


# Hypertension Prevalence, Health Service Utilization, and Participant Satisfaction: Findings From a Pilot Randomized Controlled Trial in Aged Chinese Canadians

INQUIRY: The Journal of Health Care Organization, Provision, and Financing  
Volume 54: 1–9  
© The Author(s) 2017  
Reprints and permissions:  
sagepub.com/journalsPermissions.nav  
DOI: 10.1177/0046958017724942  
journals.sagepub.com/home/inq  


Ping Zou, RN, PhD<sup>1</sup>, Cindy-Lee Dennis, PhD<sup>2</sup>, Ruth Lee, RN, PhD<sup>3</sup>, and Monica Parry, NP-Adult, PhD<sup>2</sup>

## Abstract

Responding to high prevalence of hypertension and patients' preference of integrating traditional Chinese medicine for blood pressure control, the Dietary Approach to Stop Hypertension With Sodium Reduction for Chinese Canadian (DASHNa-CC) intervention was newly designed as a culturally sensitive dietary educational intervention to facilitate middle-aged and senior Chinese Canadians' blood pressure control in community. The aim of this study was to report the hypertension prevalence rate according to the data from blood pressure screening events, to describe the characteristics of health service utilization among aged Chinese Canadians, and to report the evaluation of participant satisfaction to the DASHNa-CC intervention. This study was designed as a pilot randomized controlled trial with a sample size of 60. Among 618 Chinese Canadians participated in blood pressure screening events, 54.5% ( $n = 337$ ) having various levels of hypertension. Across 2 months, 38 (63.3%) participants made a total of 47 visits to see their family physicians; 20 (33.3%) participants consulted their family members 224 times for lifestyle modifications and hypertension self-management. Various forms of Chinese media were frequently used as sources of health care information, and English media were rarely accessed. Participants highly satisfied with the contents, delivery approaches, and integration of traditional Chinese medicine in the intervention. Results indicated that middle-aged and senior Chinese Canadians have high hypertension prevalence and specific characteristics of health service utilization. It is important to implement interventions, which are culturally tailored, language appropriate, using proper technology and incorporating traditional Chinese medicine, in Chinese Canadian community for hypertension control.

## Keywords

hypertension, health services utilization, patient satisfaction, immigrants, Chinese, Canada, pilot study, randomized controlled trial

## Background

In Canada, 1.3 million Chinese comprise approximately 4.0% of Canada's population and 21.1% of the country's visible minorities.<sup>1</sup> Literature indicates that a 15.1% hypertension prevalence rate existed among adult Chinese Canadians.<sup>2</sup> Hypertension is the most prominent risk factor for cardiovascular diseases, and it accounts for a large proportion of stroke,<sup>3</sup> myocardial infarction,<sup>4</sup> and heart failure<sup>5</sup> in the Chinese population. A systematic review, assessing the impact of 5 modifiable risk factors (hypertension, dyslipidemia, obesity, diabetes, and smoking) on stroke risk in the Chinese population, suggested that the association between hypertension and stroke was the strongest of the 5 factors (odds ratio [OR] = 2.75-5.47).<sup>3</sup> Compared with Western countries, the Chinese population has a higher risk ratio of hypertension and stroke. The Asia Pacific Cohort Studies Collaboration, an international comparison study, also suggested that the

association between blood pressure and stroke was stronger in East Asians than in other populations. After controlling for age, a 10 mm Hg higher systolic blood pressure was associated with a 41% (95% confidence interval [CI], 40%-42%) higher stroke risk in Asians, compared with a 30% (95% CI, 22%-37%) stroke risk in individuals from Australia and New Zealand.<sup>6</sup> In addition, a meta-analysis suggested the risk of ischemic stroke associated with hypertension was

<sup>1</sup>Nipissing University, Toronto, Ontario, Canada

<sup>2</sup>University of Toronto, Toronto, Ontario, Canada

<sup>3</sup>McMaster University, Hamilton, Ontario, Canada

Received 28 October 2016; revised 11 July 2017; revised manuscript accepted 13 July 2017

### Corresponding Author:

Ping Zou, Assistant Professor, School of Nursing, Nipissing University, 750 Dundas Street West, Toronto, Ontario, Canada M6J 3S3.  
Email: pingz@nipissingu.ca



Creative Commons Non Commercial CC BY-NC: This article is distributed under the terms of the Creative Commons

Attribution-NonCommercial 4.0 License (<http://www.creativecommons.org/licenses/by-nc/4.0/>) which permits non-commercial use, reproduction and distribution of the work without further permission provided the original work is attributed as specified on the SAGE and Open Access pages (<https://us.sagepub.com/en-us/nam/open-access-at-sage>).

consistently and significantly greater in Chinese (OR = 5.8, 95% CI, 4.7-7.2) than Caucasians (OR = 1.93, 95% CI, 1.7-2.2), and the risk of hemorrhagic stroke associated with hypertension was also consistently and significantly greater in Chinese (OR = 7.2, 95% CI, 5.3-9.7) than Caucasians (OR = 3.1, 95% CI, 2.5-3.9).<sup>7</sup> Although hypertension significantly impact Chinese health, with limited research among Chinese Canadian population, the hypertension prevalence rate in middle-aged and senior Chinese Canadians, who are at an increased risk of cardiovascular diseases and associated morbidity and mortality, remains unknown.

While most of Chinese Canadians are immigrants, Chinese Canadians have difficulty to access health care service and control their blood pressure. A grounded theory study indicated that Chinese Canadians struggled with management of their cardiovascular disease risks, such as hypertension, and “meeting the challenge” was the core theme of Chinese Canadian’s coping experiences.<sup>8</sup> As immigrants, most Chinese Canadians lack basic knowledge and skills to navigate the Western health care systems. Immigrants are often not aware of available health care services, their benefits, and how to access and utilize these services.<sup>9</sup> Immigrants have difficulties making appointments, understanding the need to disclose personal information, knowing various roles of health care providers in a health care team, discussing concerns with health care providers, and obtaining necessary health information from various resources.<sup>10-12</sup> In a dietary study (n = 244) among Chinese in North America, only 24% of participants were aware of nutrition information from the government.<sup>13</sup> Another dietary study (n = 106) among Chinese Canadians indicated that only 16% of female and 1% of male participants had sought nutrition advice from health professionals.<sup>14</sup> These studies imply a possible lack of health services suitable to Chinese Canadians’ health care needs and, at the same time, Chinese Canadians might have difficulty accessing existing health care services in Canada. Thus, further research on health service utilization of Chinese Canadians is needed to facilitate a better understanding of their health care needs and to provide them with better health care services.

There is a lack of culturally sensitive dietary interventions targeting Chinese Canadians despite an unhealthy diet being identified as the most important modifiable risk factor for hypertension in the Chinese population.<sup>15</sup> Literature suggests that Chinese Canadians rely strongly on traditional Chinese medicine (TCM) for chronic illness management, including hypertension control, and prefer to incorporate TCM into their health care.<sup>8</sup> Chinese Canadians reported that the holistic perspective of TCM facilitated the understanding of the nature of chronic problems, and traditional therapies promoted healing. In addition, some Chinese Canadians felt that TCM better met their needs than Western medicine.<sup>16</sup> Responding to Chinese Canadians’ desire to incorporate TCM into their hypertension care, we designed an antihypertensive dietary intervention, the Dietary Approach to Stop Hypertension With Sodium Reduction for Chinese Canadian (DASHNa-CC). Current

hypertension care guidelines recommend that individuals with hypertension and nonhypertensive individuals at increased risk of developing hypertension consume the Dietary Approach to Stop Hypertension (DASH) diet, which emphasizes fruits, vegetables, low-fat dairy products, whole grains, and protein from plant sources that are reduced in saturated fat and cholesterol.<sup>17</sup> At the same time, TCM food therapy also demonstrates the effectiveness on blood pressure control.<sup>18</sup> The DASHNa-CC intervention integrated TCM food therapy into the current DASH diet<sup>19</sup> and sodium reduction<sup>20</sup> to provide a standardized, culturally sensitive, dietary education for hypertension control. The DASHNa-CC intervention consisted of 2 classroom and 1 telephone sessions to provide healthy dietary and sodium reduction advice, integrated with TCM food therapy recommendations.

### *Summary of Primary Findings in the DASHNa-CC Study*

Following university ethics approval, the DASHNa-CC pilot trial was conducted in 2015 in a Chinese Canadian community in Toronto, Canada. The pilot study was designed as a randomized controlled trial with a sample size of 60. Self-identified Chinese Canadians at least 45 years old, with grade 1 hypertension, but not on antihypertensive medication, were recruited from diverse community settings. Participants were randomized to either a control group (usual care, n = 30) or an intervention group (usual care plus the newly developed DASHNa-CC intervention, n = 30). The objective of the DASHNa-CC pilot randomized controlled trial was to determine the feasibility and potential effects of a culturally sensitive dietary intervention for hypertension control among Chinese Canadians. The findings suggested that, at 8 weeks post randomization, those in the intervention group had greater reductions in systolic blood pressure, 3.8 mm Hg,  $t(55) = -1.58$ ,  $P = .12$ , and higher physical health scores of 36-item Short Form health survey (SF-36),  $t(55) = 2.13$ ,  $P = .04$ , compared with those in the control group. The design and main outcomes of the DASHNa-CC study have been published by another academic journal.<sup>21</sup>

### *What This Article Adds?*

In this article, the hypertension prevalence rate will be reported according to the data from blood pressure screening events in the DASHNa-CC study, the characteristics of health service utilization among older Chinese Canadians will be described, and the evaluation of participant satisfaction in the DASHNa-CC study will be reported.

## **Measurement**

### *Prevalence of Hypertension*

The prevalence of hypertension was defined as the proportion of individuals with hypertension, among the total people

involved in blood pressure screening events. For the purposes of this trial, the classification of blood pressure and its related definitions will follow the World Health Organization guidelines.<sup>22</sup> Blood pressures were measured by trained nurse researchers using a validated Spacelabs (Model 90207; Spacelabs Inc, Snoqualmie, Washington) blood pressure monitor.<sup>23</sup> All blood pressure measurements were performed following the recommended techniques by the Canadian Hypertension Education Program guidelines.<sup>17</sup> An appropriately sized cuff was placed around the upper arm so that the lower edge was 3 cm above the elbow crease with the bladder centered over the brachial artery. Participants were told to refrain from eating or smoking for at least 30 minutes before blood pressure measurements and rest comfortably for 5 minutes in the seated position with back supported before the measurement. Participants were instructed not to talk or cross their legs. Three measurements were taken in the same arm with the participant in the same position; the first reading was discarded and the latter 2 were averaged.<sup>17</sup>

### *Health Service Utilization*

Health service utilization was defined as both formal and informal health services used by individuals with hypertension to cope with their health problems or concerns. Health service utilization was assessed via the Health Service Utilization Questionnaire, which was modified from a questionnaire previously used in Ontario,<sup>24</sup> at 8 weeks post randomization by participant self-administration. Participants were asked to identify hypertension-related concerns for which a health care service was sought, number of times used, and the level of satisfaction with the support received. Nine hypertension-related concerns and 11 potential sources of health care were listed in the questionnaire. At the end of this questionnaire, participants were asked whether they took any antihypertensive medications in the past 2 months.

### *Participant Satisfaction*

Participant satisfaction was defined as the extent to which the participants were pleased with their experience with the DASHNa-CC intervention. Participant satisfaction was assessed via the Participant Satisfaction Questionnaire at 8 weeks post randomization by participant self-administration. This questionnaire was developed and translated into Chinese (simplified and traditional) by our research team. Participants who received the DASHNa-CC intervention completed the questionnaire at home, and the research assistant collected the completed questionnaire at the end of the study in the community center.

This questionnaire, including 6 parts, was used to assess participants' perception of their experiences in this pilot trial, regarding intervention contents, delivery of the intervention, and the benefits and burdens of participation. Content validity of this questionnaire was assessed by 3 North American

chronic illness management experts. Part 1 of the questionnaire had 6 questions, which were modified from participant satisfaction questionnaires used in previous trials.<sup>24-26</sup> The first question was a categorical question asking about the channels for obtaining information about this pilot trial. Questions 2 to 6 were open-ended questions, asking participants what they liked most, what they wanted to see done differently, any specific comments for TCM food therapy, and any information in a specific area where they felt they needed more information.

Part 2 to 6 of the questionnaire had thirty-eight 5-point Likert scale questions measuring participant's satisfaction to the (1) intervention content, (2) delivery approach, (3) perceived benefit, (4) perceived burden, and (5) the DASHNa-CC intervention in general. Scoring of questions in Part 2 to 5 was based on a 5-point Likert scale, whose 5 response options ranged from "strongly agree" to "strongly disagree," and were coded so that higher scores corresponded to higher satisfaction with the intervention. Part 6 included 2 questions, which were used to assess participants' general satisfaction to the DASHNa-CC intervention. The scoring of these 2 questions was on a 5-point Likert scale, with higher values reflecting greater satisfaction. These 2 questions were modified from the satisfaction questions, which were used to evaluate an automated telephone disease management intervention<sup>27</sup> and 2 culturally tailored interventions in minority groups.<sup>28,29</sup> These 2 questions had a Cronbach's alpha of 0.82 in a Chinese American population with diabetes.<sup>28</sup>

### *Data Analysis*

Data were analyzed using SPSS 20.0 software (IBM Corporation, North Castle, New York). As this was a pilot trial with a limited sample size, the focus of the analyses was on descriptive statistics rather than formal tests of hypotheses. Descriptive statistics (means, standard deviations, proportions, etc) were calculated to demonstrate how participants satisfy with their experience with the DASHNa-CC intervention. Responses to the open-ended questions in Participant Satisfaction Questionnaire were reviewed by 2 researchers independently. Data were organized into meaningful groups, combining similar patterns into themes. In addition, descriptive statistics (means, standard deviations, proportions, etc) were calculated to demonstrate health service utilization patterns.

## **Results**

### *Prevalence Rate of Hypertension*

To recruit 60 eligible participants for the DASHNa-CC study, the research team collaborated with a community center to host blood pressure screening events. There were 618 Chinese Canadians participated in blood pressure screening events in the community. Hypertension was highly prevalent

**Table 1.** Blood Pressure Status of 618 Participants in the Blood Pressure Screening.

Blood pressure status	Number of participants	%
Optimal	114	18.4
Normal	77	12.5
High normal	90	14.6
Grade 1 hypertension	302	48.9
Grade 1 hypertension, not on medication	123	19.9
Grade 1 hypertension, on medication and controlled	103	16.7
Grade 1 hypertension, on medication and not controlled	76	12.3
Grade 2 hypertension	29	4.7
Grade 2 hypertension, not on medication	10	1.6
Grade 2 hypertension, on medication and not controlled	19	3.1
Grade 3 hypertension	6	1.0
Grade 3 hypertension, not on medication	4	0.6
Grade 3 hypertension, on medication and not controlled	2	0.3
<b>Total</b>	<b>618</b>	<b>100.0</b>

Note. Controlled hypertension was defined as the pharmacological treatment of hypertension associated with systolic blood pressure <140 mm Hg and diastolic blood pressure <90 mm Hg.

among these individuals, with 54.5% (n = 337) having various levels of hypertension (Table 1). Among the individuals with hypertension, most of them (n = 302, 89.6%) had grade 1 hypertension. It was noteworthy that, of these individuals with grade 1 hypertension, 40.7% (n = 123) were not on antihypertensive medication, and 25.2% (n = 76) were on antihypertensive medication, but blood pressures were still higher than 140/90 mm Hg.

### Health Service Utilization

The frequency of participants using various health services is included in Table 2. Participants accessed several health care professionals, including family physicians, TCM practitioners, and cardiologists. Among various health care professionals, family physicians were the professionals who were most frequently visited. Across 2 months, 38 (63.3%) participants made a total of 47 visits to see their family physicians. Four (6.7%) participants used TCM services, with most participants stating that they did not use TCM services because they were not covered by the Ontario Health Insurance Plan, and the services were too expensive to use. Services from nurses, dietitians, public health personnel, and the Heart and Stroke Foundation were rarely accessed.

Participants frequently accessed their family members as sources of support. In 2 months, participants consulted their

**Table 2.** Health Service Utilization: Frequency of Use in 2 Months.

Health services	Control (n = 28)		Intervention (n = 29)	
	Mean	SD	Mean	SD
Family physician	0.9	0.7	0.8	0.7
TCM practitioner	0.1	0.3	0.1	0.3
Other health care professionals	0.3	0.9	0.1	0.4
Family member	3.6	7.5	4.2	7.6
Friends	0.4	1.9	0.7	2.6
Chinese media: Internet	7.7	8.3	5.6	8.2
Chinese media: Television	6.4	9.1	3.7	7.9
Chinese media: Radio	0.7	3.8	0.6	2.3
Chinese media: Newspaper	4.1	7.5	3.9	6.3
Chinese media: Magazines	3.6	7.2	1.9	4.6
Chinese media: Books/pamphlets	0.3	1.2	2.8	5.4
Chinese media: Others	0.1	0.4	0.6	3.0
English media: Internet	0.4	1.9	0.7	3.7

Note. Two participants lost to follow-up in the control group; 1 participant lost to follow-up in the intervention group. TCM = traditional Chinese medicine.

family members 224 times, averaging 3.9 (SD = 7.5) times per participant for lifestyle modifications and hypertension self-management, especially diet and exercise. Participants used various forms of Chinese media frequently, and they rarely accessed English media. The Chinese media used included the Internet, television, radio, newspaper, magazines, books and pamphlets, and a new media Wechat. The most frequently used Chinese media was the Internet (mean = 6.6 times, SD = 8.2) followed by television (mean = 5.0 times, SD = 8.5) and newspaper (mean = 4.0 times, SD = 6.8). The only English media used by participants (n = 3, 5%) was the Internet (mean = 0.5 time, SD = 2.9).

There was no difference between study groups regarding the use of various health care services. It was noteworthy that, on 8 weeks post randomization, more participants in the control group (n = 3, 10%), compared with the intervention group (n = 0, 0%), were on antihypertensive medication.

### Participant Satisfaction

All participants (n = 30, 100%) in the intervention group completed the Participant Satisfaction Questionnaire.

**Results from open-ended questions.** Three emerging themes included (1) both basic and new knowledge about hypertension control, (2) more information on TCM, and (3) diverse community interventions inclusive to everyone.

Participants suggested that they need both basic and updated information about hypertension control. They want to know information on diseases that cause hypertension, what season in a year and what time period in a day that blood pressure is high and associated strategies



for management, how to use different types of blood pressure monitors, and any information related to hypertension. In addition, they want to be updated about current information about hypertension control in Western medicine, Canada's foods which are different from Chinese foods, the advantages and disadvantages of transgenic food on human's health, whether Canadian dairy products are contaminated, the limitations of Western medicine on hypertension control, the side effects of antihypertensive medicine, and whether dietary intervention is effective for individuals already on antihypertensive medication.

Participants desired to know more about TCM. They recommended adding more information about TCM theories, simplifying the intervention, providing more information and samples of recommended herbs, expanding the types of food recommended in the manual so people have more choices, introducing food which can increase blood pressure so people know what to avoid, adding popular soup formulas in addition to herbal teas, providing information on how to carry out TCM food therapy during 4 seasons in a year, and urging the Canadian health care system to include TCM to enhance health care resources and reduce health care cost, especially for low-income seniors.

Participants urged that diverse community interventions be inclusive to everyone. Some participants mentioned peer support interventions because they wanted to have opportunities to talk to people with hypertension. Participants recommended using case studies, discussing dietary supplements, and providing information on how to adjust antihypertensive diet to other health conditions (eg, diabetes and hypercholesterolemia). Participants also suggested developing a comprehensive intervention to include diet, exercise, stress management, and other lifestyle modifications. In addition, participants suggested that the intervention should be extended to include individuals with hypertension who were already prescribed antihypertensive medication, and even people with normal blood pressure.

**Results from the Likert scale questions.** Results from the Likert scale questions were presented in Table 3.

**Intervention content.** The mean scores of 13 items in the Intervention Content section were all above 4 out of a possible maximum score of 5, and the mean total score of this section was 59.0 (SD = 4.8) out of a possible maximum score of 65. Participants perceived that the information provided in the DASHNa-CC intervention was helpful to them. They were highly satisfied with the intervention contents.

**Delivery approach.** The mean scores of the 7 items in the Delivery Approach section were all above 4 out of a possible maximum score of 5, and the total score of this section was 32.3 (SD = 2.2) out of a possible maximum score of 35. Participants perceived that delivery in a community center was convenient, the classroom instruction met their needs, the instructor explained ideas clearly, the booster telephone calls were helpful, and the intervention manual was easy to read.

**Table 3.** Participant Satisfaction to the DASHNa-CC Intervention.

Satisfaction items	Mean	SD
<b>Intervention content</b>		
1. DASHNa-CC eating plan.	4.7	0.4
2. DASH studies and the achievements.	4.5	0.6
3. DASH diet pattern.	4.6	0.6
4. Serving size estimation.	4.3	0.5
5. Foods rich in calcium.	4.5	0.5
6. Foods rich in potassium.	4.5	0.6
7. Why sodium reduction.	4.8	0.5
8. Goals of sodium reduction.	4.6	0.6
9. Sodium reduction strategies.	4.5	0.6
10. Traditional Chinese medicine and hypertension control.	4.5	0.7
11. Four principles of TCM food therapy	4.6	0.6
12. Twenty-four strategies: using TCM food therapy to control blood pressure.	4.5	0.6
13. Food with antihypertensive function: nature, function, and cooking menu.	4.5	0.6
Total: intervention content	59.0	4.8
<b>Delivery approach</b>		
1. Delivery in a community center is convenient.	4.3	0.6
2. Classroom instruction meets my need.	4.7	0.5
3. The instructor explained the idea clearly.	4.9	0.3
4. I like the discussion section of classroom instruction.	4.5	0.6
5. Booster telephone call is helpful.	4.5	0.5
6. The intervention manual helps me understand the contents.	4.7	0.5
7. The intervention manual is easy to read.	4.7	0.5
Total: delivery approach	32.3	2.2
<b>Perceived benefit</b>		
1. I feel good about being in the study.	4.8	0.4
2. The diet was easy to follow.	4.2	0.7
3. I have time to follow diet.	4.2	0.6
4. I want to keep following this diet after the study is over.	4.6	0.6
5. I would recommend this diet to my friend.	4.5	0.6
6. Recommended food is available in my local supermarket.	4.5	0.7
7. The price of recommended food is affordable for my family.	4.6	0.6
8. Recommended food is acceptable for me.	4.6	0.5
9. This intervention is welcomed in my family.	4.3	0.7
Total: perceived benefit	40.3	3.9
<b>Perceived burden</b>		
1. This diet takes more time than my usual diet.	3.1	1.3
2. Being in the study was stressful.	4.0	0.8
3. Finishing the study is like a weight being lifted.	3.9	0.8
4. This diet cost more money than my usual diet.	3.8	0.9
5. This diet causes conflict in my family.	4.2	0.7
6. 20-minute booster telephone call is bothersome.	4.2	0.6
7. Attending class in the community center is inconvenient.	3.7	1.0
Total: perceived burden	27.0	4.5
<b>General satisfaction</b>		
1. In general, how satisfied were you with this culturally tailored intervention?	4.8	0.4
2. How satisfied were you with the integration of traditional Chinese medicine into your blood pressure management?	4.7	0.5

Note. Except the total scores, the item scores were on 5-point Likert scales and coded so that higher scores corresponded to higher satisfaction to the intervention. DASHNa-CC = Dietary Approach to Stop Hypertension With Sodium Reduction for Chinese Canadian; TCM = traditional Chinese medicine.

**Perceived benefit.** The mean scores of 9 items in the Perceived Benefit section were all above 4 out of a possible maximum score of 5, and the mean total score of this section was 40.3 (SD = 3.9) out of a possible maximum score of 45. Participants cited that they felt good about being in the trial, they wanted to keep following the diet after the trial was over, they would recommend this diet to their friends, and the DASHNa-CC intervention was welcomed in their families.

**Perceived burden.** Six items in this section had mean scores close to or higher than 4, and one item “this diet takes more time than my usual diet” had mean score 3.1 (SD = 1.3), out of a possible maximum score of 5, on a scale that higher scores represented greater satisfaction and less burden. The mean total score of the Perceived Burden section was 27.0 (SD = 4.5) out of a possible maximum score of 35. Participants perceived that being in the trial was not stressful, the recommended diet did not cost more money than their usual diet, the diet did not cause conflict in their families, and the booster telephone call was not bothersome.

**General satisfaction.** In general, participants were highly satisfied with this culturally tailored intervention (mean = 4.8, SD = 0.4, out of a possible maximum score of 5) and integration of TCM into their blood pressure management (mean = 4.7, SD = 0.5, out of a possible maximum score of 5).

## Discussion

### Hypertension Prevalence

In this pilot trial, hypertension was highly prevalent among the 618 Chinese Canadians in the blood pressure screening, with more than 50% (n = 337, 54.5%) having various levels of hypertension. This prevalence rate is much higher than a cross-sectional study using national health survey data including 3308 Chinese Canadians, which indicated a prevalence rate of 15.1%.<sup>2</sup> The difference could be because of age, mean age of 42.3 years in that study versus 62.0 years in this pilot trial. Therefore, 15.1% might reflect the prevalence of hypertension in all adult Chinese Canadians, and 54.5% might reflect the prevalence rate among middle-aged and senior Chinese Canadians. However, it should be noted that the blood pressure screening in this pilot trial was not based on random population-based sampling; thus, the prevalence rate identified in this trial might not be a true reflection of the prevalence rate in aged Chinese Canadian population. There might be an overestimation or underestimation and future study is warranted.

The high prevalence of hypertension in this pilot trial might be related to migration characteristics of Chinese Canadians. Lifestyle changes after migration might have an impact on hypertension prevalence. Immigrants increased intake of meat and fat because of the low price in local supermarkets.<sup>30</sup> They also increased the fast food consumption because of its

convenience and the affordable price.<sup>31</sup> In the meantime, they might decrease physical activity because of the availability and affordability of private home cars. Besides lifestyle changes, migration and acculturation stress might also be related to high hypertension prevalence. Language barriers may prohibit them from receiving health information from English media; at the same time, life stress accompanying with migration and acculturation may prevent them from attending health education services in the community. In addition, most immigrants experienced economic transition in the settlement process and had low socioeconomic status in Canada.<sup>32</sup> In the lengthy process of settlement in a new country, immigrants usually consider working and supporting family as life priority.<sup>33,34</sup> Chronic illness prevention and subtle changes in health can be easily ignored. For example, in the recruitment process of the DASHNa-CC study, some individuals had not measured their blood pressure for 2 years and some individuals were unaware of their blood pressure status.

Nonpharmacological approaches for blood pressure control should be emphasized because a large percentage of individuals with grade 1 hypertension were not on antihypertensive medication, or on antihypertensive medication but not able to control their blood pressure lower than 140/90 mm Hg. In this pilot trial, 40.7% (n = 123) individuals with grade 1 hypertension were not on antihypertensive medication. Most of these individuals chose not taking medication because they did not want to take the antihypertensive medication for the rest of their lives, or they did not think they needed to take the medication, or they were afraid of the side effects of the medication.<sup>35</sup> For these individuals, lifestyle interventions were the major treatment for hypertension. Health care providers should attentively listen to their concerns, provide advice of lifestyle modifications, communicate the benefits of antihypertensive medication, and emphasize the importance of blood pressure control. In addition, 25.2% (n = 76) of individuals were on antihypertensive medication, but blood pressures were still higher than 140/90 mm Hg. This finding may suggest that, for some individuals, a pharmacological only approach may not be able to control their blood pressure. Therefore, nonpharmacological approaches are complementary treatments to achieve better health outcomes. For these individuals, health care providers should assess the acceptance of and adherence to antihypertensive medication, educate the targets of blood pressure control, and encourage constant medical follow-up to reach better blood pressure control. Cochrane review suggested that antihypertensive medications used to treat adult grade 1 hypertension did not reduce mortality or morbidity, but the adverse effects of antihypertensive treatment caused 9% of patients to discontinue.<sup>36</sup> In contrast, a recent report from the panel members appointed to the eighth Joint National Committee concluded that, for all individuals with hypertension, the potential benefits of lifestyle intervention cannot be overemphasized, because the lifestyle treatments have the potential to improve blood pressure control and even reduce medication needs.<sup>37</sup>

### Health Service Utilization

As the most frequently been visited health care professionals, family physicians should be trained and encouraged to provide adequate lifestyle interventions to their patients. In this pilot trial, 3 participants found that they had elevated blood pressure in a Shoppers Drug Mart and consulted their family physicians. The physicians stated that these individuals did not have hypertension but did not provide any explanation and any information on lifestyle modifications. Although all participants in this pilot trial were encouraged to see their family physicians, 22 (36.7%) did not make a visit in 2 months. When patients stated that they were not willing to take antihypertensive medication, family physicians did not always provide alternative lifestyle interventions. Canadian Hypertension Education Program guidelines suggest that lifestyle interventions should be applied to prevent and treat mild hypertension<sup>38</sup>; however, in clinic, physicians do not always endorse lifestyle intervention programs. The possible reasons might be lack of training and knowledge update.<sup>39</sup> Thus, effective training and information for physicians that provide local and international evidence on effectiveness of lifestyle intervention are necessary.

Besides family physicians, other health care professionals, such as dietitians, nurses, and TCM practitioners, should be involved in hypertension control in community. Although literature suggests that nurse-led educational interventions are related to better hypertension control,<sup>40</sup> there was no such program in the Chinese community in Toronto and no participant encountered any nursing service in the community in 2 months. Participants had great interest of integration TCM into their health care, but TCM services were not covered by the Ontario Health Insurance Plan and not accessible due to its expensiveness. This finding of the inaccessibility of TCM services is consistent with other related studies in Chinese Canadians.<sup>8,41,42</sup> Therefore, there is a need of an alliance of multidisciplinary health care professionals in the community to help patients cope with hypertension, especially increasing the visibility of nurses and dietitians as advocates for evidence-based nutrition information and including TCM practitioners to provide traditional practice services based on patient preference.

In an immigrant population, with limited resources and an English language barrier, engaging family is important for hypertension control in the community. In this pilot trial, family members were important health care resources and play an important role in lifestyle intervention, such as dietary behavior modification. Participants consulted their family members more frequently than the physician. Among family members, daughters, wives, and individuals, who were health care professionals in China or currently working as health care professionals, were constantly used as health care resources. This finding is consistent with another Chinese Canadian study where 68% participants cited their family members as a source of nutrition information.<sup>14</sup> Thus,

hypertension control interventions in the community have to be family-centered and encourage the participations of all family members.

Proper use of technology is essential in hypertension education in the community. In this pilot trial, the Internet was the most frequently used media for hypertension-related information. However, another Chinese Canadian study ( $n = 106$ ) indicated that the frequently used Chinese media for nutrition information were television, radio, newspapers, and magazines rather than the Internet.<sup>14</sup> In addition, in a population-based survey of Chinese immigrants ( $n = 889$ ) conducted in Vancouver, British Columbia, and Seattle, Washington, about resources of cancer-related health information, less than three-fourths of the respondents reported receiving health information from health care providers, and only a minority used the Internet as a source of health information.<sup>43</sup> This inconsistency of different findings may reflect the rapidly increased use of the Internet over recent years. In this pilot trial, it was also noteworthy that most seniors living independently in senior apartments did not have a computer and could not access the Internet service. Therefore, health educators need to constantly assess the change of the available media, the need and interest of the target population, and characteristics of the community, when planning a health education intervention. In the near future, the Internet-based component may be included as a complementary delivery approach for individuals who are unable or unwilling to attend the classroom education. However, solely Internet-based intervention may not be appropriate to senior Chinese Canadians, because it may further disadvantage senior individuals who were with low income, living alone, and with limited access to the Internet service, thereby enlarging the gap of existing social divisions.<sup>44</sup>

In this pilot trial, a very small percentage of participants ( $n = 3$ , 5%) used English media, and the only English media used was the Internet. Another Chinese Canadian study indicated that 40% of participants (aged 45-64 years) used the English media as a source of nutrition information.<sup>14</sup> The difference may be because participants in this pilot trial were older (aged 45-85 years) and less proficient in English. English proficiency is a barrier for Chinese Canadians, especially seniors, who cannot be overcome even after a lengthy stay in Canada. This implied the importance of culturally tailored and language appropriate interventions to Chinese Canadians.

### Participant Satisfaction With the DASHNa-CC Intervention

Participants in this pilot study accepted and were highly satisfied with the DASHNa-CC intervention regarding its contents and delivery approaches. This finding was consistent with others who found favorable participant satisfaction in culturally sensitive chronic illness health education interventions.<sup>28,29</sup> Thus, in future trial, the main contents of the DASHNa-CC



intervention will not change. However, according to participants' feedbacks regarding the qualitative components of the Participant Satisfaction Questionnaire, new knowledge about hypertension control and more information about TCM will be added in the intervention. In addition, a future trial should incorporate knowledge translation strategies that reflect the needs of the Chinese community and involve health policy makers in Canada.<sup>45</sup>

Integration of TCM into evidence-based clinical practice is needed to better meet Chinese Canadians' health care needs.<sup>46</sup> Health care providers need to enhance their knowledge about complementary medicine and routinely screen all patients for the use of complementary treatments.<sup>47,48</sup> China is the only country in the world where Western medicine and traditional medicine are practiced alongside each other at every level of the health care system. TCM accounts for around 40% of all health care delivered in China.<sup>49,50</sup> In Canada, as more studies show the clinical effectiveness of traditional Chinese medicine, an integrated approach to chronic illness management using a combination of Western medicine and traditional approaches may become a possibility for the future.<sup>51</sup> In addition, complementary and alternative medicine could potentially become a part of health care education. While in Canada TCM education is primarily delivered by the private professional schools,<sup>52,53</sup> nursing and medical schools might also add the contents of complementary and alternative medicine into their educational curriculum to respond to patient's need and demands.<sup>54</sup>

## Conclusion

Middle-aged and senior Chinese Canadians have higher hypertension prevalence than general population. This high prevalence rate of hypertension might be related to some migration characteristics. In addition, middle-aged and senior Chinese Canadians have specific characteristics of health service utilization including limited access to professional health services, family as an important care resource, frequent use of Chinese media, and rare access to English media when searching health information. These characteristics and results from participant satisfaction in the DASHNa-CC pilot trial indicate that it is important to implement interventions, which are culturally tailored, language appropriate, using proper technology and incorporating TCM, in Chinese Canadian community for hypertension control.

## Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

## Funding

The author(s) disclosed receipt of the following financial support for the research, authorship, and/or publication of this article: This study was supported by various research grants, including Canadian Council of Cardiovascular Nurses Research Grant, Provincial Nurse

Educators Interest Group Research Award, Bertha Rosenstadt Doctoral Research Dissertation Grant, and Canadian Institutes of Health Research (CIHR) Institute Community Support Travel Grant.

## References

1. Statistics Canada. *Immigration and Ethnocultural Diversity in Canada: National Household Survey 2011*. Ottawa, Ontario, Canada: Ministry of Industry; 2013.
2. Chiu M, Austin PC, Manuel DG, Tu JV. Comparison of cardiovascular risk profiles among ethnic groups using population health surveys between 1996 and 2007. *CMAJ*. 2010;182(8):E301-E310.
3. Yong H, Foody J, Linong J, et al. A systematic literature review of risk factors for stroke in China. *Cardiol Rev*. 2013;21(2):77-93.
4. Khan NA, Grubisic M, Hemmelgarn B, Humphries K, King KM, Quan H. Outcomes after acute myocardial infarction in South Asian, Chinese, and white patients. *Circulation*. 2010;122(16):1570-1577.
5. Moe GW, Tu J. Heart failure in the ethnic minorities. *Curr Opin Cardiol*. 2010;25(2):124-130.
6. Lawes CM, Rodgers A, Bennett DA, et al. Blood pressure and cardiovascular disease in the Asia Pacific region. *J Hypertens*. 2003;21(4):707-716.
7. Zhang X, Attia J, D'Este C, Ma XY. The relationship between higher blood pressure and ischaemic, haemorrhagic stroke among Chinese and Caucasians: meta-analysis. *Eur J Cardiovasc Prev Rehabil*. 2006;13(3):429-437.
8. King KM, LeBlanc P, Carr W, Quan H. Chinese immigrants' management of their cardiovascular disease risk. *West J Nurs Res*. 2007;29(7):804-826.
9. Zanchetta MS, Poureslami IM. Health literacy within the reality of immigrants' culture and language. *Can J Public Health*. 2006;97:S26-S30.
10. Bobal AM, Brown HL, Hartman TL, Magee M, Schmidt CM. Navigating the US health care system: a video guide for immigrant and diverse populations. *J Med Libr Assoc*. 2007;95(3):286-289.
11. Jackson JC, Do H, Chitnarong K, et al. Development of cervical cancer control interventions for Chinese immigrants. *J Immigr Health*. 2002;4(3):147-157.
12. Jackson JC, Taylor VM, Chitnarong K, et al. Development of a cervical cancer control intervention program for Cambodian American women. *J Community Health*. 2000;25(5):359-375.
13. Satia-Abouta J, Patterson RE, Kristal AR, Teh C, Tu SP. Psychosocial predictors of diet and acculturation in Chinese American and Chinese Canadian women. *Ethn Health*. 2002;7(1):21-39.
14. Kwok S, Mann L, Wong K, Blum I. Dietary habits and health beliefs of Chinese Canadians. *Can J Diet Pract Res*. 2009;70(2):73-80.
15. Wang JG, Li Y. Characteristics of hypertension in the Chinese population. *Curr Hypertens Rep*. 2012;14(5):410-415.
16. Guruge S, Lee R, Hagey R. When conventional diabetes care is viewed as complementary: perspectives of a Chinese client. *Altern Complement Ther*. 2001;7(2):117-120.
17. Dasgupta K, Quinn RR, Zarnke KB, et al. The 2014 Canadian Hypertension Education Program recommendations for blood pressure measurement, diagnosis, assessment of risk, prevention, and treatment of hypertension. *Can J Cardiol*. 2014;30(5):485-501.



18. Zou P. Traditional Chinese medicine, food therapy, and hypertension control: a narrative review of Chinese literature. *Am J Chin Med*. 2016;44(8):1579-1594.
19. Appel LJ, Moore TJ, Obarzanek E, et al. A clinical trial of the effects of dietary patterns on blood pressure. *N Engl J Med*. 1997;336(16):1117-1124.
20. He FJ, MacGregor GA. Effect of longer-term modest salt reduction on blood pressure. *Cochrane Database Syst Rev*. 2004;(3):CD004937.
21. Zou P, Dennis CL, Lee R, Parry M. Dietary Approach to Stop Hypertension With Sodium Reduction for Chinese Canadians (DASHNa-CC): a pilot randomized controlled trial [published online ahead of print December 9, 2016]. *J Nutr Health Aging*. doi:10.1007/s12603-016-0861-4.
22. World Health Organization (WHO). 1999 World Health Organization-International Society of Hypertension Guidelines for the management of hypertension. *J Hypertens*. 1999;17:151-183.
23. O'Brien E, Waeber B, Parati G, Staessen J, Myers MG. Blood pressure measuring devices: recommendations of the European Society of Hypertension. *BMJ*. 2001;322(7285):531-536.
24. Dennis CL, Hodnett E, Gallop R, Chalmers B. The effect of peer support on breast-feeding duration among primiparous women: a randomized controlled trial. *CMAJ*. 2002;166(1):21-28.
25. Dennis CL. The effect of peer support on postpartum depression: a pilot randomized controlled trial. *Can J Psychiatry*. 2003;48(2):115-124.
26. Parry MJ, Watt-Watson J, Hodnett E, Tranmer J, Dennis CL, Brooks D. Cardiac Home Education and Support Trial (CHEST): a pilot study. *Can J Cardiol*. 2009;25(12):e393-e398.
27. Piette JD. Satisfaction with automated telephone disease management calls and its relationship to their use. *Diabetes Educ*. 2000;26(6):1003-1010.
28. Wang CY, Chan SM. Culturally tailored diabetes education program for Chinese Americans: a pilot study. *Nurs Res*. 2005;54(5):347-353.
29. Choi SE, Rush EB. Effect of a short-duration, culturally tailored, community-based diabetes self-management intervention for Korean immigrants: a pilot study. *Diabetes Educ*. 2012;38(3):377-385.
30. Lee MM, Huang S. Immigrant women's health: nutritional assessment and dietary intervention. *West J Med*. 2001;175(2):133-137.
31. Rosenmoller DL, Gasevic D, Seidell J, Lear SA. Determinants of changes in dietary patterns among Chinese immigrants: a cross-sectional analysis. *Int J Behav Nutr Phys Act*. 2011;8:42.
32. Grotto I, Huerta M, Sharabi Y. Hypertension and socioeconomic status. *Curr Opin Cardiol*. 2008;23(4):335-339.
33. Beune EJ, Haafkens JA, Agyemang C, Bindels PJ. Inhibitors and enablers of physical activity in multiethnic hypertensive patients: qualitative study. *J Hum Hypertens*. 2010;24(4):280-290.
34. Im EO, Meleis AI. A situation-specific theory of Korean immigrant women's menopausal transition. *Image J Nurs Sch*. 1999;31(4):333-338.
35. Li WW, Stotts NA, Froelicher ES. Compliance with antihypertensive medication in Chinese immigrants: cultural specific issues and theoretical application. *Res Theory Nurs Pract*. 2007;21(4):236-254.
36. Diao D, Wright JM, Cundiff DK, Gueyffier F. Pharmacotherapy for mild hypertension. *Cochrane Database Syst Rev*. 2012;8:CD006742.
37. James PA, Oparil S, Carter BL, et al. 2014 evidence-based guideline for the management of high blood pressure in adults: report from the panel members appointed to the Eighth Joint National Committee (JNC 8). *JAMA*. 2014;311(5):507-520.
38. Leung AA, Nerenberg K, Daskalopoulou SS, et al. Hypertension Canada's 2016 Canadian hypertension education program guidelines for blood pressure measurement, diagnosis, assessment of risk, prevention, and treatment of hypertension. *Can J Cardiol*. 2016;32(5):569-588.
39. Jordan JE, Osborne RH. Chronic disease self-management education programs: challenges ahead. *Med J Aust*. 2007;186(2):84-87.
40. Glynn LG, Murphy AW, Smith SM, Schroeder K, Fahey T. Interventions used to improve control of blood pressure in patients with hypertension. *Cochrane Database Syst Rev*. 2010;(3):CD005182.
41. Lee R, Rodin G, Devins G, Weiss MG. Illness experience, meaning and help-seeking among Chinese immigrants in Canada with chronic fatigue and weakness. *Anthropol Med*. 2001;8(1):89-107.
42. Lai DW, Surood S. Chinese health beliefs of older Chinese in Canada. *J Aging Health*. 2009;21(1):38-62.
43. Woodall ED, Taylor VM, Teh C, et al. Sources of health information among Chinese immigrants to the Pacific Northwest. *J Cancer Educ*. 2009;24(4):334-340.
44. Korp P. Health on the Internet: implications for health promotion. *Health Educ Res*. 2006;21(1):78-86.
45. Brown K, Dyas J, Chahal P, Khalil Y, Riaz P, Cummings-Jones J. Discovering the research priorities of people with diabetes in a multicultural community: a focus group study. *Br J Gen Pract*. 2006;56(524):206-213.
46. Siow YL, Gong Y, Au-Yeung KK, Woo CW, Choy PC, O K. Emerging issues in traditional Chinese medicine. *Can J Physiol Pharmacol*. 2005;83(4):321-334.
47. Wu AP, Burke A, LeBaron S. Use of traditional medicine by immigrant Chinese patients. *Fam Med*. 2007;39(3):195-200.
48. Burge SK, Albright TL. Use of complementary and alternative medicine among family practice patients in south Texas. *Am J Public Health*. 2002;92(10):1614-1616.
49. Zhang AL, Xue C, Fong HHS. Integration of herbal medicine into evidence-based clinical practice: current status and issues. In: Benzie IFF, Wachtel-Galor S eds. *Herbal Medicine: Biomolecular and Clinical Aspects*. Boca Raton, FL: CRC Press; 2011. Chapter 22. <https://www.ncbi.nlm.nih.gov/books/NBK92760/>
50. Hesketh T, Zhu WX. Health in China. Traditional Chinese medicine: one country, two systems. *BMJ*. 1997;315(7100):115-117.
51. Martin JB. Historical and professional perspectives of complementary and alternative medicine with a particular emphasis on rediscovering and embracing complementary and alternative medicine in contemporary Western society. *J Altern Complement Med*. 2001;7(suppl 1):S11-S18.
52. Du HB. Traditional Chinese medicine education in Canada. *Chin J Integr Med*. 2015;21(3):173-175.
53. Cao BB. Current status and future prospects of acupuncture and traditional Chinese medicine in Canada. *Chin J Integr Med*. 2015;21(3):166-172.
54. Nestler G. Traditional Chinese medicine. *Med Clin N Am*. 2002;86(1):63-73.