this trial are interesting in that each intervention alone did not produce large reductions in blood pressure although the patient intervention group did reach a significant reduction of -2.6 mmHg systolic blood pressure. However, the combined intervention showed the greatest reduction in systolic blood pressure of -9.7 mmHg +/- 12.7 mmHg highlighting a possible additive effect of provider adherence on patient adherence. In a related study that did not use MI, and was therefore not included in this

review, the analysis of the study findings revealed similar effects of a combined intervention (Roumie et al., 2006). In this study, three trial arms were compared: provider education; provider education and alert; and provider education and alert and patient education. The greatest effect was seen in the combined intervention arm of the trial where patients who achieved goal blood pressure reached significance (42% versus 40.9% versus 59.5%, p=0.003).

The above results of combined provider and patient interventions warrant further research into the potential additive effects on blood pressure. As stated above, combined interventions acknowledge the dual responsibility in the collaborative patient/provider relationship. Provider interventions may help to ensure that practitioners are utilizing evidence-based practice and thus providing optimal care to their patients. Unfortunately, the utilization of evidence-based guidelines in practice cannot be presumed. To highlight this, one study by Bell and Kravitz (2008) analyzed transcripts of audio-recorded outpatient visits to physicians and found that fewer than three out of ten patients were even given a blood pressure goal or given any information regarding the consequences of uncontrolled blood pressure or received any lifestyle counselling. Utilizing evidence-based practice is fundamental in primary care but especially vital to the NP profession that is establishing credibility and trust alongside patients and other health care professionals.

Discussion and Implications for Education. Core competencies of the NP role as set out by the College of Registered Nurses of British Columbia (2017) state that NP's: "Advocate[s] for and create[s] an environment that facilitates learning and maximizes client participation and control of their own health, including living with chronic disease and meeting their own health needs" (p. 31). As such, MI would be a viable clinical model for NPs and other primary care providers and healthcare professionals to utilize in meeting competencies

associated with working in collaboration with patients and delivering patient-centered care. The formal inclusion of MI into healthcare professional education programs, including NP and medical education, would be one way to ensure that primary care professionals are adequately prepared for optimal use of this valuable technique. The need to attend to the theoretical components of MI is evident; however, in their book on MI, Miller and Rollnick (2002) caution that "a traditional training format is analogous to the very same expert model that we seek to avoid in our counselling" (p. 180). Instead they advocate learning from client interactions, role-playing, practice and feedback. In addition, VanBuskirk and Wetherell (2014) further state that MI is not a cookie cutter set of techniques to be thrust upon patients but instead an approach that emphasizes patient expression of their own reasons for change through collaboration. Therefore, integrating the guiding principles of MI into healthcare professional education early on may be one way to ensure the seamless transition to utilizing MI in clinical behaviour change encounters. As NP students and other primary care trainees may not have the clinical experience to draw upon, MI skills could be taught with the goal that these skills form the basis of communication with patients throughout the student's education and clinical practice.

Discussion and Implications for Research. Through this review, and the discussion of the findings with respect to its application to practice, a number of areas for further research have been identified. First, methodological variations, including the highly diverse dose and delivery of MI interventions weakens the evidence base and makes it challenging for providers to form judgements with respect to how to integrate MI into clinical practice. Variation in practice is evident in the literature with one large study evaluating performance on 439 indicators of quality of care for acute conditions, chronic conditions and preventive care (McGlynn et al., 2003). Results of this analysis illustrated that participants received 54.9 percent of recommended care

with little variation amongst acute versus chronic versus preventative care. When reviewing hypertension specifically, the authors stated that treatment, including lifestyle modification and medications, was underused (McGlynn et al., 2003). As discussed, provider quality control interventions would help ensure evidence-based practice is utilized leading to a decrease in variation in practice.

Second, a predominant goal of this literature review was to assess the efficacy of MI for hypertension in primary care settings, however many of the studies would be difficult to integrate into clinical practice in the primary care setting because of the study design, such as duration and frequency of intervention. As such, further research into clinically viable methods of delivering MI in the clinic setting is needed. Furthermore, to explore the use of MI specifically by primary care providers, research studies inclusive of NPs, would further contribute to the existing body of evidence.

Third, an appraisal of the studies illustrated that those, which include biometric measurements in addition to qualitative tools, achieved a more balanced and explanatory set of results. These were found to go beyond the traditional clinical outcomes to also include patient-oriented outcomes and perspectives. Further research should strive to include quantitative and qualitative data that can expand our understanding of the impact of MI upon the management of hypertension. These should also include patient-oriented outcomes and perspectives, to examine the acceptability of these interventions, since this would impact upon the broader patient and clinical outcomes. Furthermore, including a patient lens is critical, particularly when looking at research within the context of visible minorities, which may have differing viewpoints of health.

Fourth, fidelity of MI technique is an important consideration when assessing research in this domain as the studies do variable jobs of reporting on it. Six of the eight studies do mention

some effort at fidelity measures, such as MI trainers reviewing videotaped sessions and providing feedback to the interventionists; however, none of the studies appear to utilize a treatment coding tool such as the *MI Treatment Integrity Coding Manual 4.2.1* (Moyers, Manuel & Ernst, 2015). This tool consists of scales to assess the clinician's MI skill and would therefore illuminate whether an intervention is in fact delivering what it seeks to. Interestingly, authors of one systematic review report that treatment fidelity is inversely proportional to effect size in their meta-analysis (Lundahl et al., 2013). They hypothesize that this could be due to interventions not actually being consistent with MI, or conversely that MI may be easier to implement than thought, discarding the theory that fidelity monitoring is necessary. Therefore, research into the necessity and development of fidelity tools when using MI as an intervention would help to establish clarity on whether researchers are actually delivering what they claim.

With regards to the Canadian context of this review, research on Indigenous Canadians, visible minorities, and immigrant populations would be salient as close to one-fifth of the Canadian population are members of a visible minority group (Khan, Kobayashi, Lee & Vang, 2015). Furthermore, although research about visible minorities and health is lacking, it is known that certain ethnic groups have a susceptibility to hypertension above others (Khan et al., 2015). It is also well accepted that health discrepancies exist for Canadian Indigenous peoples compared to non-Indigenous Canadians with obesity, dyslipidemia, hypertension, and diabetes being common even in young adults (King, 2010). In one study by Bruce, Riediger, Zacharias and Young (2011) looking at obesity and related comorbidities in a Canadian First Nation population, 22% of participants had undiagnosed hypertension and had subsequently significantly more chronic conditions including microalbuminuria.

When viewing health disparities specific to Indigenous populations, it is vital that healthcare providers, educators, and organizations acknowledge and respect the work of the Truth and Reconciliation Commission of Canada (2015), which acknowledges that health disparities are "a direct result of previous Canadian government policies, including residential schools" (p. 322). Furthermore, one of the Commission's calls to action specifies that medical and nursing programs be required to teach a course on Indigenous health issues requiring "skills-based training in intercultural competency, conflict resolution, human rights, and anti-racism" (p. 323). Incorporating this lens, along with MI, may further assist providers in caring for populations at risk, or suffering from, hypertension.

Research specific to the above visible minorities, is a necessity in order to acknowledge and examine the unique social determinants of health related to "cultures, histories and colonization, and the current social, economic, political and geographic context (King, 2010, para. 1). It is through this promotion of understanding of the unique challenges faced by minorities that development of appropriate and inclusive healthcare interventions that address disparities, promote equity and improve the health outcomes of all Canadians may occur.

In summary, key recommendations for clinical practice take into consideration that MI in the clinical setting related to hypertension requires more research into optimal dose, duration, method of delivery, and fidelity measures. Despite this, some key recommendations gained from this review support the utilization of MI or adaptations of MI into clinical practice as Rubak et al. (2005) state that no studies have reported any adverse effects or harm associated with MI. MI in clinical practice may need to be an interdisciplinary process in order to overcome time constraints, or MI may be feasible in an NP's practice, which may have greater flexibility with office appointment times. The utilization of behaviour change techniques, such as MI, by NPs

may help highlight the role's unique contribution and value to the health care system. All of the studies included in this review are randomized controlled trials, and the addition of qualitative research regarding MI would add valuable data, such as patient perspectives into the MI literature. Other key recommendations include the formal addition of MI into healthcare profession's educational preparation in order to solidify a foundation of behaviour change techniques. Furthermore, regarding a Canadian context, education and research specific to Canadian Indigenous people and visible minorities is vital in understanding health issues facing many Canadians as well as supporting the health of all Canadians. Please see appendix 2 for a summary of recommendations.

Limitations

Potential limitations of this review include the lack of literature related to the Canadian context. The studies included in this review vary regarding geographical location and ethnicity of participants and this should be acknowledged when applying findings within a Canadian context. Furthermore, while every attempt was made to undertake a thorough search, it is possible that some sources may have been overlooked. This review had a small number of studies included, given the inherent variation in the literature, and as a result it is challenging to make concrete recommendations for NP practice and thus further research in the field is needed to address these gaps.

Conclusion

Hypertension is a chronic health condition that accounted for over 20 million patient visits to primary care clinics in 2007 (PHAC, 2010). Despite it being the most common reason to visit a physician, hypertension is often silent and has the potential to inflict serious organ damage on those who may not be aware that they have it (Hammer & McPhee, 2014). The costs to the

healthcare system, the economy, as well as on individual quality of life (WHO, 2013), necessitate research into the prevention and treatment of hypertension. Current evidence recommends the inclusion of lifestyle modifications for all hypertensive patients and lifestyle modification may be adequate treatment if it is caught in the early stages (Daskalopoulou et al., 2015; James et al., 2014; World Health Organization, 2003). The focus of this literature review is therefore geared toward lifestyle modification in the context of hypertension in primary care which led to the inquiry: Is MI within a primary care context an effective method in eliciting change relating to modifiable risk factors associated with hypertension? In order to answer this inquiry a thorough literature search was conducted using the CINAHL, Medline OVID, PUBMED, and COCHRANE Reviews databases. A total of eight relevant articles were selected for inclusion. These articles were then critically reviewed using the CASP tools in order to highlight study strengths, weaknesses and overall findings.

Based on the critical analysis of the eight articles, key outcomes were revealed regarding the use of MI and hypertension. Overall, MI shows great potential in its utility in primary care for hypertensive patients with the majority of studies showing positive results on blood pressure. However, further research needs to be undertaken looking at uniformity of the MI intervention in order to establish clearer guidelines on optimal length and number of sessions; utilizing the primary care provider as the interventionist; and research on Indigenous populations and visible minorities. Further research will help to establish the utility of MI in the clinical setting and thus provide primary care providers and patients a tool that can be learned and used with confidence when collaborating on behavioural change in the context of hypertension.

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Appendix 1. Summary of Search Strategy Methodology

Date	Database	Search Terms/ Boolean operator	Results
May 6, 2016	CINAHL	Hypertension AND MI; AND cardiovascular risk factors	29; 4
May 1st 2016	Medline OVID	Hypertension AND MI; AND primary care Hypertension AND Cognitive therapy OR counselling AND primary healthcare	14; 3 54
May 6th 2016	PUBMED	Hypertension OR Cardiovascular Disease AND MI; AND cardiovascular risk factors	32; 9
June 13th, 2016	COCHRANE	Hypertension AND MI; Hypertension AND MI AND nurse practitioners; Cardiovascular disease AND MI	66; 3; 62

Appendix 2: Article Matrix

Authors	Title	Methodological Approach	Rationale for Inclusion/Exclusion
Fisher, Fitzgibbon, Glasgow, Haire-Joshu, Hayman, Kaplan, Nanney & Ockene (2011)	Behaviour Matters: Summary of evidence	Evidence summary	Excluded: not a study and no focus on hypertension or MI
Stenman, Leijon, Calling, Bergmark, Arvidsson, Gerdtham, Sundquist & Ekesbo (2012)	Study Protocol: A Multi-profession team intervention of physical activity referrals in primary care patients with cardiovascular risk factors – the Dalby Lifestyle Intervention Cohort (DALICO) study: study protocol in 2012	Randomized controlled trial	Excluded: Study has not concluded as of yet
Ogedegbe, Tobin, Fernandez, Cassells, Diaz-Gloster, Khalida, Pickering & Schwartz (2014)	Counseling African Americans to Control Hypertension: Cluster-Randomized Clinical Trial Main Effects	Cluster-randomized Clinical trial	Excluded: Intervention not consistent with MI
Svetkey, Pollak, Yancy, Dolor, Batch, Samsa, Matchar & Lin (2009)	Hypertension Improvement Project: Randomized Trial of Quality Improvement for Physicians and Lifestyle Modification for Patients	Randomized controlled trial	Included: Stated the intervention was MI and was delivered by trained specialists
Kastarinen, Puska, Korhonen, Mustonen, Salomaa, Sundvall, Tuomilehto, Uusitupa & Nissinen (2002)	Non-pharmacological treatment of hypertension in primary health care: a 2-year open randomized controlled trial of lifestyle intervention against hypertension in eastern Finland	Randomized controlled trial	Excluded: No correlation with MI
Ruzicka, Hiremath, Steiner, Helis,	What is the feasibility of implementing	Systematic Review of 6 trials	Excluded: Does not identify counselling

Szczotka, Baker & Fodor (2014)	effective sodium reduction strategies to treat hypertension in primary care settings? A systematic review		methods as MI and states that none of the counselling methods were feasible for application in primary care settings
Bell & Kravitz (2008)	Physician counselling for hypertension: What do doctors really do?	Qualitative analysis of transcripts of audio-recorded outpatient visits, augmented with patient and physician surveys	Excluded: as did not utilized MI as intervention or have BP as measurable outcome
Hardcastle, Taylor, Bailey, Harley & Hagger (2013)	Effectiveness of a MI intervention on weight loss, physical activity and cardiovascular disease risk factors: a randomised controlled trial with a 12-month post-intervention follow-up	Randomized controlled trial	Included: uses MI in primary care settings and BP is measureable outcome
Schoenthaler, Luerassi, Teresi, Silver, Kong, Odedosu, Trilling, Errico, Uvwo, Sebek, Adekoya & Ogedegbe (2011)	A practice-based trial of blood pressure control in African Americans (TLC-Clinic): study protocol for a randomized controlled trial	Randomized controlled trial	Excluded: trial protocol
Miura, Yamaguchi, Urata, Himeshima, Otsuka, Tomita, Yamatsu, Nishida & Saku (2004)	Efficacy of a Multicomponent Program (Patient-Centered Assessment and Counseling for Exercise plus Nutrition [PACE + Japan]) for Lifestyle Modification in Patients with Essential Hypertension	Randomized Controlled Trial	Included: description of the characteristics of the counselling were deemed to be similar to MI
Artinian et al. (2010)	Interventions to promote physical activity and dietary lifestyle changes for cardiovascular risk factor reduction in adults: A scientific	Scientific Statement	Excluded: not a study

	statement from the American Heart Association		
Campos-Outcalt (2014)	Diet, exercise, and CVD: When counselling makes the most sense	Practice Alert	Excluded: not a study
Niiranen, Leino, Puukka, Kantola, Karanko & Jula (2014)	Lack of Impact of a Comprehensive Intervention on Hypertension in the Primary Care Setting	Randomized Controlled Trial	Excluded: the participants were instructed on how to change their diet, the amount of exercise and weight loss and alcohol use. Specific lifestyle goals were used. This is not consistent with MI and the authors do not state that MI was used.
Roumie, Elasy, Greevy, Griffin, Liu, Stone, Wallston, Dittus, Alvarez, Cobb, Speroff (2006)	Improving Blood Pressure Control through Provider Education, Provider Alerts, and Patient Education	Cluster randomized, controlled trial	Excluded: used patient education not MI
Willard-Grace, Chen, Hessler, DeVore, Prado, Bodenheimer & Thom (2015)	Health Coaching by Medical Assistants to Improve Control of Diabetes, Hypertension, and Hyperlipidemia in Low-Income Patients: A Randomized Controlled Trial	Randomized controlled trial	Included: Consistent with MI and BP measureable outcome
Farrell & Keeping-Burke (2014)	The Primary Prevention of Cardiovascular Disease: Nurse Practitioners Using Behaviour Modification Strategies	Opinion piece	Excluded: not a study
Tonstad, Alm & Sandvik (2007)	Effect of nurse counselling on	Randomised controlled trial	Excluded: Based on behavioural self-

	metabolic risk factors in patients with mild hypertension: A randomised controlled trial		management and the Transtheoretical Stages of Change. Nothing consistent with MI
Ski & Thompson (2012)	MI as a brief intervention to improve cardiovascular health	Editorial	Excluded: not a study
Landry, Madson, Thomson, Zoellner, Connell & Yadrick (2015)	A randomized trial using MI for maintenance of blood pressure improvements in a community-engaged lifestyle intervention: HUB city steps	Randomized controlled trial	Excluded: because it was performed by two MI coaches who were research staff and it was a community engaged lifestyle intervention. I wondered at its applicability to primary care as besides the telephone delivery of MI, 3 health fairs were held at 3 month intervals.
Drevenhorn, Bengtson & Kjellgren (2015)	To be motivated or only comply – patients' views of hypertension care after consultation training for nurses	Elicited as part of a randomized controlled study	Excluded: reports on patients' perceptions on nurse management of hypertension. Does not use blood pressure as measurable outcome
Woollard, Beilin, Lord, Puddey, MacAdam & Rouse (1995)	A Controlled Trial of Nurse Counselling on Lifestyle Change For Hypertensives Treated in General Practice: Preliminary Results	Randomized Controlled Trial	Included: utilizes MI and BP as measurable outcome
Volpp (2002)	The Counseling African Americans to Control Hypertension Study and Ways to Enhance the Next Wave of Behavioural Interventions	Editorial	Excluded: editorial
Schoenthaler, Luerassi, Silver, Odedosu, Kong,	Comparative Effectiveness of a Practice-Based	Randomized Controlled Trial	Included: Uses MI and BP as measureable outcome

Ravenell, Teresi & Ogedegbe (2015)	Comprehensive Lifestyle Intervention vs. Single Session Counseling in Hypertensive Blacks		in primary care setting
Ma, Zhou, Zhou & Huang (2014)	Evaluation of the Effect of MI Counselling on Hypertension Care	Randomized Controlled Trial	Included: utilizes MI in primary care and BP as measurable outcome
Hyman, Pavlik, Taylor, Moye (2007)	Simultaneous vs. Sequential Counselling for Multiple Behaviour Change	Randomized Controlled Trial	Excluded: did not use BP as measurable outcome
Blackford, Jancey, Lee, James, Howat, Hills & Anderson (2015)	A Randomized Controlled Trial of a Physical Activity and Nutrition Program Targeting Middle-aged Adults at Risk of Metabolic Syndrome in a Disadvantaged Rural Community	Randomized controlled trial	Excluded: Trial remains in progress
Kouwenhoven-Pasmooij, Djikanovic, Robroek, Helmhout, Burdorf & Hunink (2015)	Design and Baseline Characteristics of the PerfectFit Study: A Multicenter Cluster-randomized Trial of a Lifestyle Intervention in Employees with Increased Cardiovascular Risk	Cluster Randomized Controlled Trial	Excluded: Trial Remains in Progress
Marquardt & Vezeau (2007)	MI: The Link Between Healthy Choices and Healthy Patients	Opinion Piece	Excluded: not a study
Roberts & Ivey (2012)	Is MI Effective For Hypertension?	Opinion piece	Excluded: not a study
Van Keulen, Mesters, Ausems, Breukelen, Campbell, Resnicow, Brug, de Vries (2011)	Tailored Print Communication and Telephone MI are Equally Successful in Improving Multiple Lifestyle Behaviours in a Randomized Controlled Trial:	Randomized Controlled Trial	Excluded: Did not use BP as a measurable outcome

Nolan, Liu, Shoemaker, Hachinski, Lynn, Mikulis, Wennberg, Moy & Zbib (2012)	Therapeutic Benefit of Internet-Based Lifestyle Counselling for Hypertension:	Randomized Controlled Trial	Excluded: Electronic e-counselling and not MI
Ren, Yang, Browning, Thomas & Liu (2014)	Therapeutic Effects of MI on Blood Pressure Control: A Meta-Analysis of Randomized Controlled Trials	Meta-analysis of Randomized Controlled Trials	Excluded: Not applicable to primary care setting
Navidian, Abedi, Baghban, Fatehizadeh & Poursharifi (2010)	Effect of MI on Blood Pressure of Patients Suffering From Hypertension	Quasi-experimental study - Randomized	Excluded: Purely Group MI so question applicability to primary care
Tan & Morgan (2015)	Psychological Interventions in Cardiovascular Disease: An Update	Review Article	Excluded: not a study and did not focus on MI or BP
VanBuskirk & Wetherell (2014)	MI With Primary Care Populations: A Systematic Review and Meta-analysis	Systematic Review and Meta-analysis	Excluded: Looked at 10 studies using MI but only one focused on hypertension
Rubak, Sandboek, Lauritzen & Christensen (2005)	MI: A Systematic Review and Meta-analysis	Systematic Review and Meta-analysis	Excluded: Looked at 72 randomized controlled trials focused on different areas of disease
Lundahl, Moleni, Burke, Butters, Tollefson, Butler & Rollnick (2013)	MI in Medical Care Settings: A Systematic Review and Meta-analysis of Randomized Controlled Trials	Systematic Review and Meta-analysis	Excluded: Looked at 48 studies of varying diseases. Only two studies used BP as a measurable outcome
Ogedegbe, Chaplin, Schoenthaler, Statman, Berger, Richardson, Phillips, Spencer & Allegrante (2008)	A Practice-based Trial of MI and Adherence in Hypertensive African Americans	Randomized Controlled Trial	Included: Utilized MI and BP as measureable outcome in Primary Care
Hartley & Repede (2011)	Nurse Practitioner Communication and Treatment Adherence in Hypertensive Patients	Opinion piece	Excluded: Not a study. Does not discuss MI but discusses patient-centered outcomes

Appendix Three: Summary of Recommendations

Clinical Recommendations:

- An interdisciplinary approach utilizing MI into clinical practice may help overcome difficulties with potential time constraints of using this approach
- NPs are in a prime position to incorporate MI into practice due to their holistic focus on health promotion and prevention, longitudinal relationships with patients and longer than average consultation times
- NPs should harness their capacity to provide behavioural change counselling, such as MI in order to illustrate their unique contribution and value to the healthcare system
- MI shows promise regarding medication adherence but requires more research into optimal technique, duration, and measurement tools. NPs may use MI or adaptation of MI to help explore importance of medication adherence and health
- Healthcare provider adherence to evidence-based guidelines combined with patient adherence likely has an additive effect on blood pressure reduction and ensures optimal delivery of healthcare

Educational Recommendations:

- A combination of formal education and learning based on client interactions, role-playing, practice and feedback could facilitate MI to be a viable clinical model utilized by primary care practitioners
- Health care professional education programs should be required to teach courses in Indigenous health issues including history of colonization and residential schools

Research Recommendations:

- Further research into clinically viable methods of delivering MI in the clinic setting is needed with a focus on utilizing the primary care provider as the interventionist
- Research that includes biometric measures in addition to qualitative tools achieve a more balanced and explanatory set of results including patient-oriented outcomes and perspectives
- Potential benefits of treatment fidelity protocols needs to be established as fidelity is not uniform in current research
- Research specific to Indigenous people and visible minorities is vital to address disparities in health and promote intercultural understanding, and anti-racism and overall improve health outcomes of all Canadians