

**Developing and Validating a Survey to Assess Physician-Implementation of Dietary
Guidelines for Patients with Hypertension in Primary Care**

By

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Abstract

Dietary guidelines are a key component for the health behaviour management of hypertension. Primary care physicians are key facilitators in encouraging patients with hypertension to adopt healthy diets; however, multiple barriers related to nutrition knowledge, attitudes and behaviours may influence their provision of diet to these patients. Such barriers have not been well described in the literature. The objective of this study was to develop and validate a survey to identify internal and external barriers and facilitators to the implementation of dietary guidelines for hypertensive patients in primary care. A MEDLINE search was conducted to identify physician-related barriers, and facilitators related to dietary advice in clinical practice. Identified literature and the Clinical Practice Guidelines Framework for Improvement model (Cabana et al. 1999) were used to derive survey questions. Content and face validity were assessed by consulting primary care physicians, experts on hypertension, and experts on survey development. Finally, to further validate and assess the feasibility of the survey prior to survey administration to a national sample, a feasibility study was conducted among primary care physicians and medical residents in the Durham region of Ontario. The final web-based survey included 33 questions; Survey responses included Likert scales, multiple choice and open-ended questions. The survey takes 5 to 10 minutes to complete. This survey tool is evidence-based and validated to assess barriers that may affect the implementation of dietary guidelines for patients with hypertension in primary care settings.

Keywords: Hypertension; Nutrition Education; Medical education; Nutrition; Diet; Sodium; Physicians; Knowledge; Practice; Family Practice; Barriers; Attitudes; Behaviours; Facilitators; Nutritional; Counseling; Guidelines; Implementation; Primary care.

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Table of Contents

List of Abbreviations and key terms.....	vii
List of Tables.....	viii
List of Figures.....	ix
1.0 Chapter One: Introduction.....	1
1.1 Background	1
1.2 Objectives.....	3
2.0 Chapter Two: Review of the Literature.....	5
2.1 Overview of Hypertension and Management	5
2.2 Overview of CHEP Dietary Recommendations for Management of Hypertension.....	6
2.3 Dietary Sodium Reduction.....	7
2.4 Dietary Approaches to Stop Hypertension (DASH) Diet.....	8
2.5 Nutrition Counselling in Primary Care.....	11
2.6 Barriers to Physicians-delivered of Dietary Advice	14
2.6.a Internal Barriers	14
2.6.b External Barriers	17
2.7 Facilitators to Nutrition Counselling by Physicians.....	20
2.8 Summary and Knowledge gaps	21
3.0 Chapter Three: Objectives.....	23
3.1 General Objective.....	23
3.2 Specific Objectives.....	23
4.0 Chapter Four: Methodology Approach	24
4.1 Methodological Overview.....	24
4.2 Development the Survey	26
4.2.a The Conceptual Framework.....	26
4.2.b Literature Review.....	29
4.2.c Question Design and Format.....	35
4.3 Assessment of Content and Face Validity	36
4.4 Feasibility Test.....	37
4.4.a Feasibility test recruitment and data collection.....	38

4.4.b Compensation.....	39
4.4.c Data analysis for feasibility test.....	39
5.0 Chapter Five: Results.....	40
5.1 Questionnaire Development.....	40
5.2 Validation & Editing the Survey by Content and Face Validity Experts.....	41
5.3 Feasibility Test: The Response.....	44
5.4 Feasibility Test: Characteristics of the Participants.....	44
5.5 Feasibility Test: Participants' Comments on the Feasibility Questions and Survey.....	45
5.6 Feasibility Test: Survey Responses.....	46
6.0 Chapter Six: Summary, Discussion and Future Work.....	54
6.1 Summary.....	54
6.2 Discussion.....	56
6.3 Future work.....	59
References.....	61

List of Abbreviations and Key terms

DASH Dietary Approaches to Stop Hypertension

CHEP The Canadian Hypertension Education Program

Key Term	Definition
Canadian adults/adults	20 years and older
Older adults	Aged 60 to 79 years
Primary care physicians	A physicians who work in primary care as a practice setting
Nutrition counseling	Includes the term “dietary advice” used in this study in respect of other studies reporting, the term “nutrition counseling” was kept.
Content validity experts	Experts who reviewed the survey questions in the areas of hypertension, sodium, nutrition and heart disease
Face validity experts	Primary care physicians who reviewed the survey questions
Feasibility test participants	Participants who were involved in the feasibility test in this study

List of Tables

Chapter Two

- Table 1-1 CHEP health behaviour management strategies and their impact on blood pressure
- Table 1-2 A comparison of key food and nutrients recommended by Dietary Approaches to Stop Hypertension (DASH) and Canada's Food Guide for adults (19-50 years)

Chapter Four

- Table 4-1 Modifications made to Cabana et al.'s conceptual framework*
- Table 4-2 List of search terms used to identify studies from bibliographic databases
- Table 4-3 Summary of literature survey of barriers and facilitators that affect the provision of dietary advice and the adoption of dietary guidelines

Chapter Five

- Table 5-1 Summary of items and response type
- Table 5-2 Areas of expertise of content validity experts
- Table 5-3 Survey modifications made following the face validity experts' comments and suggestions
- Table 5-4 Characteristics of the feasibility test participants
- Table 5-5 Summary of feedback received from feasibility test participants
- Table 5-6 Feasibility test participants' level of confidence when advising on behaviours related to hypertension management
- Table 5-7 Frequency of providing advice on diet or nutrition
- Table 5-8 Patient barriers reported by feasibility test participants
- Table 5-9 Physician barriers reported by feasibility test participants
- Table 5-10 Systemic barriers reported by feasibility test participants
- Table 5-11 Assessment of feasibility test participants' knowledge of DASH diet components

List of Figures

Chapter Four

- Figure 4-1 Methodological overview of survey development and validation
- Figure 4-2 Conceptual framework showing barriers to physician adherence to practice guidelines in relation to behaviour change (Cabana et al., 1999)
- Figure 4-3 Conceptual framework showing the modified framework used in this study

Chapter Five

- Figure 5-1 The frequency of providing dietary recommendations for patients with hypertension

Chapter One: Introduction

1.1 Background

Hypertension is a leading risk factor for mortality (Bromfield & Muntner, 2013) and the worldwide prevalence of hypertension is expected to increase over the next decade (Poulter, Prabhakaran, & Caulfield, 2015). In Canada, hypertension now affects 23% of Canadian adults (Padwal et al., 2016). If the prevalence of hypertension could be reduced by 30% in Canada, it is estimated that 23,500 cardiovascular events would be prevented every year (Joffres, Campbell, Manns, & Tu, 2007). In addition, cardiovascular health care costs would be greatly reduced (Joffres et al., 2007). Between 1975 and 2014, prescribed drugs were the second most costly element of health care, accounting for \$33.9 billion of Canadian health spending in 2014 (Canadian Institute for Health Information, 2014). Hypertension-attributable health care costs were estimated at approximately \$13.9 billion in 2010 with the 2020 cost expected to be approximately \$20.5 billion (Weaver et al., 2015). It is estimated that limiting sodium intake by 1,840 mg/day in Canada would generate direct health care savings of \$430 to \$540 million annually (Penz, Joffres, & Campbell, 2008).

Meta analyses and systemic review studies have established a significant relationship between high sodium intake, high blood pressure, and subsequent chronic diseases (Aburto et al., 2013). Hypertension results from the interaction of internal derangements (primarily in the kidney) and the external environment. Sodium, which is the main extracellular cation, has been considered the pivotal environmental factor for hypertension (Androque & Madias, 2007). For example, high sodium and low potassium intakes result in corresponding changes in intracellular concentration. This imbalance leads to contraction of vascular smooth muscle, restricting blood flow then increase blood

pressure (Androque & Madias, 2007). Therefore, controlling sodium and potassium intakes are important in maintaining a healthy blood pressure.

It has been suggested that almost 30% of hypertension cases occur because of excess dietary sodium (Joffres et al., 2007). Canadian adults without hypertension consume a daily average of 3,400 mg (Institute of Medicine, 2005), and Canadian adults with hypertension consume 2,950 mg/day (Shi, De Groh, Morrison, Robinson, & Vardy, 2011), which is higher than the CHEP guidelines recommendation of 2,000 mg/day to prevent and manage hypertension (Dasgupta et al., 2014). In North America, more than 77% of consumed sodium comes from restaurants and processed food. An estimation of 6.2% is added at the table or during preparation, 5% is added during cooking and 12% occurs naturally in foods (Mattes & Donnelly, 1991; Garriguet, 2007; Harnack et al., 2017). Although Canadian adults (20 to 69 years) who have hypertension are more likely than others to report taking action to limit sodium intake (Arcand et al., 2013), it is clear that more initiatives are required to manage sodium intake for patients with hypertension.

To manage hypertension evidence-based dietary guidelines have been developed, and are included in clinical practice guidelines such as the Canadian Hypertension Education Program (CHEP) guidelines for health care providers. These guidelines include pharmaceutical and behavioural instructions for hypertension prevention and management with an emphasis on dietary components such as dietary sodium reduction and the Dietary Approaches to Stop Hypertension (DASH) diet. The guidelines are comprehensive in approach, and they provide a key component in the health behaviour management of hypertension (Leung et al., 2016). The DASH diet recommended in the CHEP guidelines encourages food choices such as fruits, vegetables, low-fat dairy products, soluble fibre, whole grains, and protein from plant sources. The diet helps to

manage and maintain healthy blood pressure levels by significantly reducing both systolic and diastolic blood pressure (Appel et al., 1997; Sacks et al., 2001).

The primary care setting is the ideal for providing dietary advice and implementing dietary guidelines as most Canadians have a primary care physician, and most cases of hypertension are managed in this setting (Carrière, 2005). In addition, physicians are highly trusted by patients (Truswell, 2000). Through the provision of dietary advice, physicians may engage patients to improve their patient diet (Win, Schafer, Mak, & Stewart, 2014), and thus reducing the risk of stroke and cardiovascular diseases (Khan et al., 2008).

The frequency at which dietary advice is provided is low (Wynn et al., 2010; Mellen et al., 2004), and the time spent on counseling is minimal (Wynn et al., 2010). Many barriers (and facilitators) related to knowledge, attitudes and behaviours may influence whether or not physicians discuss diet with their hypertension patients. These barriers have not been well-described in the literature, or these that have been described were documented many years ago and likely do not reflect the changing in clinical environment. However, to promote the optimal up-take of dietary guidelines, it is important to understand internal and external barriers to the implementation of dietary guidelines in primary care.

1.2 Objectives

The overall objective of this thesis was to develop and validate a survey. In the future, this study will be administered on a national sample of primary care physicians. The specific objectives were to:

1. Conduct a literature search to identify internal (e.g., knowledge, attitudes and behaviours/actions) and external (e.g., compensation and health system factors)

barriers and facilitators to the implementation of dietary guidelines for patients with hypertension in primary care;

2. Develop a survey to identify these internal and external barriers and facilitators;
3. Assess the survey for content and face validity by consulting primary care physicians, experts on hypertension, and experts on survey development; and
4. Test the acceptability and feasibility of administering the survey on a national sample of primary care physicians and residents in Canada.

Chapter Two: Review of the Literature

2.1 Overview of Hypertension and Management

Normal blood pressure for adults (20 years and older) refers to a systolic blood pressure of 120 mmHg (millimetres of mercury) when the heart beats and a diastolic blood pressure of 80 mmHg when the heart relaxes (Leung et al., 2016). People with blood pressure lower than 90 mmHg systolic blood pressure and 60 mmHg diastolic blood pressure are considered to have low blood pressure. Whereas when the systolic blood pressure is equal to or greater than 140 mmHg, or the diastolic blood pressure is equal to or greater than 90 mmHg, it is known as hypertension (Simces, Ross, & Rabkin, 2012; Leung et al., 2016). Epidemiological studies suggest that systolic blood pressure is of particular importance in managing blood pressure (Strandberg, & Pitkala, 2003). The risk factors for hypertension include poor diet, excess alcohol consumption, overweight and obesity, inactivity, and smoking (Ibekwe 2015).

Worldwide, high blood pressure affects more than 40% of adults (25 years and older) and is the leading global risk factor for death or disability (Lim et al., 2012). Hypertension affects approximately 23% of Canadian adults (20 to 59 years) (Padwal et al., 2016). Approximately 53% of older Canadian adults (60 to 79 years) have a marked tendency to develop hypertension (Wilkins et al., 2010). Achieving blood pressure targets lower the risk of chronic diseases such as cardiovascular disease and chronic kidney disease, and to lower their risk of death.

Hypertension is a modifiable risk factor for chronic diseases and mortality (World Health Organization, 2002, p. 4; Bromfield & Muntner, 2013). Fortunately, it can be managed and treated through drug therapy and health behaviours changes (Slama, Susic, & Frohlich, 2002). Dietary modification is a key component in the health behaviour

management of hypertension (Touyz et al., 2004). Excess sodium intake (more than 2,000 mg/day) is a leading cause of hypertension and some evidence suggests that high sodium intake is linked to cardiovascular diseases and stroke (Dionne et al., 2017). Sodium reduction has been shown to reduce patients' blood pressure significantly (Aburto et al., 2013).

2.2 Overview of CHEP Dietary Recommendations for Management of Hypertension

A large body of evidence shows that moderate physical activity and healthy eating habits can help individuals sustain and reduce the risk of chronic diseases such as hypertension (Leung et al., 2016). Every year, the CHEP provides updated evidence-based guidelines for hypertension prevention and management including recommendations for health behaviour management such as physical activity, weight reduction, alcohol consumption, and diet. The CHEP guidelines recommend the DASH diet as a prevention strategy. The DASH diet emphasizes fruits, vegetables, low-fat dairy products, whole grain foods rich in dietary fibre, and protein from plant sources with reduced saturated fat and cholesterol. The guidelines recommend reducing sodium intake to 2,000 mg/day and increasing dietary potassium intake for patients who are not at risk of hyperkalemia. Combinations of two or more health behaviour modifications can achieve significant results (Chobanian et al., 2003).

Table 2-1 summarizes the CHEP health behaviour management strategies and their impact on blood pressure. In the Table, SBP refers to systolic blood pressure and DBP refers to diastolic blood pressure.

Table 2-1

CHEP health behaviour management strategies and their impact on blood pressure

Health behaviour management, prevention and treatment		Reduction in hypertension
Dietary recommendations	Consume (DASH) diet that emphasizes whole grains; fruits and vegetables; low-fat dairy products, lean meat, fish and poultry; nuts, seeds and legumes; and limited sweets and added fats.	SBP by 4.6 and DBP by 2.6 mmHg
Sodium intake	Reduce sodium intake to 2,000 mg/day	SBP by 10-11 mmHg
Physical exercise	Take 30-60 minutes of moderate-intensity dynamic exercise on 4 to 7 days/week	SBP by 4-9 mmHg
Weight reduction	Maintain body mass index in range from 18.5-24.9, and waist circumference < 102 cm for men and < 88 cm for women	SBP by 5-20 mmHg per 10-14 kg weight loss
Alcohol consumption	Consume a maximum of 14 drinks/week for men and 9 drinks/week for women	SBP by 2-4 mmHg
Potassium intake	In patients not at risk of hyperkalemia, increase dietary potassium intake to reduce BP	SBP by 3.49 mmHg; DBP by 1.96 mmHg
Stress management	Manage stress and learn how to cope with everyday health behaviour challenges	Variable

Note: From (Simces et al., 2012; Leung et al., 2016; Chobanian et al., 2003)

2.3 Dietary Sodium Reduction

Evidence has shown that a high sodium intake, a low consumption of fruit and vegetables and other unhealthy dietary behaviours contribute to the development of hypertension (He & MacGregor, 2010). It is estimated that 30% of hypertension cases are a result of excess sodium intake (Joffres et al., 2007). Systematic reviews and meta-analysis of randomized trials have reported that reducing sodium intake for four or more weeks leads to significant reductions in blood pressure for patients with hypertension (He & MacGregor, 2010). Reducing sodium intake among the population will result in improved health outcomes (Cobb, Appel, & Anderson, 2012) including reducing the incidence of hypertension by 30% (Joffres et al., 2007). It has been estimated that

reducing sodium intake would reduce cardiovascular events ranged from 8,300 to 16,800 per year in Canada (Penz et al., 2008). There have been few reports on sodium intake among patients with hypertension. The mean intake for Canadian adults (20 years or older) with hypertension is 2,950 mg/day (Shi et al., 2011), which is higher than the CHEP guidelines recommendation of 2,000 mg/day to prevent and manage hypertension (Dasgupta et al., 2014). The main sources of sodium in the diet are 77% from restaurants and processed food, 6.2% is added at the table or during preparation, 5% is added during cooking, and 12% occurs naturally in foods (Mattes & Donnelly, 1991; Garriguet, 2007; Harnack et al., 2017).

Health Canada's Working Group on Dietary Sodium Reduction has suggested three strategies to reduce sodium intake: voluntary sodium reduction in packaging and prepared foods, research and surveillance, and education (Sodium Working Group, 2010), but as each strategy would be voluntary, there is no guarantee that the strategies would be effective. However, a good starting point would appear to be helping people to make educated choices to reduce their personal sodium intake, which can be motivated by health care providers.

2.4 Dietary Approaches to Stop Hypertension (DASH)

The CHEP guidelines recommend the DASH diet. This diet is similar relatively to Canada's Food Guide for adults. The two dietary patterns are compared in Table 2-2.

Table 2-2

A comparison of key food and nutrients recommended by Dietary Approaches to Stop Hypertension (DASH) and Canada's Food Guide for adults (19-50 years)

Food Group/ Sodium	Servings in DASH Diet	Canada's Food Guide	
		Female	Male
	Both Genders		
Fruit and vegetables	4-5	7-8	8-10
Low-fat dairy	2-3	2	2
Saturated fat and cholesterol	2-3	30 to 45 ml Recommends vegetable oils	
Lean meat, poultry, and fish	2 or less	2	3
Nuts and legumes	4-5 per week	2	3
Grains	7-8 (mainly whole grains)	6-7	8
Sugar & sweets	5 servings or fewer a week (example of serving = 1 tablespoon of sugar, jam or jelly)	Limit sugar intake	
Sodium	2,000 mg/day (or less)	Limit sodium intake	

The DASH diet foods are rich in nutrients such as potassium, magnesium, and calcium all of which help lower blood pressure levels (Houston & Harper, 2008). The DASH diet significantly reduces systolic and diastolic blood pressure (Sacks et al., 2001; Appel et al., 1997). A multicenter randomized trial to assess the effects of the DASH diet on blood pressure included 459 participants (22 years or older), 133 of whom had hypertension, but were not taking any antihypertensive medication. The study was conducted over 11 consecutive weeks with the participants randomly allocated to one of three different groups: a typical American diet group (the control group), a fruit and vegetables diet group, and a combination group. For the 133 hypertensive participants in the study, the combination diet was more effective than the fruit and vegetables diet in

reducing blood pressure. Compared to the control diet, the combination diet reduced systolic blood pressure by 11.4 mmHg and diastolic blood pressure by 5.5 mmHg, (Appel et al., 1997).

The results were confirmed in a randomized control trial. This study found that a combination of the DASH diet and reduced sodium intake had the greatest effect on blood pressure. The study included 412 participants (22 years or older) whom blood pressure exceeded 120/80 mmHg, including people with hypertension. The study compared the effect of three levels (high, intermediate and low) of sodium intake during a control diet (typical American diet) and the DASH diet on blood pressure. The study found that reduction from high (150 mmol/day, equivalent to 2,700 mg/day) to intermediate level (100 mmol/day, equivalent to 1800 mg/day) reduced the systolic blood pressure by 2.1 mmHg (Sacks et al., 2001). A sodium reduction from the intermediate intake to the low intake reduced systolic blood pressure by an additional reduction 4.6 mmHg (Sacks et al., 2001). The results showed that the DASH diet reduced the systolic blood pressure of patients with hypertension by an average 11.5 mmHg compared with participants on control diet. Diastolic blood pressure was reduced by an average of 5.5 mmHg (Sacks et al., 2001).

An observational study in Sweden investigated whether adherence to the DASH diet is inversely associated with the incidence of stroke (Larsson, Wallin & Wolks, 2016). The researchers followed 74,404 males and females (45 to 83 years) for an average of 11.9 years (a total of 882,727 person-years). None of the participants had a stroke when recruited into the study. The study showed that there was a statistically inverse relationship between the modified DASH diet and the risk of ischemic stroke ($P = 0.002$) (Larsson et al., 2016).

Adherence to dietary recommendations is important in the prevention and management of hypertension. In 2009, the Public Health Agency of Canada conducted a survey to investigate Canadians' efforts to control high blood pressure. The results showed that 58% of Canadians with hypertension consumed less than five servings of fruits and vegetables daily, 71% were overweight or obese, 58% were physically inactive, and 17% smoked daily (Public Health Agency of Canada, 2010). A randomized clinical trial to determine what promotes participants' adherence to the DASH diet and exercise. The study included 144 participants (average age 52 years) who are overweight or obese and had hypertension. The results showed that greater adherence to the DASH diet was associated with larger reductions in systolic and diastolic blood pressure ($p \leq .01$) (Epstein et al., 2012). Moreover, efforts should be made to improve the dietary intake of Canadians and that these efforts should consider both public health and clinical approaches to help those at greatest risk (Epstein et al., 2012).

2.5 Nutrition Counseling in Primary Care

In Canada, 86% of the population has a primary care physician (Carrière, 2005). Primary care physicians are the main health care providers for patients with chronic diseases, and have opportunities to provide nutrition advice during patient visits. They are in a position to identify patient's dietary habits and provide appropriate counseling. A systematic review of 50 studies from different databases found that physicians who provide behavioural counseling, motivational interviewing, education, and advice such as advice on topics such as diet, excess alcohol consumption, being overweight, being inactive, and smoking can modify patients' choice of health behaviours (Noordman, Weijden, & Dulmen, 2012).

Studies have found that physician engagement and communication with patients improves health outcomes and enhances patient satisfaction and treatment adherence. A 2013 meta-analysis in the United States included more than 205,000 patients and showed the benefits of physicians dialoguing with patients about their weight and health behaviours. The study found that greater physician engagement resulted in more significant weight loss for patients (Rose et al., 2013). A national survey conducted in Canada found that many patients did not follow a sodium-reduced diet if their primary care physician did not recommend it (Arcand et al., 2013). Similarly, the 2014 National Health and Nutritional Examination Survey (NHANES) study in the United States reported that patients whose physicians had notified them about being overweight were significantly more likely to lose weight by engaging in health behaviour changes (Pool et al., 2014). The authors concluded that even when patients knew that they were overweight, they would not change their behaviours unless their physicians discussed the issue (Pool et al. 2014). Kaplan et al. (1989) found that physician-patient interaction patterns influenced patient health status for patients with hypertension and breast cancer who asked their physicians questions and received additional information about their condition. The researchers concluded that the physician-patient relationship may play a role in influencing the health outcomes (Kaplan et al., 1989). Studies of nutrition counseling by physicians indicate that even brief messages about diet can influence patients' behaviour (Pignone et al., 2003), but it appears that few health care providers give nutrition counseling to their patients with hypertension (Mellen et al., 2004). It is clearly important to identify and understand the barriers that affect the provision of dietary advice by primary care physicians.

Nutrition counseling and advice are usually administered by health care providers such as physicians and nurses, who provide the initial nutrition advice. Complex nutritional needs are referred to Registered Dietitians. However, the availability of dietitians is often limited, especially in rural and remote areas. In Canada, only 16.6% of family physicians working in private offices and clinics, community clinics or community health centres reported having a dietitian in their setting (Rosser, 2003). A descriptive study at the Hamilton Health Service Organization Nutrition Program investigated access to dietitians' services in primary care. Registered dietitians visited 80 family physician offices in the year 2000. They found that the most common reasons for referring patients to a dietitian were dyslipidemia (44% of all referrals), type 2 diabetes (21%), obesity (17%), and cardiovascular disease (1.3%), but that overall access to dietitians' services in primary care is limited (Crustolo, Kates, Ackerman, & Schamehorn, 2005). Fifty-eight percent of primary care physicians reported that more than (60%) of their patients would benefit from nutrition counseling; however, approximation of (19 %) of patients reported that they received nutrition counseling by their physicians (Wynn et al., 2010). Eaton et al. (2002) conducted a direct observation study that found that physicians spent an average of 55 seconds per visit on health behaviour changes. Nutrition counseling was provided to only 30 of 595 patients with hypertension. Similarly, Al-Muammar (2012) found that fewer than 33% of doctors provided nutrition counseling, and that less than 20% of the visit was given to nutrition counseling. Understanding the barriers and facilitators to the implementation of nutrition guidelines for patients with hypertension is an important first step to improve patient health and design interventions to promote dietary guidelines. There is some published literature on this topic, but studies do not

reflect the contemporary primary care practice settings and have not focused on patients with hypertension.

2.6 Barriers to Physicians-delivered of Dietary Advice

Understanding barriers and facilitators related to knowledge, behaviours and attitudes to nutrition counseling in primary care is critical to improving the implementation of dietary interventions for hypertension management. This section discusses internal and external barriers, and Section 2.7 discusses facilitators.

The barriers discussed in the literature include internal barriers (nutrition knowledge and training, availability of implementation tools, perceived importance of nutrition, and self-efficacy) and external barriers (time, workload and various environmental factors).

2.6.a Internal barriers. *Nutrition knowledge and training.* Self-reported studies have showed a lack of nutrition knowledge among primary care physicians and specialists (Wynn et al., 2010; Cranney et al., 2001; Cabana et al., 1999; Al-Muammar 2012; Kolasa et al., 2010; Lugtenberg et al., 2011; Kushner 1995). Training health care providers about nutrition has been shown to have a positive effect on improving their dietary knowledge and confidence and possibly changing their attitudes to nutrition care (Lindorff-Larsen et al., 2007) and, subsequently, their behaviour (Pelto et al., 2004; Gance-Cleveland et al., 2009). A qualitative survey of family physicians in British Columbia found that 82% believed the nutrition education they received in their medical training was inadequate (Wynn et al., 2010). A qualitative study of physicians in the United Kingdom also found that lack of education or mentoring could be an obstacle to effective dietary education. As one primary care physician interviewed commented, “How do we know what we don’t know?” (Cranney et al., 2001). Wynn et al. (2010) noted that the resource most

commonly used by physicians was peer-reviewed nutrition journals, but only 30% of physicians used any nutrition-related resources. Some researchers have suggested that even when physicians are knowledgeable and aware about nutrition science, they may face challenges when trying to apply their knowledge in a practical way that benefits their patients (Cabana et al., 1999).

The availability of implementation tools. The availability of implementation tools to support physicians in advising patients about diet and health behaviour changes may improve their provision of dietary advice. An observational study found that physicians working in clinics where nutritional brochures were available and accessible were 30% more likely to provide advice on diet and 50% more likely to provide advice on physical activity than were physicians working in clinics without brochures (Anis et al., 2004).

Electronic dietary assessment tools on mobile apps and websites may improve dietary advice and communication between physicians and patients. For example, when patients record their dietary intake, primary care physicians have a better understanding of patients' diets and can target and improve the quality of their nutrition advice (Bonilla et al., 2015). Hypertension Canada provides a CHEP mobile app that gives health care providers easy access to the recommended clinical practice guidelines. Such apps may help guide management of patients with hypertension.

Perceived importance of nutrition. "Perceived importance of nutrition" refers to the belief that diet has the potential to improve patients' health. Most physicians and primary care staff agree that nutrition or dietary interventions are important to disease prevention and management (Moore, & Adamson, 2001; Mellen et al., 2004; Wynn et al., 2010; Kushner, 1995). A survey of 496 physicians in three Swiss regions found that all the physicians rated preventive intervention as important for blood pressure control

(Cornuz et al., 2000). Another survey found that 58.1% of physicians believed that more than 60% of their patients would benefit from nutrition advice, but only 19.1% of the patients actually received nutrition counselling (Wynn et al., 2010). Litaker et al. (2005) asked 128 primary care physicians to rate the importance of various preventive measures including diet. The study found that the physicians rated nutrition counseling at the lowest level of importance and only 10% of their 2,708 patients were advised about diet. Moore & Adamson (2001) had similar findings.

The literature reports mixed findings on physicians' perceived importance of nutrition. While differences in research methodologies and subjects might account for some of the mixed findings, it is clear that nutrition counseling and the adoption of nutrition tools among primary care physicians is low.

Self-efficacy. Self-efficacy is one's belief in one's ability to perform a behaviour (Bandura, 1986). A survey of 114 internal medicine interns showed that fewer than one-third of the interns were confident in their ability to assess the nutritional status of patients or to discuss general nutritional issues (Vetter, Herring, Sood, Shah, & Kalet, 2008). Lack of confidence has been widely reported to affect a physician's ability to advise patients about nutritional topics or to improve patients' diet (Cabana et al., 1999; Kolasa & Rickett, 2010; Lugtenberg et al., 2011; Wynn et al., 2010; Kushner 1995).

Studies have shown that physicians' limited nutrition knowledge/training is linked with low self-confidence in the area of nutrition counseling. For example, a survey of trained primary care physicians found that those who reported inadequate nutrition training were not comfortable advising patients about nutrition. They were willing to discuss general nutrition, but they were not comfortable giving specific nutrition advice related to chronic disease management (Wynn et al., 2010). Physicians who were

comfortable providing nutrition counseling were also more likely to spend extra time discussing nutrition (Wynn et al., 2010). Al-Muammar (2012) also noted that lack of training, lack of knowledge and perceived barriers are associated with low self-efficacy in the area of nutrition counseling.

2.6.b External barriers. Time. One of the most commonly reported barriers to physicians' providing nutrition advice is lack of time (Kushner 1995; Anis et al., 2004; Cornuz et al., 2000; Nicholas, Roberts, & Pond, 2003; Visser et al., 2008; Taba et al., 2012; Eaton et al., 2002). Some studies have investigated the length of visits that included nutrition counseling. Eaton et al. (2002) conducted a direct observation study that found that physicians spent an average of 55 seconds per visit on health behaviour changes. Taba et al. (2012) noted that some physicians reported that lack of time to search for current nutrition and guidelines information was an issue.

Workload. Some studies have linked the size of patient lists and individual patients' number of chronic conditions to the provision of nutrition counseling in primary care practices. In the United Kingdom, physicians reported state that an increasing workload, due to a higher volume of patient cases and continuous changes in clinical practice, makes it challenging to become experts in every area (Cranney et al., 2001). Petek et al. (2013) confirmed these findings in a study that investigated counseling given in all areas of cardiovascular disease prevention including advice on smoking, blood pressure, physical activity, and diet. Jay et al. (2015) were told that patients with an increasing number of chronic diseases a patient might receive less nutrition counseling than other patients from their primary care physicians. For example, a primary care physician said, "I don't mind spending 5, 10 minutes - even 20 minutes, the whole time, you know, talking about exercise, nutrition. However, if a patient comes in who has seven problems

including congestive heart-related, etc., and I have to manage all that stuff, the truth is you probably don't want me to spend that time [on nutrition]". In another descriptive study, primary care physicians reported that patients were demanding more services making it impossible to provide nutrition advice in the allotted time (Cranney et al., 2001). However, two other observational studies concluded that patients with more than one chronic disease, e.g., hypertension and obesity, were more likely than other patients to receive nutrition counseling (Anis et al., 2004; Eaton et al., 2002). The studies reviewed here clearly had mixed results when investigating whether physicians had time to provide nutrition advice and whether the size of patient lists and a patient's number of chronic conditions affect the provision of nutrition counseling by primary care physicians. The different results may in part be due to the studies' different methodologies. The Jay et al. (2015) and Cranney et al. (2001) studies were based on interviews whereas the Anis et al. (2004) and Eaton et al. (2002) studies used the observational method.

Environmental and other factors. The provision of nutrition counseling may be influenced by external factors not under a physician's control (Resnicow et al., 1989; Kosecoff et al., 1987). Environmental factors mentioned in the literature include compensation, and geographic location.

Compensation for primary care physicians in Canada is arranged directly with the province and includes fee-for-service, salary, and various alternative payment plans. Compensation has been shown to influence physicians' motivation to teach patients about nutrition (Wynn et al., 2010; Cabana et al., 1999; Kushner 1995; Cranney et al., 2001; Kolasa & Rickett, 2010; Lugtenberg et al., 2011). The fact that nutrition education and counseling are not built into the consultation fee for physicians may contribute to few

primary care providers giving nutrition counseling. It is clearly important to investigate whether this is the case.

The geographic location of the clinic may influence health care provider engagement with patients, the referral of patients to dietitians, and the provision of nutrition advice. For example, in rural/remote medical centres in British Columbia, primary care physicians are significantly more likely to refer patients to receive nutrition counseling from a dietitian (Wynn et al., 2010). Wynn et al. found that 41.7% of rural practitioners referred patients to dietitians compared to 21.7% of urban physicians ($P < .0005$). Mellen et al. (2004), however, found that geographic location did not affect nutrition counseling significantly. Study design and sampling variation may account for some or all of the difference. Mellen and colleagues used medical records and may have underestimated the number of visits in which counseling was provided.

Other barriers to physicians giving nutrition counseling may include patients' age, level of patient interest in diet, and physicians' gender. Older patients are more likely than younger patients to receive nutrition counseling (Mellen et al., 2004; Anis et al., 2004).

Cornuz et al. (2000) and Whitaker et al. (2016) found that 44% of physicians reported a lack of patient interest in nutrition counseling on the part of patients.

The role of physicians' gender is not clear. For example, surveys have found that female physicians are more likely than male physicians to provide nutrition counseling (Dutton et al., 2014; Diehl et al., 2015), but two other studies found that physicians' gender did not affect whether the physicians gave nutrition counseling (Anis et al., 2004; Cornuz et al., 2000). Both studies observed mainly male physicians (78% in Anis et al. and 86% in Cornuz et al.) and this may have affected the findings.

Ideally physicians will adopt clinical practice guidelines supported by fair or high evidence and will not consume resources and time on guidelines that are based on poor evidence (Essential Evidence Plus, 2007). However, studies from the United Kingdom have shown that physicians who do not agree with the clinical importance of guidelines were unlikely to implement them, regardless of the grading of the recommendations, even if financial incentives were provided (Heneghan et al., 2007). In British Columbia, physicians stated that lack of evidence-based interventions or evidence also made them less likely to use the guidelines (Wynn et al., 2010).

2.7 Facilitators to Nutrition Counselling by Physicians

Many nutrition related initiatives and resources have been developed to facilitate the provision of nutrition advice in primary care. For instance, according to Canada Health Infoway, Electronic Medical Records (EMR) can be used to record individuals' health history, medical care and nutrition care. Electronic nutritional tools (e-tools) assess nutrient intake and nutritional status and can be useful facilitators. Examples include Sodium Calculator, which may help with the management of hypertension, and some Canadian e-tools that assess the nutritional status of infants, children and older adults (Arcand et al., 2014; Agarwalla, Saikia, & Baruah, 2015). The use of these tools may increase the likelihood of nutrition counseling, improve physicians' understanding of patients' diets and subsequently increase physicians' nutrition knowledge and the quality of nutrition advice (Bonilla et al., 2015).

2.8 Summary and Knowledge Gaps

Hypertension is a common condition known to affect one in five Canadians adults. It is serious because it is associated with cardiovascular disease and stroke. Dietary modification provides a highly effective treatment for some patients with hypertension.

In Canada, primary care physicians are the main health care providers: 86% of Canadians aged 12 and older reported that they had a primary care physician (Carrière, 2005) and most Canadians see a physician at least once a year. This means that primary care physicians are in an excellent position to identify and monitor hypertension and dietary habits, and to counsel patients accordingly.

Unfortunately, the rate of provision of dietary advice is unacceptably low. It is critical to improve our understanding of the barriers that deter physicians from providing nutrition counseling and we need to improve our understanding of the facilitators what may increase the number of physicians providing nutrition counseling. To manage nutrition related chronic diseases such as hypertension effectively, physicians need to be familiar with dietary guidelines and able to deliver nutrition advice to their patients. The implementation of dietary guidelines such as the CHEP guidelines offers an important opportunity to tackle hypertension and its health complications.

Although primary care physicians' nutrition counseling has been found to impact patients' behaviour including improving patients' diets (Visser et al., 2008), physicians encounter several barriers when providing such advice. The top barriers reported in the literature were lack of time during the office visit, lack of knowledge and training, compensation issues, lack of evidence-based interventions, and other possible obstacles such as patients' age, level of patient interest in diet, and physicians' gender.

There are, however, a number of gaps and difficulties in interpreting the existing literature. Firstly, some studies used direct observation methods to collect data. The reliability of observation methods cannot be measured because of the Hawthorne effect, i.e., the problem that subjects who are being observed are likely to alter their behaviour (Eaton et al., 2002; Anis et al., 2004; Stange et al., 1998; Antognoli et al., 2014). Secondly, some studies used interviews to collect data. A number of issues can arise. For example, although it is possible to assess the nature of nutrition advice directly from participants (patients and/or physicians), there may be a tendency for the interviewers to interpret and recall information in a way that confirms the interviewers' pre-existing hypotheses (confirmation bias). Interviews are also open to the risk of social desirability bias in which the subjects answer questions in the way that they think will lead to their being liked and accepted by the interviewers and/or survey organizers (Cranney et al., 2001; Jay et al., 2015; Britt et al., 2004). Interview surveys may also introduce response bias in which participants may, for example, under- or overestimate the nutrition services received. Thirdly, the literature is limited because most studies do not specifically explore barriers/facilitators to providing nutrition management plans for patients with hypertension. Fourthly, many studies were conducted a decade or more ago and do not reflect current technology-enabled clinical practices.

To develop an understanding of barriers and facilitators to the provision of dietary advice in modern clinical practice, this research designed and validated a survey to establish an understanding of these knowledge gaps so that innovative interventions can be developed to improve the dietary management of patients with hypertension.

Chapter Three: Objectives

3.1 General Objective

The overall objective of this thesis was to develop and validate a survey. In the future, this study will be administered on a national sample of primary care physicians.

3.2 Specific Objectives

1. Conduct a literature search to identify internal (e.g., knowledge, attitudes and behaviours/actions) and external (e.g., compensation and health system factors) barriers and facilitators to the implementation of dietary guidelines for patients with hypertension in primary care;
2. Develop a survey to identify these internal and external barriers;
3. Assess the survey for content and face validity by consulting primary care physicians, experts on hypertension, and experts on survey development; and
4. Test the acceptability and feasibility of administering the survey on a national sample of primary care physicians and residents in Canada.

Research question

What are the barriers that prevent primary care physicians from implementing dietary guidelines for patients with hypertension in Canada?

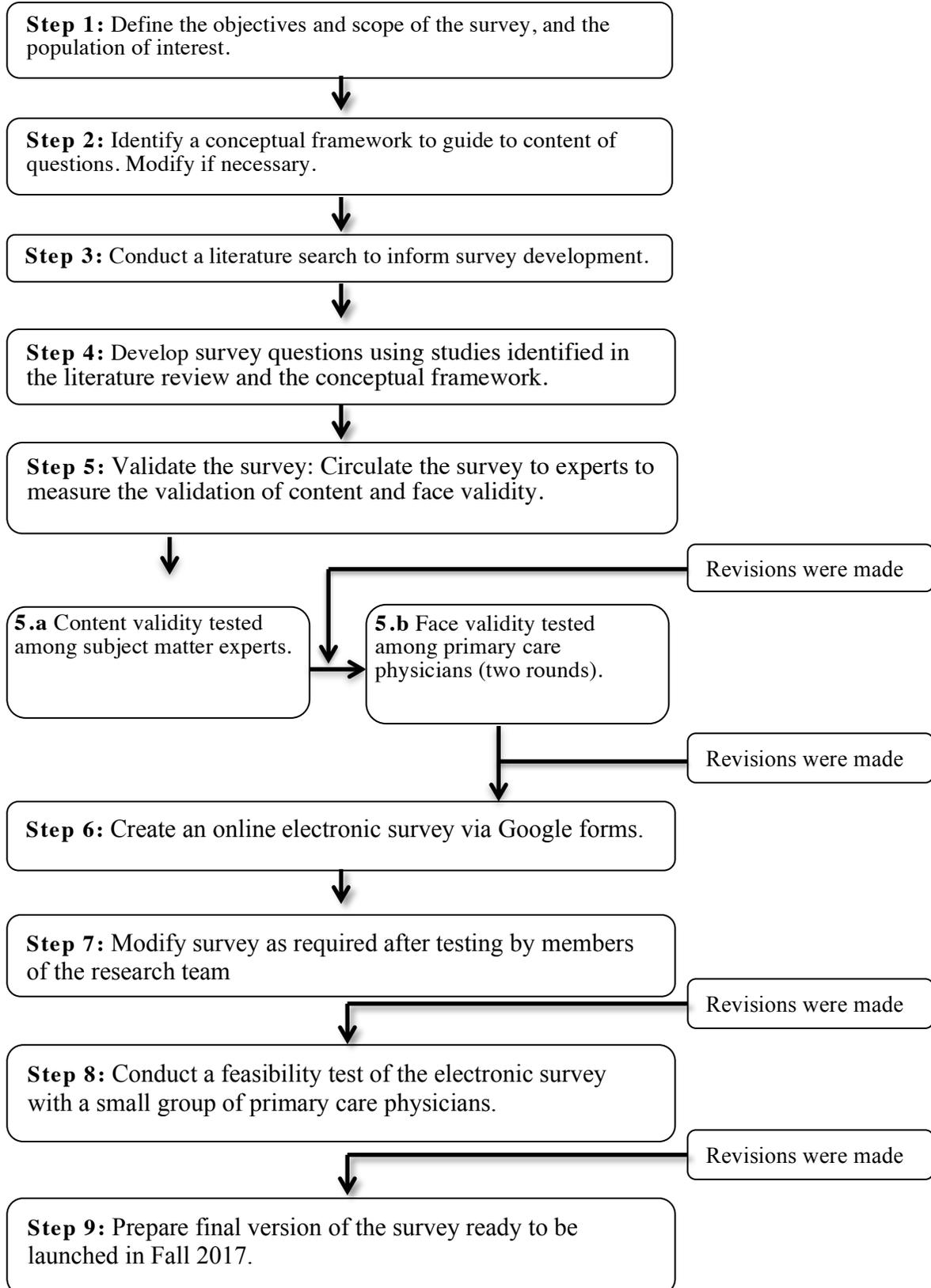
Chapter Four: Methodological Approach

4.1 Methodological Overview

This thesis develops, validates, and tests the feasibility of a survey to assess barriers and facilitators that affect the implementation of dietary guidelines for patients with hypertension managed in primary care in Canada. Figure 4-1 provides a methodological overview of the study.

Figure 4-1

Methodological overview of survey development and validation



4.2 Development of the Survey

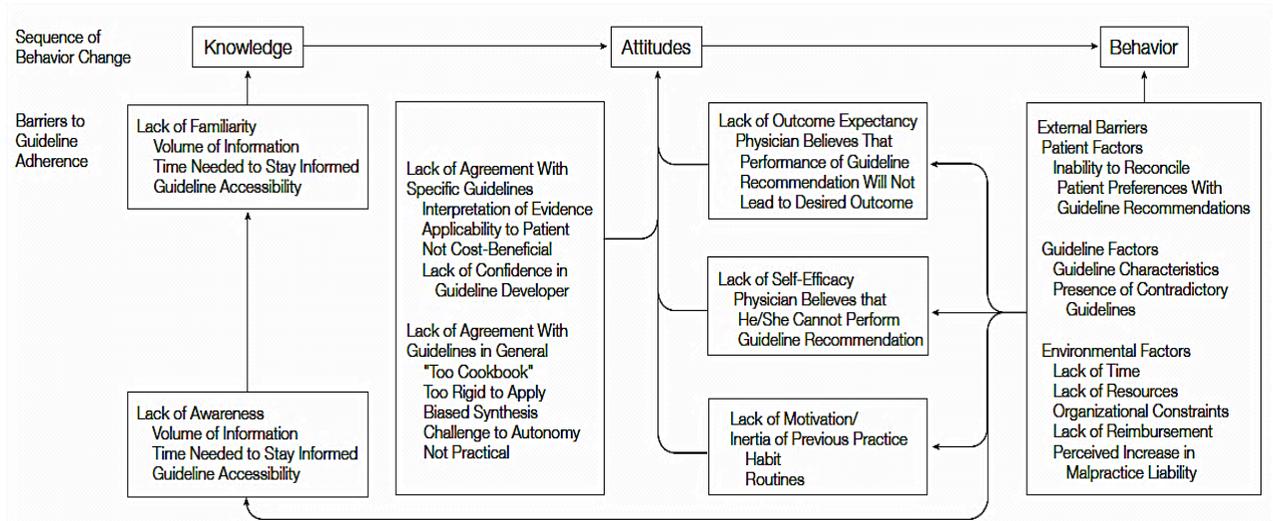
The development of the survey involved selecting a conceptual framework (Section 4.2.a), conducting a literature review (Section 4.2.b), and deciding on the question design and format (Section 4.2.c).

4.2.a Conceptual framework. Surveys of barriers to improved clinical practice have used a variety of conceptual frameworks to design research surveys. Cabana et al.'s (1999) "Clinical Practice Guidelines Framework for Improvement" framework is the most frequently cited framework and was used in this thesis. Cabana et al.'s framework is shown in Figure 4-2. The framework has been promoted and supported by the Canadian Institutes of Health Research which used the framework to assess barriers and facilitators in Canada's health system of primary care in Canada (Government of Canada, n.d.).

Cabana et al. (1999) developed their framework by conducting a systematic review of 76 studies that assessed barriers to physician adherence to clinical practice guidelines. They classified seven general barriers under the headings knowledge, attitudes and behaviours. This classification formed the basis of their framework. Barriers related to physicians' knowledge included lack of familiarity and lack of awareness; barriers related to physicians' attitudes included lack of self-efficacy, lack of agreement and lack of motivation; and barriers related to behaviours included external barriers such as guidelines, patients and environmental barriers. Figure 4-2 summarizes Cabana et al.'s framework.

Figure 4-2

Conceptual framework showing barriers to physician adherence to practice guidelines in relation to behaviour change (Cabana et al., 1999)



The findings of the literature review were used to modify the framework shown in Figure 4-3 to meet the objectives of the current study. Figure 4-3 shows the modified version. Table 4-1 summarizes the changes.

The conceptual framework shown in Figure 4-3 assumes that various barriers related to knowledge, attitudes and behaviours affect the implementation of dietary guidelines by primary care physicians for patients with hypertension. Cabana et al. (1999) pointed out that modifying behaviours through changes in knowledge and attitudes was more likely to ensure sustainability in providing advice to patients.

Figure 4-3

Conceptual framework showing the modified framework used in this study

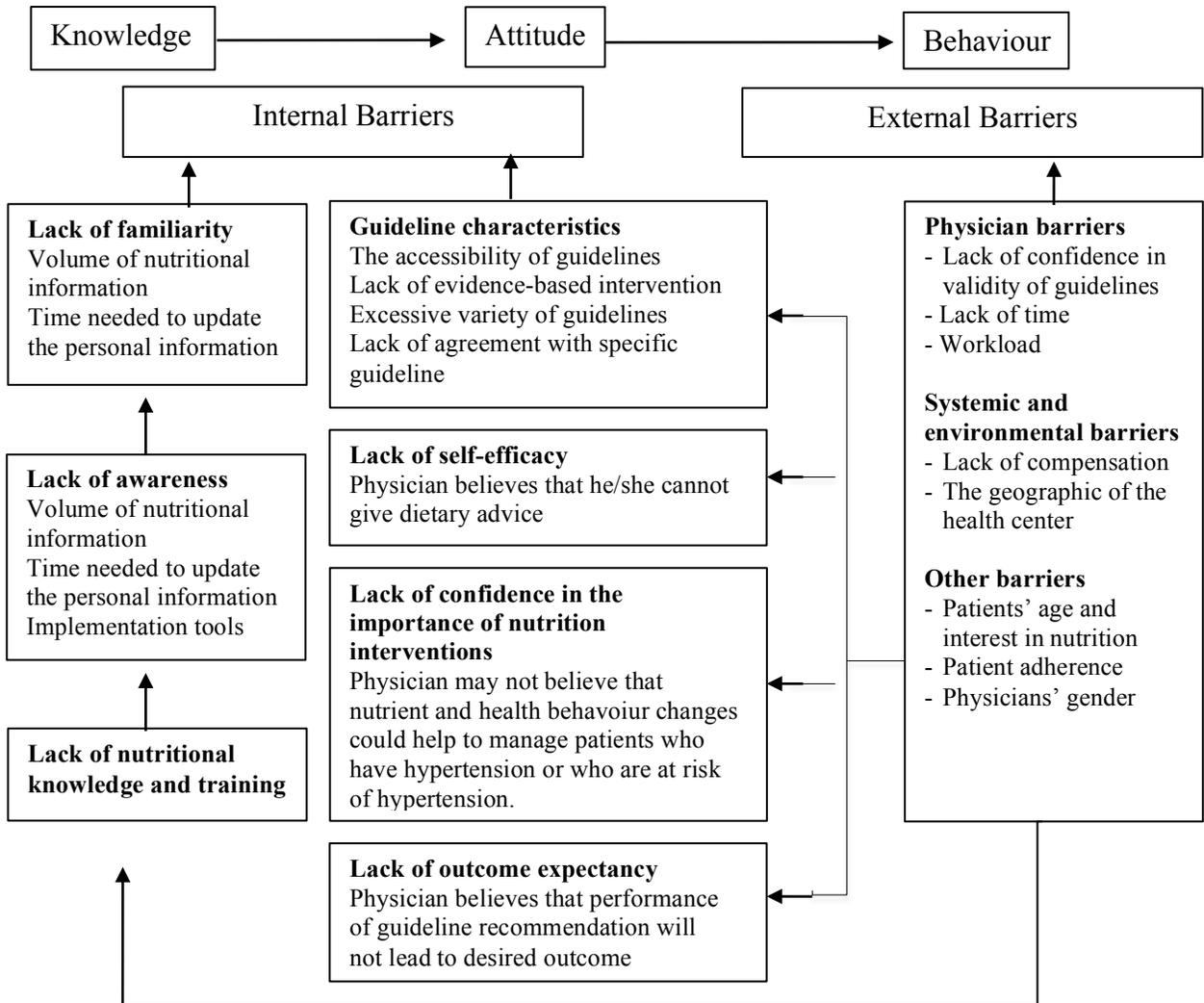


Table 4-1

*Modifications made to Cabana et al.'s conceptual framework**

Category	Removed	Added
Knowledge	N/A	Lack of dietary knowledge and training Questions to assess level of dietary knowledge
Attitudes	Lack of agreement with guidelines in general	Lack of agreement/perceived attitude regarding dietary guidelines for patients with hypertension.
	Lack of motivation: physicians do not have the motivation to change	Specific possible impediments (such as patient and systemic barriers) to physicians providing dietary advice
	N/A	Perception of the importance of dietary intervention
Behaviours	N/A	<ul style="list-style-type: none"> - Workload - Geographic location of the practice - Patient age - Patient health status (whether patient has other chronic diseases) - Physician gender

* Cabana et al. (1999)

4.2.b Literature review. The literature was reviewed 1) to identify questionnaires and instruments available to identify barriers and facilitators to the provision of dietary advice and the implementation of dietary guidelines in primary care, 2) to determine the validity and reliability of existing surveys, 3) to identify barriers and facilitators described in the literature, and 4) to understand some of the gaps in the literature.

Four bibliographic databases were searched: MEDLINE/PubMed, the Cochrane Library, Scholars Portal, and Google Scholar. The search terms used to identify studies are listed and described in Table 4-2.

Table 4-2

List of search terms used to identify studies from bibliographic databases

Subject	Search terms
Population	Physicians OR family doctors
Setting	Primary care
Nutrition	Nutrition OR dietary AND counseling OR advice
Health condition	Chronic disease OR high blood pressure OR hypertension
Nutrition	DASH diet or Dietary approaches to stop hypertension OR sodium
Tool/study method	Survey OR survey validation OR validity OR internal validity OR content validity OR construct validity OR face validity OR questionnaire OR survey instrument OR health Education
Barriers and facilitators	Barriers and facilitators

Studies were selected for inclusion in the review process if they met the following criteria:

- *Study design:* Cross-sectional survey, observational and interview methods, qualitative, randomized clinical trials, and systemic reviews;
- *Population:* Patients with hypertension, primary care physicians, family doctors; and
- *Exclusions:* barriers that were reported by nurses, or dietitians, and if the participant were specialist doctor, pharmacist.

All the studies included were in English.

The findings are summarized in Table 4-3. The Table lists the barriers and facilitators that affect the provision of dietary advice and the adoption of dietary guidelines. The studies were all published between 1990 and 2016. The classification is detailed at the end of the Table. The list of barriers and facilitators reported was used to create a list of possible barriers and facilitators affecting the implementation of dietary guidelines for patients with hypertension by primary care physicians. Some barriers and facilitators that may commonly occur in primary care settings in Canada were added to

the list. They included, for example, the availability of EMR, characteristics of physicians, and number of patients with hypertension.

Table 4-3

Summary of literature survey of barriers and facilitators that affect the provision of dietary advice and the adoption of dietary guidelines

Year	Setting	Method	Classification	Barrier/Facilitator identified
Wynn et al.				
2010	Family practice offices in British Columbia, Canada	Mailed survey	K	Formal nutrition training in medical school is inadequate
			P	Physician is not comfortable counseling patients about nutrition topics related to chronic diseases
			S	There was a considerable gap between the proportion of patients who physicians thought would benefit from nutrition counseling and the proportion of patients who received such counseling by primary care physicians
			S	Lack of time and reimbursement
			P	Lack of evidence based information regarding nutrition intervention
				Rural area practices referred patients to dietitian services more frequently than urban physicians
Cabana et al.				
1999	Various central settings in the United States, Australia, the Netherlands, Italy, Canada, etc.	Systematic review	K	Lack of familiarity and awareness due to volume of information, time needed to stay informed, and accessibility of guidelines
			P	Physician believes that recommendations in guidelines will not lead to desired outcome
			S	Physician believes that he/she cannot conduct the guideline recommendations
			S	Lack of agreement with specific guidelines due to interpretation of evidence, applicability to patient, and belief that not cost-beneficial
				Lack of time, lack of resources, organizational constraints, lack of reimbursement
			Pt	Contradictory guidelines
				Inability to reconcile patient preferences with guideline recommendations
Cranney et al.				
2001	Nine primary care practices in the United Kingdom	Semi-structured interviews	P	Poor adherence of primary care physicians to practice protocols
			S	Doubts about the applicability of trial data to particular patients
				Time pressure and financial considerations affect applying clinical guidelines
				Absence of an effective computer system and educational mentor

Year	Setting	Method	Classification	Identified Barriers and Facilitators
Kushner				
1995	Primary care practices, internal medicine, and pediatrics in the United States	Cross-sectional survey	K	Physicians who counsel their patients about diet are more likely to have received training
			P	Low self-efficacy
			S	Lack of compensation for providing nutrition counseling
			Pt	Time pressures from usual clinical practice, time demands of recruitment and follow-up
			Pt	Patients unwilling to adhere to guidelines
				Older patients more likely to receive nutrition counseling
Eaton et al.				
2002	Primary care practices in the United States	Direct observation	S	Providing nutrition counseling depends on patients' list
			Pt	Physicians state they have many things to do in a visit. They average 55 seconds talking about nutrition
			Pt	Older patients are more likely to receive nutrition counseling or chronic illness, and during longer visits

Note. System level barriers (S), Patient barriers (Pt), Physician-related barriers (P), Knowledge barriers (K)

4.2.c Question design and format. The survey was also designed to elicit barriers and facilitators to the implementation of dietary guidelines for patients with hypertension (but not other chronic diseases). The survey also aimed to assess physicians' dietary knowledge by exploring their perception and knowledge of essential nutrition information related to hypertension (such as daily sodium intake), and by exploring the physicians' familiarity with the DASH diet components. These varied objectives required a variety of question types. The final survey (Appendix C) included Likert scales, multiple choice and open-ended questions. Likert scales are widely used in public health evaluation (Sullivan & Artino, 2013; Losby & Wetmore, 2012). The scales are ideal for measuring respondents' attitudes, beliefs or behaviours. They are also easy to read and complete in a short time (Losby & Wetmore, 2012).

Likert scales were used in the survey to measure physicians' attitudes, beliefs and behaviours. Multiple choice questions were used to examine physicians' knowledge about nutrition and hypertension. Open-ended questions were used to obtain data on different barriers and facilitators to express participants' reflective experiences and beliefs.

The survey was designed to take 10 to 15 minutes to complete. Care was taken when ordering the questions to ensure, for example, that the multiple-choice questions did not influence responses to any later knowledge questions. Skip logic was applied to some questions.

The questionnaire was converted to an electronic format to be completed online. The Web-based version of the questionnaire was created using Google Forms and stored on Google Drive where it was protected by a password. The electronic server is considered secure and confidential, and is hosted by the University of Ontario Institute of Technology.

4.3 Assessment of content and face validity

The validation process included validating the content, and face validity of the survey and then conducting a feasibility test.

Assessment of content validity. Content validity is the extent to which the questions within a tool are relevant and representative of the construct that they will be used to measure (Haynes et al., 1995). The content validity of the questionnaire was assessed through a series of reviews conducted by 9 of experts in hypertension, sodium, nutrition, heart disease, and by survey development. The content validity experts were selected to represent different age and gender groups, different lengths of time in practice and different practice settings in Ontario and Québec. The experts were asked to comment on the contents of the survey, to point out any errors such as double-barreled or confusing questions, to assess the readability, clarity and comprehensiveness of each question, and to provide an opinion on how well the content of each question was likely to measure the survey's objectives. The content validity experts were also asked to comment on the placement and ordering of the questions in the survey. The input received was used to modify the survey as necessary.

Assessment of face validity. Face validity is the extent to which a survey is subjectively viewed as covering the concept it purports to measure (Holden, 2010). It was assessed by asking a group of primary care physicians (face validity experts) to review the survey. The survey was sent to 10 primary care physicians who assessed and reviewed the questionnaire, and provided comments based on their experience.

After getting face validity experts' input, we modified the survey and asked the same experts to review the new version. The feedback received for these questions helped us assess and meet the content and face validity objectives (as discussed in Chapter Five).

The content and face validity experts were asked to answer four specific questions:

1. Have we captured all relevant barriers and facilitators? If not, what was missed?
2. Are questions clear and do they come across/interpreted as intended? Are there any that are misleading, confusing or inappropriate?
3. Do the available responses seem appropriate?
4. At this point, the survey is long. Are there any questions that should be removed?

Recruitment of content and face validity experts. An invitation email was sent to 9 experts for the content validity, and 10 primary care physicians for the face validity. The invitation included background information designed to enable the experts to examine all relevant aspects of the survey. Appendix A reproduces the email sent to the content and face validity experts.

4.4 Feasibility Test

The goals of the feasibility test were to evaluate the survey among a sample representing the study population of interest, establish whether respondents were able to follow the directions provided, test whether the survey met the purpose of the study, check for errors that might have been overlooked, identify questions that did not make sense to the subjects, and identify problems that might lead to biased results. The final version of the electronic survey was sent to 30 primary care physicians and 16 residents. All the physicians and residents worked in a large primary care clinic in the Durham region of Ontario. Residents were included to determine if differences exist between relatively new graduates and experienced practicing physicians. The feasibility study excluded specialists, pharmacists, nurses, dieticians or other medical professionals

working in governmental or non-governmental health organizations, educational institutions or industry.

The participants' eligibility was determined in the first three questions of the survey. Only eligible participants were able to complete the survey.

After completing the survey, participants were asked four questions about their survey experience:

- a. On a scale of 1 to 10, how easy was this survey to complete?

Not at all easy	<input type="checkbox"/>	Extremely easy									
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- b. If you could change anything thing about the survey, what would it be and why?

Please provide comments about specific questions/responses.

- c. Are there any question(s) you think we should add or remove?

- d. How long does it take to complete the survey?

The study (REB File #14343) was approved by the University of Ontario Institute of Technology on May 18, 2017.

4.4.a Feasibility test recruitment and data collection. Participants in the feasibility test received an initial invitation email and three follow-up emails, one per week over the following three weeks (Appendix B). The electronic invitation included an introduction, information on the purpose of the study, and information on compensation. An embedded hyperlink was provided to access the electronic questionnaire and the consent form (Appendix B).

Upon selecting the hyperlink, participants viewed the consent form. After providing informed consent, they proceeded to the survey. Individuals were informed that

their participation was voluntary and they could withdraw at any time. No identifying information such as name or email address was collected. The responses were anonymous. As the feasibility test was a one-time questionnaire, there was no follow-up survey, and participants were not asked to provide extra data after completing the survey.

4.4.b Compensation. Participants were informed that upon completing the survey, they could enter a prize draw for an iPad. Participants who entered needed to provide name and email address. An extra link to a second Google Form at the end of the survey created a separate database for prize draw entrants' information and ensured that individuals could not be linked to the survey data.

4.4.c Data analysis for feasibility test. All the feasibility test data were collected online and tabulated into an online database via Google Docs. The responses were downloaded for tabulation and analysis. The data were entered and analyzed using SPSS® Statistics (24.0) (IBM Corp., 2014). Frequency analyses provided the proportion of individuals responding to each item and, where applicable, the mean and standard deviation for each item.

Chapter Five: Results

5.1 Questionnaire Development

The final survey (Appendix C) included 33 questions: 7 questions on physician demographics, 7 questions on knowledge, 5 questions on attitudes to barriers and facilitators, 11 questions on behaviours related to barriers and facilitators, and one question on facilitators. The questionnaire included multiple-choice questions and a series of questions that used a five-point Likert scale. Table 5-1 summarizes the items covered and the type of response collected.

Table 5-1

Summary of items and response type

Items	Response type
Self-efficiency in the provision of dietary advice	Confidence scale, 'not at all confident' to 'extremely confident'
Attitudes towards the importance of dietary guidelines for hypertension management and prevention	Importance scale, 'not at all important' to 'very important'
Frequency of providing specific types of dietary recommendations	Frequency scale, 'Never' to 'always.' "I do not know" also an option
Frequency of advising individuals who have hypertension and who are at higher risk of hypertension	Frequency scales, 'Never' to 'always'
Frequency of referring patients to a dietitian	
Frequency of discussing the severity of hypertension	
Barriers: patient (5 statements), physician (7 statements), systemic (3 statements)	Agreement scale, 'strongly disagree' to 'strongly agree,' "I do not know" also an option. Open-ended questions
Facilitators or other practice improvements (8 statements)	Agreement scale 'strongly disagree' to 'strongly agree.' "I do not know" also an option. Open-ended questions
Remuneration model	
Electronic Medical Record system	Multiple-choice questions. "I do not know" also an option
Knowledge about the dietary management of hypertension	
Nutritional training history	Multiple-choice questions, and "other" option

5.2 Validation and Editing of the Survey by Content and Face Validity Experts

Nine experts in hypertension, sodium, nutrition, heart disease, and survey development evaluated the survey for content validity, and three primary care physicians tested the survey (two rounds) for face validity. See Table 5-2.

Table 5-2

Areas of expertise of content validity experts

	Hypertension	Cardiovascular diseases	Nutrition and sodium	Survey development	Primary care physicians
Expert 1	■	■			
Expert 2	■		■		
Expert 3			■	■	
Expert 4	■		■		
Expert 5			■	■	
Expert 6		■		■	
Expert 7		■	■		
Expert 8			■		
Expert 9	■		■	■	
Expert 10					■
Expert 11					■
Expert 12					■

Table 5-3 provides an overview of the survey modifications made following the feedback from the content and face validity experts. Appendix D provides the detailed comments.

Table 5-3

Survey modifications made following the face validity experts' comments and suggestions

Type of change	Modification
Language	Some language was simplified
Question construction	<p>The question “Do you have a Registered Dietitian to refer your patients to?” was changed to “How often do you refer your patients to a dietitian for help with the nutrition management of hypertension?” An expert indicated that the original question “does not really report how much dietitians are being used. If physicians have a dietitian to refer to, it doesn’t necessarily imply that they are regularly referring patients to that dietitian” (Appendix C, Q23).</p> <p>An expert suggested that the barriers should be separated into three sections (patients, physicians, systemic) (Appendix C, Q25; 27 and 29).</p>
Content	<p>More options were added to the question “Which best describes your remuneration model?”</p> <p>An expert on hypertension said that research has found that patients said that their primary care physicians did not discuss the severity of hypertension with them, and that is why they did not adopt healthy behaviours. The expert suggested adding the question “How often do you discuss the severity of hypertension with your patients to encourage them to adopt healthy behaviours?” (Appendix C, Q24).</p> <p>Several experts suggested removing the question “Appendix D, Q25” to reduce the size of the survey.</p>
Answering format	<p>Modifications were made to the options for “Tell us how often you recommend the following nutrition interventions for your patients with hypertension?” The following options were removed to reduce the length of the question: “to reduce saturated fat/to consume lean meats and alternatives (e.g., legumes, nuts, eggs)/to increase soluble fibre and whole grain intake/to consume low-fat dairy products/to increase fruit and vegetable intake.” The options were replaced by “to follow the Dietary Approaches to Stop Hypertension (DASH) diet.”</p>
Language	<p>The negative tone of statements such as “I often do not discuss diet with patients with hypertension because I am not compensated to do so,” (Q29, statement 3) and “Some patients do not tell the truth about their dietary intake” (Q25, statement 1) was softened.</p>
Question construction	<p>Change the order of the survey questions.</p> <p>Questions such as “For patients with hypertension, tell us how confident are you in providing advice on the following lifestyle recommendations?” were changed from new versions such as “How confident are you in providing advice to patients hypertension?” The changes were made because a physician said that the original versions were likely to scare people away (Appendix C, Q13).</p>
Content	<p>The statement “I usually discuss the severity of hypertension with my patients to encourage them to adopt healthy behaviours for the following reasons?” was removed and replaced with a simple Likert scale (Appendix C, Q24).</p> <p>The option “Other” under questions Q27, 29 and 31 was removed and replaced by a separate question such as “What are other (patient/physician/systemic) barriers to discussing nutrition recommendations with your patients?” (Appendix C,</p>

Q28, 30 and 32).

Answering format

The type of geographic area (“rural area/urban area/suburban”) was defined by adding the typical population of each type of area (Appendix C, Q5).

The options for the question “Which best describes your primary place of work?” were altered. “Family health team/Family practice group and independent practice” was changed to “Group practice/Solo Practitioner.”

5.3 Feasibility Test: The Response

Seven responses were received from primary care physicians and residents in the Durham region of Ontario out of (30 primary care physicians and 16 residents). The response rate was (15.2%). The data were collected from June 21 to August 10, 2017. The average time reported for filling in the survey was 6.4 minutes.

All seven participants in the feasibility test completed the ranking questions regarding barriers, and most participants responded to the open-ended questions. The percentage of participants who skipped a question was not calculated as Google forms does not support this service.

5.4 Feasibility Test: Characteristics of the Participants

Table 10 summarizes the demographic and practice data of the participants. They were almost evenly split between: primary care physicians and residents; male and female; working in a Community Health Centre and working in a group practice; years of experience after residency; and remuneration model. Most worked in an urban area and almost all saw at least ten patients with hypertension per week. Almost half saw at least 25 patients with hypertension per week. About half had some training in nutrition. All used EMR, but none appeared to use EMR to support dietary screening or advice. Table 5-4 provides details of the characteristics of the feasibility test participants.

Table 5-4

Characteristics of the feasibility test participants (n=7)

Characteristics	Frequency n (%)
Primary care physicians	3 (42.9%)
Residents	4 (57.1%)
Gender	
Male	3 (42.9%)
Type of facility	
Community Health Centre	3 (42.9%)
Group practice	3 (42.9%)
Other	1 (14.3%)
For licensed physicians, number of practicing years after residency	
0-4 years	2 (28.6%)
16-20 years	1 (14.3%)
More than 20 years	1 (14.3%)
Current location of practice	
Suburban area (a population between from 10,000 to 100,000 people)	2 (28.6%)
Urban area (a population of >100,000 people)	5 (71.4%)
Number of patients with hypertension seen each week	
1-9 patients	1 (14.3%)
10-24 patients	3 (42.9%)
25-40 patients	3 (42.9%)
Remuneration model	
Enhanced fee for service	2 (28.6%)
Alternative payment plans	3 (42.9%)
Salary	2 (28.6%)
Use EMR for patient care	
Yes	7 (100%)
EMR inclusion of tools to support dietary screening or advice	
Yes	0 (0%)
No	1 (14.3%)
I don't know	6 (85.7%)
Past training in nutrition have you received?	
Lectures as part of a course in medical school or residency program	2 (28.6%)
Attending workshops in person or webinars	1 (14.3%)
Taking a nutrition course	1 (14.3%)
Post-secondary degree in nutrition	0 (0%)
None	2 (28.6%)
Missing response	2 (28.6%)
Other	0 (0%)

5.5 Feasibility Test: Participants' Comments on the Feasibility Questions and Survey

The results of the feasibility test suggested that the survey included some questions (such as Q13, 27 and 22 in Appendix C) where participants tried to answer

quickly by choosing the same answer as other questions or choosing the safest answer, "natural/always." This may indicate response bias.

The number of responses to the feasibility questions varied: six for the first question, four for the second question, three for the third question, and six for the fourth question. Changes were made to each question as soon as comments and suggestions were made to avoid testing and retesting an inadequate question.

No responses were available for the two questions on facilitators due to an error in the survey code. Table 5-5 summarizes the of feedback received from the feasibility test participants.

Table 5-5

Summary of feedback received from feasibility test participants (n=7)

	Response	Revision
Q1 On a scale of 1 to 10, how easy was this survey to complete?	The mean of responses was 6.42 (ranged from 6 to 9).	
Q2 If you could change anything thing about the survey, what would it be and why? Please provide comments about specific questions/responses.	The survey was a bit long	NA
	There are some typos in Q 13 and 33	The typos were corrected
	Q 15 and 16 asked "select all that apply," but the buttons were not formatted so the participants could not choose multiple answers	The problem was corrected
Q3 Are there any question/s you think we should add or remove?	Include doctor's perception of barriers for patients	Added some patient barriers. Added some open-ended questions
	Q16/17 are similar to each other	The two questions were changed. Q16 became "To your knowledge, which of the following should be reduced to lower blood pressure?" Q17 became "Which of the following is known to lower blood pressure?"
	Delete the definition of "suburban" in Q5	Experts recommended keeping the definitions
Q4 How long does it take to complete the survey?	The mean of responses was 7.57 minutes (ranged from 5 to 10 minutes)	

5.6 Feasibility Test: Survey Responses

The following is a summary of survey responses obtained from the feasibility study participants.

Feasibility test participants' confidence in providing nutrition advice. Table 5-6 shows the feasibility test participants' level of confidence when advising on behaviours related to hypertension management. The participants were clearly very or extremely confident about all the behaviours.

Table 5-6

Feasibility test participants' level of confidence when advising on behaviours related to hypertension management (n=7)

	Not at all confident					Extremely confident	Mean \pm SD
	1 n (%)	2 n (%)	3 n (%)	4 n (%)	5 n (%)		
...to be more physically active.	0	0	0	4 (57.1%)	3 (42.9%)	4.42 \pm 0.53	
...to reduce body weight.	0	0	0	4 (57.1%)	3 (42.9%)	4.42 \pm 0.53	
...to reduce alcohol consumption.	0	0	0	4 (57.1%)	3 (42.9%)	4.42 \pm 0.53	
...to stop smoking.	0	0	0	4 (57.1%)	3 (42.9%)	4.42 \pm 0.53	
...to provide general advice about diet.	0	0	0	5 (71.4%)	2 (28.6%)	4.28 \pm 0.48	
...to reduce sodium intake.	0	0	0	6 (85.7%)	1 (14.3%)	4.14 \pm 0.37	
...to manage stress.	0	0	0	7 (100%)	0	4.00 \pm 0.00	

Feasibility test participants' frequency of providing diet or nutrition advice.

Table 5-7 shows the feasibility test participants' frequency of providing diet or nutrition advice to patients with a higher risk of hypertension and to patients with hypertension. There was little difference in the responses for the two types of patient. Five of the test participants said that they often or always gave these patients nutrition advice.

Table 5-7

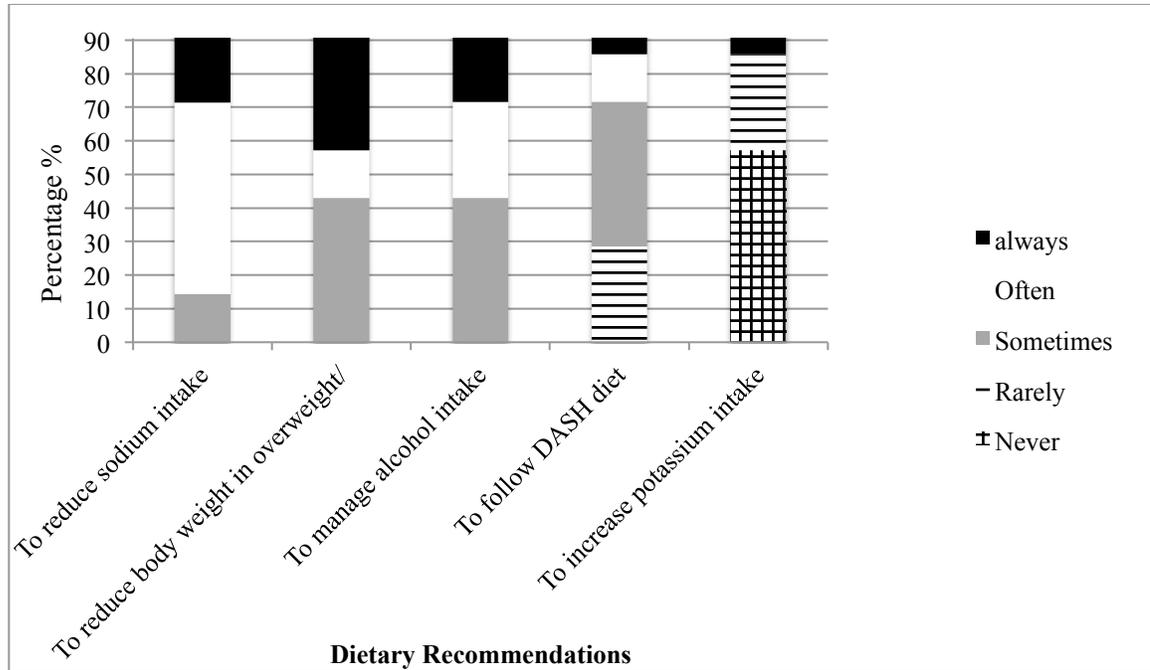
Frequency of providing advice on diet or nutrition (n=7)

	Never n (%)	Rarely n (%)	Sometime s n (%)	Often n (%)	Always n (%)	Mean ± SD
Talking about diet or nutrition with patients at higher risk of hypertension?	0	1 (14.3%)	2 (28.6%)	3 (42.9%)	1 (14.3%)	3.57± 0.97
Talking about diet or nutrition with patients who have hypertension?	0	0	3 (42.9%)	2 (28.6%)	2 (28.6%)	3.85± 0.89

Figure 5-1 shows that the participants reported that they typically advised patients with hypertension to reduce sodium, followed by losing weight, and reducing alcohol consumption. Fewer participants advised patients to adopt the DASH diet and/or increase their potassium intake.

Figure 5-1

The frequency of providing dietary recommendations for patients with hypertension (n=7)



Patient barriers. The feasibility test participants rated five patient barriers to providing dietary advice for patients with hypertension. The barriers and ratings are shown in Table 5-8.

The main barriers were: “Some patients don’t tell the truth about their dietary intake, and Patients with hypertension prefer medications, not dietary changes.”

The open-ended responses added to the patient barriers:

- Not enough money to see dietitian,
- Not enough money to buy non-processed foods,
- Not enough time,
- Different sources of information,
- Patient’s lack of interest/motivation in making lifestyle changes,

- Inadequate knowledge, and
- Angry patient.

Table 5-8

Patient barriers reported by feasibility test participants (n=7)

	Strongly disagree		Strongly agree			I do not know	Mean ± SD
	1 n (%)	2 n (%)	3 n (%)	4 n (%)	5 n (%)		
Some patients don't tell the truth about their dietary intake.	1 (14.3%)	0	0	4 (57.1%)	2 (28.6%)	0	4.14± 0.69
Patients with hypertension prefer medications, not dietary changes.	0	1 (14.3%)	2 (28.6%)	2 (28.6%)	1 (14.3%)	1 (14.3%)	3.85± 1.34
It is difficult to discuss diet with patients who consume cultural food.	1 (14.3%)	1 (14.3%)	2 (28.6%)	2 (28.6%)	1 (14.3%)	0	3.14± 1.34
Patients will not listen/apply the dietary advice.	0	2 (28.6%)	2 (28.6%)	2 (28.6%)	0	0	3.28± 1.11
Patients know about sodium intake; I don't need to advise them.	2 (28.6%)	3 (42.9%)	2 (28.6%)	0	0	0	2.00± 0.81

Physician barriers. The feasibility test participants rated seven physician barriers to providing dietary advice for patients with hypertension. The barriers and ratings are shown in Table 5-9.

The main barriers were: “It’s difficult to know which foods are high or low in sodium, and I often don’t have enough time to counsel patients about diet.” “There was less agreement with “A low sodium diet is no longer necessary to prevent or manage hypertension,” and “Dietary changes for hypertension is not a priority when patients have co-morbidities.”

The open-ended responses added to the physician barriers:

- Patients don't have enough money to follow through with recommendations, and

- Patient money.

Table 5-9

Physician barriers reported by feasibility test participants (n=7)

	Strongly disagree					Strongly agree	I do not know	Mean ± SD
	1 n (%)	2 n (%)	3 n (%)	4 n (%)	5 n (%)			
It's difficult to know which foods are high or low in sodium.	0	1 (14.3%)	1 (14.3%)	2 (28.6%)	3 (42.9%)	0	4.00± 1.15	
I often don't have enough time to counsel patients about diet.	0	1 (14.3%)	0	5 (71.4%)	1 (14.3%)	0	3.85± 0.89	
I rely on pamphlets/ brochures to guide patients about diet.	0	1 (14.3%)	4 (57.1%)	2 (28.6%)	0	0	3.14± 0.69	
There are controversial findings about dietary sodium and its link to hypertension and cardiovascular risk.	1 (14.3%)	1 (14.3%)	4 (57.1%)	0	0	1 (14.3%)	3.00± 1.52	
Dietary modifications are more important for older patients, compared to younger patients, with hypertension.	1 (14.3%)	4 (57.1%)	1 (14.3%)	1 (14.3%)	0	0	2.28± 0.95	
A low sodium diet is no longer necessary to prevent or manage hypertension.	0	6 (85.7%)	1 (14.3%)	0	0	0	2.14± 0.37	
Dietary changes for hypertension is not a priority when patients have co-morbidities.	3 (42.9%)	2 (28.6%)	1 (14.3%)	1 (14.3%)	0	0	2.00± 1.15	

Systemic barriers. The feasibility test participants rated three systemic barriers to providing dietary advice for patients with hypertension. The barriers and ratings are shown in Table 5-10.

The two main barriers were: “I don’t know where to find the most recent dietary recommendations for hypertension,” and “There are so many dietary guidelines for hypertension management that it is nearly impossible to keep up.” There was less agreement with “I don’t often discuss diet with patients with hypertension because I’m

not compensated to do so,” and “Dietary changes for hypertension are not a priority when patients have co-morbidities.”

There was only one open ended response:

Patients do not have money to follow through with recommendations.

Table 5-10

Systemic barriers reported by feasibility test participants (n=7)

	Strongly disagree				Strongly agree	I don't know	Mean ± SD
	1 n (%)	2 n (%)	3 n (%)	4 n (%)	5 n (%)		
I don't know where to find the most recent dietary recommendations for hypertension.	0	1 (14.3%)	2 (28.6%)	4 (57.1%)	0	0	3.42± 0.78
There are so many dietary guidelines for hypertension management that are nearly impossible to keep up.	0	1 (14.3%)	2 (28.6%)	4 (57.1%)	0	0	3.42± 0.78
I often don't discuss diet with patients with hypertension because I'm not compensated to do so.	2 (28.6%)	1 (14.3%)	2 (28.6%)	2 (28.6%)	0	0	2.57± 1.27

Knowledge assessment. Table 5-11 lists the topics covered in the knowledge assessment. The correct responses are marked with an asterisk.

Five of the seven participants knew that the recommended sodium daily intake for patients with hypertension was 2,000 mg, but as there were many gaps in the detailed knowledge of the foods and minerals recommended for lowering blood pressure, it was clear that none of the participants knew all the components of the DASH diet, and only three of the seven participants knew that dietary potassium lower blood pressure.

Table 5-11

Assessment of feasibility test participants' knowledge of DASH diet components (n=7)

	# of Participants (% total)
What is the maximum daily amount of sodium recommended for patients with hypertension according to Hypertension Canada?	
1,500 mg	0 (0%)
2,000 mg*	5 (71.4%)
2,500 mg	2 (28.6%)
3,400 mg	0 (0%)
4,000 mg	0 (0%)
I don't know	0 (0%)
To your knowledge, which of the following is recommended to take to lower blood pressure?	
Fruit and vegetables*	7 (100%)
Vitamin D fortified foods*	2 (28.6%)
Low fat dairy products*	4 (57.1%)
Whole grains*	3 (42.9%)
Omega 3 fatty acids	2 (28.6%)
Low glycemic index carbohydrates	1 (14.3%)
Nuts and legumes*	0 (0%)
I don't know	2 (28.6%)
To your knowledge, which of the following is recommended to reduce blood pressure?	
Sodium*	3 (42.9%)
Calcium*	1 (14.3%)
Sugar*	1 (14.3%)
Saturated and trans fats*	1 (14.3%)
Potassium	2 (28.6%)
I don't know	2 (28.6%)
Which of the following is known to lower blood pressure?	
Potassium*	3 (42.9%)
Chloride	0 (0%)
Calcium	0 (0%)
Alcohol	2 (28.6%)
Iron	0 (0%)
None of the above	0 (0%)
I don't know	2 (28.6%)

* the correct answer(s).

Chapter Six: Summary, Discussion and Future Work

6.1 Summary

Hypertension is a major health risk due its association with heart attacks and stroke and is a serious issue in Canada where 22.6% of adults have hypertension. Dietary changes are an important way in which individuals can manage their blood pressure and reduce the risk of hypertension health complications (Public Health Agency of Canada, 2009). According to Hypertension Canada, dietary sodium reduction is an essential element in the dietary control of hypertension management.

Although most Canadians have a primary care physician and primary care physicians are the obvious place for patients to receive dietary advice, the rate of providing dietary advice in primary care is low (Mellen et al., 2004). It is clearly important to address the barriers that impede primary care physician from providing dietary advice to patients with hypertension. The objective of the current study was to develop and validate a survey to identify barriers and facilitators regarding the implementation of dietary guidelines for patients with hypertension by primary care physicians. To achieve this objective, it was necessary to conduct a feasibility test designed to contribute to the creation of a survey that could be administered to a national sample.

The survey development and final survey discussed in this thesis is the result of an extensive literature review followed by testing. The literature review provided the basis for the initial survey content and design. The studies available mentioned various barriers and facilitators that affect the provision of dietary advice and the implementation of dietary guidelines, and showed that past studies have used several different methods to establish the barriers and facilitators.

A list of candidate survey questions emerged from the literature review. These questions were assessed through content and face validity testing conducted by subject matter experts. Care was taken, for example, to avoid errors due to unclear questions. All such questions were rephrased to make them as clear and simple as possible, and different types of questioning techniques were used. The revised questionnaire was then assessed by conducting a feasibility test.

The feasibility test was developed as an online tool. The test survey included a mix of closed and open questions. The closed questions included questions that measured participants' attitudes to possible barriers and facilitators. These questions used Likert scales. The barriers included patient, physician and systemic barriers. The open questions provided an opportunity for participants to contribute their own opinions. The test survey also included a set of questions which investigated participants' knowledge of various important diet and nutrition issues.

The feasibility test was conducted among primary care physicians and residents. Unfortunately, the sample was restricted to seven participants as the response rate to a request to 46 physicians and residents at a Durham, Ontario clinic to participate was low (only 15.2%). Nevertheless, the participants provided much valuable information. They identified a few minor errors, but were able to answer all the questions. They reported that the survey was easy to answer and that it took 5 to 10 minutes to complete (averaging 7.57 minutes). These points were important for a survey intended for busy primary care physicians.

The responses given by the feasibility test participants pointed to a number of barriers to giving nutrition advice. Most participants did not know where to find the most recent dietary recommendations for hypertension, and most said that there are so many

dietary guidelines for hypertension management that it is nearly impossible to keep up to date. Most participants knew the maximum daily sodium intake for patients with hypertension recommended by Hypertension Canada, but they noted that it is difficult to know which foods are high or low in sodium. For patients with multiple diseases, however, most participants believed that dietary changes for hypertension are a priority.

The survey also showed that there were gaps in the participants' knowledge. For example, participants were not always familiar with the benefits of increasing potassium intake to lower blood pressure, and the DASH diet was not widely promoted or recommended.

Physicians' lack of familiarity with nutrition issues was reinforced by lack of time. Lack of time was clearly a major barrier to primary care physicians' giving nutrition advice. Physicians limited visit time by not discussing dietary advice.

6.2 Discussion

Response rate. The low response rate and resulting small sample for the feasibility test were regrettable. The literature review suggested that the response rate would be higher. For example, a study that used an electronic survey to collect data from primary care physicians had a response rate of 38%. This survey offered one continuing medical education (CME) accreditation point as compensation for completing the questionnaire (Lugtenberg et al., 2011). A Canadian study that specifically investigated barriers to dietary advice in primary care reported a response rate of 59.6%. In this case the data were collected by mail and the compensation offered was a \$1 lottery ticket (Wynn et al., 2010). A study conducted in Saudi Arabia recorded a response rate of 61.4%. This study delivered the survey to a five hospitals included in the survey (Al-Muammar 2012).

The feasibility test's low response rate may be due partly to the use of email for the initial and follow-up information. Murphy et al. (2016) found some physicians receive well over 100 electronic notifications each day and dealing with this electronic burden requires more than an hour each day. Moreover, the feasibility study was conducted in June/July, a time when many people take vacation.

Consistency with previous studies. The feasibility test findings were consistent with the findings of other studies. There were no significant inconsistencies. Important consistencies included:

- The feasibility test participants felt that they do not have time to give dietary advice (Kushner 1995; Anis et al., 2004; Cornuz et al., 2000; Nicholas, Roberts, & Pond, 2003; Visser et al., 2008; Taba et al., 2012; Eaton et al., 2002);
- Participants said that they are not fully informed about hypertension and nutrition (Wynn et al., 2010; Cranney et al., 2001; Cabana et al., 1999; Al-Muammar 2012; Kolasa et al., 2010; Lugtenberg et al., 2011; Kushner 1995);
- Participants agreed that dietary changes for hypertension are a priority when patients have multiple diseases. This finding is consistent with research which has found that physicians provide nutrition advice more often to older adults. Older adults are more likely to have multiple diseases (e.g., hypertension, diabetes and cardiovascular disease) (Eaton et al., 2002; Mellen et al., 2004; Davis, Chung, & Juarez, 2011).

Study strengths. As far as could be ascertained, the questionnaire developed in this study is the first web-based tool designed to investigate physicians' knowledge,

attitudes, behaviours and related barriers and facilitators that affect the encouragement and implementation of dietary guidelines for patients with hypertension in primary care. Thanks to the content and face validity checks and the feasibility test, the survey tool captures a comprehensive set of barriers and facilitators, avoids ambiguity, and ensures that all questions are direct, clear and specific. In addition, the online format avoids interviewer bias and allows participants to express their opinions anonymously.

The tool developed also has a number of practical strengths: the online approach is inexpensive (as opposed, for example, to mail or interview surveys); the online format reduces coding errors; the tool is easy and quick to complete; and the survey is mobile-user-friendly. An online survey can also be circulated broadly.

Study limitations. The study's limitations must also be considered. Firstly, the face validity testing was inevitably subjective, but possible bias in the final survey was reduced by adding closed questions, using clear language, and offering numerous options in the responses. Bias was also reduced by providing the face validity experts with a set of guidelines for the survey review (Appendix A). Content validity testing is typically more straightforward than face validity testing, but requires a rigorous approach supported by sufficient resources, time, expertise, and attention to detail.

Secondly, as participation in the feasibility testing was voluntary, there may have been some selection bias. For example, the low response rate might be associated with non-response bias, participants might have decided to complete the survey because they were particularly interested in nutrition research, and additional bias might have occurred because the survey was conducted in mid-summer when people might be away on vacation.

Thirdly, there was no the reliability testing, i.e., the reliability of the survey was not tested by re-administering the survey and investigating the correlation between the two sets of results.

6.3 Future work

Until now, Canada has had no tool for investigating barriers and facilitators to the implementation of dietary recommendations for patients with hypertension in primary care. A valid survey tool for assessing physicians' knowledge, attitudes and behaviours is an important way to promote the value of physicians talking to their hypertensive patients about how diet can improve the patients' health. The survey developed in this study will be administered to approximately 500 Canadian primary care physicians in mid November 2017.

The findings of this study suggest that a survey of a larger sample faces challenges, but is a feasible and worthwhile undertaking. The following recommendations are proposed when administrating the survey on a national sample: 1) Administer the survey in Fall/Winter when most of primary care physicians are not away on vacation. 2) Send follow up emails regularly every two weeks of collecting data duration. 3) In the invitation email, remind subjects that the survey only takes 5 to 10 minutes to complete.

Organizations and facilities from different cities in Canada such as university program directors and the Canadian Primary Care Sentinel Surveillance Network (CPCSSN) organization will be asked to email the survey to their lists of primary care physicians, so the sample is representative of the study population.

The study suggests that Hypertension Canada should consider a strategy to increase physician awareness about the CHEP guidelines for patients with hypertension. The results of the survey of 500 physicians will provide the data required to design the

best interventions and strategies for increasing understanding and adoption of dietary guidelines in the primary care for patients with hypertension.

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Appendix A: The email that was sent to obtain experts' feedback

Dear

We are looking for expert review for survey validation.

The purpose of the survey is to explore barriers and facilitators to the implementation of dietary recommendations for hypertension in primary care. As part of the survey validation process, we are sending it to experts in either nutrition/diet, family medicine, hypertension or survey design and implementation. Any time you can give is greatly appreciated.

The target audience is primary care doctors. Included in this survey is also an objective assessment of physician knowledge, as a barrier. The survey should be about 10 minutes long. Presently, it's on the longer side.

Here is what we are looking to know:

1. Have we captured all relevant barriers and facilitators? If not, what was missed?
2. Are questions clear and do they come across/interpreted as intended? Are there any that are misleading, confusing or inappropriate?
3. Do the available responses seem appropriate?
4. At this point, the survey is too long. Are there any questions that you think can be removed?

Thanks in advance for your consideration. We are looking to obtain feedback ASAP and hopes you can respond by Friday March 10th.

Appendix B: E-invitation that was sent to feasibility testing sample

Dear Doctor

I am writing to you to request your participation in a brief survey, which will take about **10-15 minutes** to complete. The purpose of this study is developing and evaluating the feasibility of distributing a survey that identifies internal and external barriers and facilitators to physician-implementation of dietary guidelines for patients with hypertension in primary care. We are validating the survey among **a small group of primary care physicians**.

Your response is important to us to validate the survey the barriers and facilitators to implementing dietary recommendations so that novel interventions can be developed to assist health care providers in engaging in conversations about diet.

Please click the link below to go to the survey Web site (or copy and paste the link into your Internet browser).

<https://goo.gl/forms/SFFkOR0yMF9xoUwD3>

Right to withdraw and voluntary:

Your participation is voluntary, and you can answer only those questions that you are comfortable with. As well, you can withdraw during the survey by choosing not to complete it (Read more when click the link).

Confidentiality:

All of your responses will be kept confidential. No personally identifiable information will be collected. Therefore, your responses will remain anonymous. No one will be able to identify you or your answers, and no one will know whether or not you participated in the study (Read more when click the link).

Should you have any comments or questions, please feel free to contact us at JoAnne.Arcand@uoit.ca or Sadeem.alsaeed@uoit.net

Thank you very much for your time and cooperation

Sincerely,

Printable investigator: JoAnne Arcand PhD, RD
Assistant Professor (Human Nutrition)
University of Ontario Institute of Technology (UOIT)

Co-investigator: Sadeem Alsaeed
Master Candidate, Community Health, Health Science
Bachelor degree of Nutrition and Food Sciences with honor

Appendix C: The final version of the survey

Thank you for participating in the pilot study for this survey. At the end of the survey we will ask you a few questions about your survey experience:

- On a scale of 1 to 10, how easy was this survey to complete?
- If you could change anything thing about the survey, what would it be and why? Please provide comments about specific questions/responses.
- Are there any question/s you think we should add or remove?
- How long does it take to complete the survey?

Q01 Are you a primary care physician who practices in Canada? (Please choose one)

1. Yes, I am a primary care physician
2. No, I am **not** a primary care physician

(If the subject responds “No” (2), then he/she is excluded from the study. Go to thank you page.)

Q02 Which best describes your primary place of work? (Please choose one)

1. Community Health Centre
2. Group practice (i.e., shared responsibility for a group of patients /family practice group)
3. Solo Practioner (i.e. do not work in partnership with other family doctors)
4. Hospital
5. Long-term care facility
6. Mental Health Centre
7. Industry
8. Educational Institution
9. Government or non-governmental health organization
10. Other. Pleases specify

(If the subject responded to statements 7, 8 or 9, then he/she is excluded from the study. Go to thank you page)

Q03 Approximately how many patients with hypertension do you see each week?

1. 1-9 patients
2. 10-24 patients
3. 25-40 patients
4. > 41 patients
5. I do not see patients with hypertension

(If the subject responded to statement 5, then he/she is excluded from the study. Go to thank you page)

Q04 In which province/territory do you primarily practice? (Please choose one)

- 1 Newfoundland and Labrador
- 2 Prince Edward Island
- 3 Nova Scotia
- 4 New Brunswick
- 5 Quebec
- 6 Ontario
- 7 Manitoba
- 8 Saskatchewan

Roses World 2017-10-13 11:22 AM

Comment [1]: Show this as a description in the e-survey

Roses World 2017-10-13 11:22 AM

Comment [2]: Show this as a description in the e-survey

- 9 Alberta
- 10 British Columbia
- 11 Yukon
- 12 Northwest Territories
- 13 Nunavut

Q05 In which type of community is your primary place of work ? (Please choose one)

- 1. Rural area (small town or village of < 10,000 people)
- 2. Suburban area (a population between 10,000 to 100,000 people)
- 3. Urban area (a population of >100,000 people)

Q06 What is your gender? (Please choose one)

- 1 Male
- 2 Female
- 3 Other, please describe: _____

Q07 After residency, how long have you been practicing as a primary care physician? (Please choose one)

- 1. 0-4 years
- 2. 5-10 years
- 3. 11-15 years
- 4. 16-20 years
- 5. More than 20 years

Q08 Which best describes your remuneration model? (Please choose one)

- 1. Fee for service
- 2. Enhanced fee for service
- 3. Alternative payment plans
- 4. Salary
- 5. Other, please describe: _____
- 6. Don't know

---PAGE BREAK---

Q09 Do you use an Electronic Medical Record (EMR) for patient care? (Please choose one)

- 1. Yes
- 2. No *(If no, then skip Q10)*

Q10 Does your EMR include tools to support dietary screening or dietary counseling? (Please choose one)

- 1. Yes
- 2. No
- 3. I don't know

Q11: If yes, please tell us about the tool(s):

--

Q12 **Would you find it helpful if your EMR included decision support tools about nutrition and diet?**

- 1. Yes
- 2. No
- 3. I don't know

---PAGE BREAK---

Q13 **How confident are you in providing advice to patients hypertension... (Please check one response per line)**

	Not at all confident				Extremely confident
	1	2	3	4	5
1. ...to reduce sodium intake?	<input type="radio"/>				
2. ...to be more physically active?	<input type="radio"/>				
3. ...to reduce body weight?	<input type="radio"/>				
4. ...to reduce alcohol consumption?	<input type="radio"/>				
5. ...to stop smoking?	<input type="radio"/>				
6. ...to provide general advice about diet?	<input type="radio"/>				
7. ...to manage stress?	<input type="radio"/>				

---PAGE BREAK---

Q14 **What is the maximum daily amount of sodium recommended for patients with hypertension according to Hypertension Canada? (Please choose one response)**

- A. 1500 mg
- B. 2,000 mg*
- C. 2,500 mg
- D. 3400 mg
- E. 4000 mg
- F. I don't know

Q15 To your knowledge, which of the following is recommended to take to lower blood pressure? (Please choose all responses that apply)

1. Fruit and vegetables*
2. Vitamin D fortified foods*
3. Low fat dairy products*
4. Whole grains*
5. Omega 3 fatty acids
6. Low glycemic index carbohydrates
7. Nuts and legumes*
8. I don't know

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Q16 To your knowledge, which of the following should be reduced to lower blood pressure? (Please choose all responses that apply)

1. Sodium*
2. Calcium*
3. Sugar*
4. Saturated and trans fats*
5. Potassium
6. I don't know

Q17 Which of the following is known to reduce blood pressure? (Please choose one response)

1. Potassium*
2. Chloride
3. Calcium
4. Alcohol
5. Iron
6. None of the above
7. I don't know

---PAGE BREAK---

Q18 How important do you feel diet or nutrition is in the prevention of hypertension? (Please choose one)

Not at all important	Low importance	Neutral	Moderately important	Very important
<input type="radio"/>				

Q19 Tell us how often you talk about diet or nutrition with you patients at higher risk of hypertension (Please choose one)

Never	Rarely	Sometimes	Often	Always
<input type="radio"/>				

JoAnne Arcand 2017-12-5 11:23 AM

Comment [3]: Be sure to remove all highlights.

Q20 How important do you feel diet or nutrition is in the management of patients with hypertension? (Please choose one)

Not at all important	Low importance	Neutral	Moderately important	Very important
<input type="radio"/>				

Q21 Tell us how often you talk about diet or nutrition with your patients who have hypertension (Please choose one)

Never	Rarely	Sometimes	Often	Always
<input type="radio"/>				

Q22 Tell us how often do you recommend the following dietary interventions for your patients with hypertension? (Choose one response per line)

	Never	Rarely	Sometimes	Often	Always	I do not know
1. To reduce sodium intake	<input type="radio"/>					
2. To follow the Dietary Approaches to Stop Hypertension (DASH) diet	<input type="radio"/>					
3. To reduce body weight in overweight/obese patients	<input type="radio"/>					
4. To increase potassium intake	<input type="radio"/>					
5. To manage alcohol intake	<input type="radio"/>					

Q23 Tell us how often you refer your patients to a dietitian for help with the dietary management of hypertension? (Please choose one)

Never	Rarely	Sometimes	Often	Always
<input type="radio"/>				

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Q24 How often you discuss the severity of hypertension with your patients to encourage them to adopt healthy behaviours? (Please choose one)

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Deleted: behaviors

Never	Rarely	Sometimes	Often	Always
<input type="radio"/>				

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Q25 Below are some possible patient barriers to implementing dietary advice for people with hypertension. Please tell us the extent to which you agree or disagree with each statement. (Please choose one response per line)

	Strongly disagree		Strongly agree			I do not know
	1	2	3	4	5	
1. Some patients don't tell the truth about their dietary intake.	<input type="radio"/>					
2. It is difficult to discuss diet with patients who consume cultural food.	<input type="radio"/>					
3. My patients know about sodium intake; I don't need to advise them.	<input type="radio"/>					
4. Patients will not listen/apply the dietary advice that I provide.	<input type="radio"/>					
5. Patients with hypertension prefer medications, not dietary changes.	<input type="radio"/>					

Q26 What are other patient barriers to discussing dietary recommendations with your patients?

(open ended)

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Q27

Below are some possible physician barriers to implementing dietary advice for people with hypertension. Please tell us the extent to which you agree or disagree with each statement. (Please choose one response per line)

	Strongly disagree					I don't know
	1	2	3	4	5	
1. A low sodium diet is no longer necessary to prevent or manage hypertension.	<input type="radio"/>					
2. There are controversial findings about dietary sodium and its link to hypertension and cardiovascular risk.	<input type="radio"/>					
3. Dietary changes for hypertension is not a priority when patients have co-morbidities.	<input type="radio"/>					
4. It's difficult to know which foods are high or low in sodium.	<input type="radio"/>					
5. I often don't have enough time to counsel patients about diet.	<input type="radio"/>					
6. I rely on pamphlets/ brochures to guide patients about diet.	<input type="radio"/>					
7. Dietary modifications are more important for older patients, compared to younger patients, with hypertension.	<input type="radio"/>					

Q28 What are other physician barriers to discussing dietary recommendations with your patients?

(open ended)

.....

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Q29 Below are some possible systemic barriers to implementing dietary advice for people with hypertension. Please tell us the extent to which you agree or disagree with each statement. (Please choose one response per line)

	Strongly disagree					I don't know
	1	2	3	4	5	
1. I don't know where to find the most recent dietary recommendations for hypertension.	<input type="radio"/>					
2. There are so many dietary guidelines for hypertension management that is nearly impossible to keep up.	<input type="radio"/>					
3. I often don't discuss diet with patients with hypertension because I'm not compensated to do so.	<input type="radio"/>					

Q30 What are other systemic barriers to discussing dietary recommendations with your patients?

(open ended)

Q31 Below are ways that may help you improve your ability to counsel hypertensive patients about diet. Please tell us the extent to which you agree or disagree with each statement. (Please choose one response per line)

	Strongly disagree					I do not know
	1	2	3	4	5	
1. I would like to be compensated for providing dietary advice.	<input type="radio"/>					
2. I would like to adjust specific app or EMR tool to help me educate my patients with hypertension about diet.	<input type="radio"/>					
3. It would be helpful if the EMR had a reminder feature to remind me to educate my patients about diet.	<input type="radio"/>					
4. I would like to participate in nutrition workshops or webinars to learn more about diet.	<input type="radio"/>					
5. I would like to have a mentor or registered dietitian to teach me how to effectively counsel patients about diet.	<input type="radio"/>					
6. I wish I had learned more about nutrition in medical school/residency training.	<input type="radio"/>					
7. I would like to have access to a registered dietitian to refer my patients to.	<input type="radio"/>					
8. I use written materials such as a brochures and pamphlets to help me educate my patients about diet.	<input type="radio"/>					

Q32 What are other facilitators (e.g. tools, recourses, health system changes) do you think would help you discuss diet with your patients?

(open ended)

---PAGE BREAK---

Q33 Tell us how much of training in nutrition have you received? (Please choose all responses that apply)

1. A few lectures as part of medical school curriculum or residency program
2. Attending workshops in person or webinars
3. Taking a nutrition course
4. Post-secondary degree in nutrition
5. None
6. Other: Please describe: _____

End of Survey

Finally, we would like to ask you a few questions about difficulties you faced to complete the questions.

On a scale of 1 to 10, how easy was this survey to complete? (1=not at all easy, 10 = extremely easy)

(Create a scale)

If you could change anything thing about the survey, what would it be and why? Please provide comments about specific questions/responses.

Are there any question/s you think we should add or remove?

How long does it take to complete the survey?

Appendix D: the pre final survey with the experts comments

Q01 Are you a family doctor? (Please Choose one)

1. Yes, I am a family doctor
2. No, I am not a family doctor
3. No, I am not a doctor

(If the subject responded "No" to statements 2 and 3, then he/she is excluded from the study and will receive a thank)

Q02 How would you describe your practice setting? (Please Choose one)

1. Community Health Centre
2. Family Health Team
3. Independent Practice (i.e. work individually without health team)
4. Hospital
5. Long-term care facility
6. Mental Health Centre
7. Business/Industry
8. Educational Institution
9. Association/Government
10. Other. Please specify

(If the subject responded to statements 7, 8 or 9, then he/she is excluded from the study and will receive a thank)

Q03 Approximately, how many patients with hypertension do you see each week?

1. 1-9 patients
2. 10-24 patients
3. 25-40 patients
4. > 41 patients
5. I do not see patients with hypertension

(If the subject responded to statement 5, then he/she is excluded from the study and will receive a thank)

Q04 In which province/territory do you primarily practice? (Please Choose one)

- 1 Newfoundland and Labrador
- 2 Prince Edward Island
- 3 Nova Scotia
- 4 New Brunswick
- 5 Quebec
- 6 Ontario
- 7 Manitoba
- 8 Saskatchewan
- 9 Alberta
- 10 British Columbia
- 11 Yukon
- 12 Northwest Territories
- 13 Nunavut
- 14 I don't practice in Canada

(If the subject responded to statement 14, then he/she is excluded from the study and will receive a thank)

Q08 In which type of geographic area do you primarily work? (Please Choose one)

SADEEM MOH 2017-9-1 10:18 PM

Comment [4]: Is this a facility? Expert 3

SADEEM MOH 2017-9-1 10:18 PM

Comment [5]: consider making this Q3 instead of 8 Expert 1

1. Rural area
2. Urban area
3. Suburban

SADEEM MOH 2017-9-1 10:18 PM

Comment [6]: How are you defining rural vs. urban vs. suburban? Your respondents might have different opinions... **Expert 3**

Q05 What is your gender? (Please Choose one)

1. Male
2. Female
3. Other

SADEEM MOH 2017-9-1 10:18 PM

Comment [7]: "Why are you asking about gender and not sex?" **Expert 3**

Q06 Please enter your age (in years)?

 years

SADEEM MOH 2017-9-1 10:18 PM

Comment [8]: Keep 6 or 7 not both 7 is more relevant in my mind **Expert 1**

SADEEM MOH 2017-9-1 10:18 PM

Comment [9]: "Might be easiest for analysis and less error (typos) if this is categorical" **Expert 3**

Q07 How long have you been practicing as a primary care provider? (Excluding your residency)

6. 0-4 years
7. 5-10 years
8. 11-15 years
9. 16-20 years
10. More than 20 years

Q09 Do you have an Electronic Medical Record (EMR) in your clinic? (Please Choose one)

1. Yes
2. No

Q10 Do you have a registered dietitian to refer your patients to? (Please Choose one)

1. Yes, in my clinic/team
2. Yes, in my community
3. No

Q11 For patients with hypertension or at risk of hypertension, how confident are you in providing your patients with advice on the following lifestyle recommendations? (Please Check one response per line)

	Not at all confident	Somewhat confident	Neutral	Confidant	Extremely confident
8. To reduce sodium intake	<input type="radio"/>				
9. To be more physically active	<input type="radio"/>				
10. To reduce body weight	<input type="radio"/>				
11. To reduce alcohol consumption	<input type="radio"/>				
12. To stop smoking	<input type="radio"/>				
13. To provide general advice about diet	<input type="radio"/>				
14. To manage stress	<input type="radio"/>				

SADEEM MOH 2017-9-1 10:18 PM

Comment [10]: Doesn't make sense to put neutral here since you seem to be progressing up the scale from not at all to extremely. I would change "somewhat" to "slightly" and "neutral" to "somewhat" **Expert 3**

SADEEM MOH 2017-9-1 10:18 PM

Comment [11]: "Have you thought about doing a Likert scale instead of categories? E.g. Not at all confident (1) to Extremely confident (7)" **Expert 3**

Q12 How important is diet or nutrition is in the prevention of hypertension? (Please Choose one response)

Not at all important	Low importance	Neutral	Moderately important	Very important
<input type="radio"/>				

SADEEM MOH 2017-9-1 10:18 PM

Comment [12]: Remove "Expert 2 agree" if we want just focus on patients with hypertension

Q13 How important do you feel diet or nutrition is in the management of hypertension? (Please Choose one response)

Not at all important	Low importance	Neutral	Moderately important	Very important
<input type="radio"/>				

Q14 According to Hypertension Canada, what is the maximum allowable daily amount of sodium for patients with hypertension? (Please Choose one response)

- G. 1500 mg
- H. 2,000 mg*
- I. 2,500 mg
- J. 3400 mg
- K. 4000 mg
- L. I do not know

SADEEM MOH 2017-9-1 10:18 PM

Comment [13]: Are there any other surveys that looked into this question? **Expert 1**

Q15 How often do you advise the following types of patients to modify their dietary habits to manage hypertension risk? Please exclude recommendations related to alcohol and weight loss. (Please Check one response per line)

	Never	Rarely	Sometimes	Often	Always
1. Those at risk of hypertension	<input type="radio"/>				
2. Those with hypertension	<input type="radio"/>				

If the answer to the above question for (1) is rarely, sometimes, often or always then the subject sees the question 16, 17,18 then the rest. If the subject answers never, then the subject will answer Q16, 17, 20 to the rest

If the answer to the above question for (2) is sometimes, often or always then the subject sees question 16, 17, and 19 then the rest. If the subject answers never, then the subject will answer Q16, 17, 20 and the rest

Q16 The DASH diet (Dietary Approaches to Stop Hypertension) is recommended for people with hypertension. To the best of your knowledge, please select the food components or supplements that best correspond to the DASH diet? (Please Choose all responses that apply)

1. Lots of vegetables and fruit*
2. Calcium and magnesium supplements
3. Refined grains over whole grains
4. Low fat dairy products*
5. Adequate amounts of dietary fibre*
6. Low amounts of dietary fibre
7. Limit egg consumption to no more than four per week
8. Reduce saturated fat and cholesterol*
9. Consume lean meat, poultry and fish*
10. Consume moderate amounts of nuts and legumes*
11. Limit sodium intake to 2000 mg/day *
12. I do not know

Q17 Which nutrient is known is reduce blood pressure? (Please choose one response)

1. Potassium*
2. Chloride
3. Alcohol
4. Iron
5. None of the above
6. I do not know

Q18 How often do you advise patients at risk of hypertension about the following nutrition recommendations? (Please Check one response per line)

SADEEM MOH 2017-9-1 10:18 PM

Comment [14]: Expert 4 agreed

SADEEM MOH 2017-9-1 10:18 PM

Comment [15]: What do you think of removing the highlighted part? As physicians usually provide advice about alcohol and weight more frequently more that other nutrition recommendations such as salt intake and vegetables...

SADEEM MOH 2017-9-1 10:18 PM

Comment [16]: "I'm confused...are you saying that those who answer "rarely" should answer questions 16-18 but not 19, and those who answer "sometimes" to "often" should answer questions 16, 17, and 19, but not 18? This doesn't make sense" Expert 3

SADEEM MOH 2017-9-1 10:18 PM

Comment [17]: "I'm confused...are you saying that those who answer "rarely" should answer questions 16-18 but not 19, and those who answer "sometimes" to "often" should answer questions 16, 17, and 19, but not 18? This doesn't make sense" Expert 3

SADEEM MOH 2017-9-1 10:18 PM

Comment [18]: "I wouldn't ask this question like this...it's very easy to guess these answers even if you don't know the DASH diet. I would just ask Yes/No, are you familiar with the DASH diet?" Expert 3

SADEEM MOH 2017-9-1 10:18 PM

Comment [19]: 1.Eating lots of fruit and vegetables *
2.Taking calcium and magnesium supplements
3.Choosing refined grains over whole grains
4.Including low fat dairy products*
5.Having adequate amounts of dietary fibre*
6.Having low amounts of dietary fibre
7.Limiting egg consumption to no more than four per week
8.Reducing saturated fat and cholesterol*
9.Consuming lean meat, poultry and fish*
10.Consuming moderate amount nuts and legumes*
Limiting sodium intake to 2000 mg/day **
Expert 5

SADEEM MOH 2017-9-1 10:18 PM

Comment [20]: Expert 2 and 4 agreed

	Never	Rarely	Sometimes	Often	Always	I do not know
1. To reduce sodium intake	<input type="radio"/>					
2. To follow the Dietary Approaches to Stop Hypertension (DASH) diet	<input type="radio"/>					
3. To reduce/manage weight	<input type="radio"/>					
4. To increase fruit and vegetable intake	<input type="radio"/>					
5. To consume low-fat dairy products	<input type="radio"/>					
6. To increase soluble fibre & whole grain intake	<input type="radio"/>					
7. To consume lean meats & alternatives (e.g legumes, nuts, eggs)	<input type="radio"/>					
8. To reduce saturated fat	<input type="radio"/>					
9. To increase potassium intake	<input type="radio"/>					
10. To manage alcohol intake	<input type="radio"/>					

SADEEM MOH 2017-9-1 10:18 PM

Comment [21]: "I think it may be sufficient to include Q. 4 and omit Q.9. ... you don't ask about calcium, so I don't think you need to ask specifically about K⁺" **Expert 5**

Q19 How often do you advise patients with hypertension about the following nutrition recommendations? (Please Check one response per line)

	Never	Rarely	Sometimes	Often	Almost Always	I do not know
1. To reduce sodium intake	<input type="radio"/>					
2. To follow the Dietary Approaches to Stop Hypertension (DASH) diet	<input type="radio"/>					
3. To reduce/manage weight	<input type="radio"/>					
4. To increase fruit and vegetable intake	<input type="radio"/>					
5. To consume low-fat dairy products	<input type="radio"/>					
6. To increase soluble fibre & whole grain intake	<input type="radio"/>					
7. To consume lean meats & alternatives (e.g legumes, nuts, eggs)	<input type="radio"/>					
8. To reduce saturated fat	<input type="radio"/>					

9. To increase potassium intake	<input type="radio"/>					
10. To manage alcohol intake	<input type="radio"/>					

Q I usually discuss the severity of hypertension with my patients to encourage them to adopt healthy behaviours

1. Yes
 2. No
- If no:
- No because I provide them with hypertension materials and brushes
 - No because patients know about the severity of the disease

SADEEM MOH 2017-9-1 10:18 PM
Comment [22]: "one thing we learned in some patient focus groups we conducted last year, was that 100% of the patients said they weren't told about the severity of hypertension, and had they been, they would have been more likely to adopt healthy behaviours" **Expert 2**

Q20 Please rate the extent to which you agree or disagree with each of the following statements regarding the implementation of diet and nutrition recommendations for hypertension management. (Please Check one response per line)

	Strongly disagree	Disagree	Neither agree or disagree	Agree	Strongly agree	I do not know
1. I often don't discuss diet with patients with hypertension because I'm not compensated to do so.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2. I don't have time to talk to patients with hypertension about diet.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3. I have too many patients to see daily, so I don't provide dietary advice.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4. I don't know where to find the most recent diet recommendations for hypertension.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5. There are so many dietary guidelines for hypertension management that is nearly impossible to keep up.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
6. I don't recommend dietary changes when patients have multiple comorbidities. OR "I don't give priority to diet for hypertension when patients have co-morbidities"	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
7. I have a hard time knowing which foods are high or low in sodium.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

SADEEM MOH 2017-9-1 10:18 PM
Comment [23]: "Would use Likert scale here?" **Expert 3**

SADEEM MOH 2017-9-1 10:18 PM
Comment [24]: Consider to be removed as we already know that time is a barrier from the literature, what do you think?

SADEEM MOH 2017-9-1 10:18 PM
Comment [25]: Experts 3 and 6 disagreed. Remove 3 the next one because it is similar to 2

SADEEM MOH 2017-9-1 10:18 PM
Comment [26]: Expert 4 agreed; Expert 2 agreed

SADEEM MOH 2017-9-1 10:18 PM
Comment [27]: "I'm not sure I understand this question. To me the more co morbidities the more important diet is. Some recs may conflict re K in renal impairment" **Expert 6**

SADEEM MOH 2017-9-1 10:18 PM
Comment [28]: Expert 4 suggested

8. There are controversial findings about dietary sodium and its link to hypertension and cardiovascular risk.	<input type="radio"/>					
9. A low sodium diet is no longer necessary to prevent or manage hypertension.	<input type="radio"/>					

SADEEM MOH 2017-9-1 10:18 PM
Comment [29]: “no longer” or “not”?
 Expert 3

Q21 Please tell us the extent to which you agree or disagree with the following statements about implementing nutrition guidelines for patients with hypertension. (Please Check one response per line)

	Strongly disagree	Somewhat disagree	Neutral	Somewhat agree	Strongly agree	I do not know
1. Patients do not tell the truth about their diet.	<input type="radio"/>					
2. Patients consume traditional food (cultural food), so it is hard to discuss diet when I am not familiar with those traditional meals.	<input type="radio"/>					
3. My patients know about sodium intake; I do not need to advise them.	<input type="radio"/>					
4. Patients will not listen/apply the dietary advice that I provide.	<input type="radio"/>					
5. Patients with hypertension prefer medications not dietary recommendations.	<input type="radio"/>					
6. I rely on pamphlets/ brochures to guide patients about diet.	<input type="radio"/>					
7. Dietary modifications are more important for older patients, compared to younger patients, with hypertension.	<input type="radio"/>					

SADEEM MOH 2017-9-1 10:18 PM
Comment [30]: “Not sure about these questions because I would think it depends on the individual. Not sure how these doctors will feel about generalizing. Some of these seem a bit judgemental...have they been used in other surveys?”
 Expert 3

SADEEM MOH 2017-9-1 10:18 PM
Comment [31]: “Suggested changes”
 Expert 3

SADEEM MOH 2017-9-1 10:18 PM
Comment [32]: “Should not use both verbal and written advice. I would try to get at both independently”
 Expert 6

Q22

Are there any other barriers to the implementation of dietary guidelines we missed? If so, please tell us what they are: OR What is the main barrier to discussing dietary recommendations to your patients?
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Q23

Please tell us the extent to which you agree or disagree with each of the following statements regarding ways that would help you to implement dietary recommendations for patients with hypertension (Please Check one response per line)

	Strongly disagree	Somewhat disagree	Neutral	Somewhat agree	Strongly agree	I do not know
1. I would like to be compensated for providing dietary advice.	<input type="radio"/>					
2. I would like to use phone apps such as Hypertension Canada (CHEP) Guidelines would help me implement dietary recommendations OR (so that I can better educate my patients.)	<input type="radio"/>					
3. I would like to participate in workshops or webinars about nutrition so that I can better educate my patients.	<input type="radio"/>					
4. I would like to have more time during patient visits to provide dietary advice visit	<input type="radio"/>					
5. I would like to have a mentor or registered dietitian to help me effectively counsel patients about diet.	<input type="radio"/>					
6. I would like to use resources such as a registered nurse, a registered dietitian or dietary brochures to educate patients about nutrition.	<input type="radio"/>					
7. If I have adequate nutrition knowledge, I would provide dietary advice to patients with hypertension.	<input type="radio"/>					
8. I would like an EMR (electronic medical record) to remind me to educate my patients about diet.	<input type="radio"/>					
9. I would like an EMR to provided direction on how to educate patients about diet.	<input type="radio"/>					

SADEEM MOH 2017-9-1 10:18 PM
Comment [33]: Expert 3

SADEEM MOH 2017-9-1 10:18 PM
Comment [34]: Expert 2 agreed

SADEEM MOH 2017-9-1 10:18 PM
Comment [35]: "I'd still keep it as a validity check" Expert 6

SADEEM MOH 2017-9-1 10:18 PM
Comment [36]: "Would remove...how would someone answer this if they think they already have adequate nutrition knowledge? Also, you ask a lot about knowledge above" Expert 3

Q24

Are there any other tools or strategies that would help you to implement
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nutrition recommendations for your patients with hypertension?

Q25 Please answer the following questions:

	True	False	Do not know	
1. Vegetables and fruit are rich sources of potassium, magnesium, and fibre (True)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	SADEEM MOH 2017-9-1 10:18 PM Comment [37]: "I would leave in but ask this at the beginning of the questionnaire, otherwise some of the questions before this one may be educational" Expert 3
2. Most of the sodium consumed by Canadians is from salt added at the table (False)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	SADEEM MOH 2017-9-1 10:18 PM Comment [38]: "I think you may be able to remove this Q. as some of your earlier Q. assess knowledge" Expert 5
3. Sea salt contains lower amounts of sodium compared to table salt and is therefore an appropriate substitute (False)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
4. People with diabetes, kidney disease, and heart disease should use salt substitutes (False).	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	SADEEM MOH 2017-9-1 10:18 PM Comment [39]: "I'd still keep it as a validity check" Expert 6
5. Foods high in magnesium might help to reduce blood pressure levels.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
6. Dietary potassium can be increased with a dietary supplement to effectively decrease blood pressure.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	SADEEM MOH 2017-10-3 10:44 AM Comment [40]: Remove Experts 123, 7,8,and 9

Q26 Do you have any formal training on nutrition?

1. No, I have not received any formal training on nutrition
2. Yes, I have received formal training on nutrition after university (e.g. courses, conferences, training programs)
3. Yes, I received training while attending university as an undergraduate, graduate or medical student
 Following choices will appear if statement 3 was chosen:
 - a. Undergrad/graduate studies in nutrition
 - b. Nutrition course
 - c. One, or few, nutrition lectures during my undergraduate in medical school as part of continuing education (e.g. attend conferences sessions related to nutrition)

SADEEM MOH 2017-9-1 10:18 PM
Comment [41]: "How is this different from 3. Graduate/medical student?" **Expert 3**

End of Survey

SADEEM M. ALSAEED
B.Sc
2017

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B.Sc
2017