

Hypertension

Applicable to: Nurses, Physicians, and Other Health Professionals

Recommendations

- Patients with hypertension should consume a diet similar to the Dietary Approaches to Stop Hypertension (DASH), vegetarian (or Portfolio) and/or the Mediterranean diet. These diets emphasize:
 - Rich in vegetables and fruit
 - Good sources of fibre from whole-grain cereals
 - Sources of low fat dairy products
 - Low in sodium
 - Moderate intake of lean unprocessed meat, poultry and fish
 - Moderate intake of unsaturated fats
 - Low intake of saturated and trans-fat
 - Plant sources of proteins
- The DASH diet recommends foods high in minerals such as potassium, calcium and magnesium which help in lowering blood pressure (BP):
 - High dietary potassium is associated with lower BP; however, some patients may need a potassium restriction. Individualize recommendations based on medications, laboratory values and dietary intake.
 - Low dietary calcium is associated with high BP. The most benefit is seen when dietary calcium intake meets the dietary reference intake guidelines of 1000 – 1500 mg/day. Supplementation of calcium above 1000 mg/day is not recommended as it may increase risk for cardiovascular disease.
 - Dietary magnesium may improve BP, however this remains unclear. Supplementation shows a small BP lowering benefit. Recommending supplementation as treatment to lower BP is not yet confirmed. Gastrointestinal side effects may occur at high doses.
- Most Canadians are consuming about 3400 mg/day of sodium. To help lower BP, support patients to reduce their intake to 1500 to 2300 mg/day of sodium. High sodium intake is associated with osteoporosis, kidney disease, stomach cancer, and worsening of asthma symptoms.
- All patients with overweight or obesity are encouraged to lose weight. Weight loss of 4 – 5 kg can reduce BP significantly. The more weight loss achieved the greater the BP reductions.
- Consuming 30 g of dietary fibre daily can lower BP in patients with hypertension. Fibre supplements do not have the same BP lowering effect.
- BP increases as alcohol intake increases (particularly after two standard beverages). Chronic consumption of excess alcohol is associated with increased mortality in patients with hypertension. Discuss alcohol intake with patients who wish to consume alcohol, and ensure they are within Canada's Low-Risk Drinking Guidelines.
- Caffeine increases BP by about 1 – 3 hours following intake in patients with hypertension. Moderate intake (400 mg of caffeine daily or 2 – 4 cups/day of coffee) shows no long term effects on BP.
- Long chain omega-3 fat (marine based) supplements show some benefit in lowering BP, however the dose dependent response remains unclear, therefore supplementation is not yet recommended in patients with hypertension. Support patients to consume omega-3 fats from dietary sources such as fish, shellfish, seaweed, kelp, and fortified foods.
- Vitamins, minerals and natural health products have been shown in some studies to improve vasodilation and therefore may reduce BP. These studies are limited with conflicting evidence; therefore no recommendation for supplementation is supported at this time.
- Moderate intensity physical activity can help modestly reduce BP in patients with hypertension. Aim for 30 to 60 minutes four to seven days per week.

Hypertension

Applicable to: Nurses, Physicians, and Other Health Professionals

- Smoking and exposure to second hand smoke increases the risk of cardiovascular events in patients with hypertension. All individuals are encouraged to quit smoking.
- Chronic stress, without making adjustments to the stressor, can lead to sustained elevated BP. Stress management is encouraged for those patients with stress related elevated BP.

Description

Patients who are at risk or have hypertension may work with multiple different healthcare professionals including the primary care or family physician, cardiologist, nurse or nurse practitioners, physical and occupational therapists, dietitians, mental health professionals, social workers and pharmacists. This guideline provides nutrition interventions to help prevent and manage hypertension and improve blood pressure.

Health Benefits

Hypertension is common in the adult Canadian population (one in five adults) and is one of the leading causes of death in Canada.¹ If Canadians live to the average lifespan, about 90% of them will develop hypertension.¹ Many patients with hypertension do not have their blood pressure (BP) under control. Hypertension is the number one modifiable risk factor for stroke and renal disease^{1,2} and having elevated BP significantly increases the risk for all cardiovascular disease (CVD) outcomes including artery disease and heart failure.³ Lifestyle intervention is encouraged for all patients with hypertension to improve BP, reduce the requirement for medications and reduce the risk factors for CV events.⁴

Following the recommendations provided in this guideline can help to:^{1,4}

- Help prevent hypertension
- Decrease systolic and diastolic BP
 - Reducing systolic BP by 10-12 mmHg and diastolic BP by 5-6 mmHg can substantially reduce the risk of mortality and morbidity.
 - Reducing systolic BP by 5 mmHg has been estimated to prevent 1 in 7 stroke deaths, one in 11 coronary deaths, and 1 in 14 deaths from any cause.
- Decrease the risk for CVD
- Achieve and maintain a healthy body weight

Key Questions

Definition

- What is hypertension?
- How is hypertension diagnosed?
- What are the targets for blood pressure?
- What is the role of nutrition and lifestyle interventions in the treatment of hypertension?

Dietary Patterns

- What dietary patterns are helpful for the prevention and treatment of hypertension?
- What is the DASH dietary pattern?
- What are the main recommendations for the DASH dietary pattern?
- When is the DASH diet not be appropriate?

Hypertension

Applicable to: Nurses, Physicians, and Other Health Professionals

Electrolytes

- What are the benefits to lower dietary sodium (salt) in patients with hypertension?
- What amount of sodium (salt) is recommended daily for patients with hypertension?
- Is it safe to consume less than 1500 mg or more than 2300 mg of sodium daily?
- How can patients lower their sodium intake?
- Is sea salt better than table salt?
- Are salt substitutes (potassium chloride) safe to include in the diet?
- Why is dietary potassium beneficial?
- Why is dietary calcium beneficial?
- Why is dietary magnesium beneficial?
- Should patients with hypertension use supplements of these minerals?

Weight Management

- Can weight reduction lower blood pressure?
- What is a healthy body weight?
- What is the best way to lose weight?
- What tips at restaurants can patients use to make their meals healthier?
- What does a healthy meal look like?

Fibre

- Does fibre intake affect hypertension?

Alcohol

- How does alcohol affect blood pressure?
- What are Canada's Low-Risk Drinking Guidelines?

Caffeine

- How much caffeine is safe for patients with hypertension?
- What products contain caffeine?

Omega-3 Fatty Acids

- Do omega-3 fats help improve blood pressure?

Supplements

- Do patients with hypertension require a vitamin or mineral supplement?
- What are some potential food – drug interactions that patients with hypertension may have?
- What is the role of vitamin D in hypertension management?

Physical Activity

- How much physical activity is recommended for the prevention and treatment of hypertension?
- What type of physical activity is recommended?

Smoking

- Should patients with hypertension avoid smoking and second hand smoke?

Stress Management

- Can stress management help to lower blood pressure?

Hypertension

Applicable to: Nurses, Physicians, and Other Health Professionals

Definition

What is hypertension?

Hypertension is elevated blood pressure (BP). BP is the force on the walls of the arteries as the blood circulates. BP is measured with two numbers and expressed as a fraction: the top number (systolic) is the BP when the heart contracts and the bottom number (diastolic) is the BP when the heart relaxes and fills with blood. More attention is typically given to the systolic number as in most individuals, systolic BP rises with age due to arterial stiffness.⁵

High BP can cause thickening of the arteries and increase risk for atherosclerosis or arterial plaque build-up.⁴ This plaque build-up can increase the risk of cardiovascular disease (CVD) (including heart failure, stroke, and coronary artery disease), chronic kidney disease, and death.^{4,6} The prevention of hypertension can significantly influence the progression or development of these diseases.⁴

Hypertension affects about 20% of all Canadians.^{4,6} Most patients are unaware that they have high blood pressure, as they do not experience any symptoms. Risk factors for the development of hypertension include family history, obesity, physical inactivity, stress, smoking, excess chronic alcohol intake and high dietary sodium intake.⁴

How is hypertension diagnosed?

BP should be measured accurately by a trained healthcare provider. It is recommended that validated equipment is used and may include the use of clinic automated and electronic BP equipment, home BP monitors and ambulatory BP monitors for the purpose of hypertension diagnosis.⁶

Table 1. Diagnosis of Hypertension Based on the Canadian Hypertension Education Program (CHEP) 2015 Guidelines⁶

Clinic	Hypertension outcome	Blood pressure values
Visit 1	<ul style="list-style-type: none"> Diagnosed hypertension 	≥180/110 mmHg
	<ul style="list-style-type: none"> No hypertension Annual BP measurements recommended 	<140/90 mmHg using an electronic BP or <135/85 mmHg using an automatic BP
	<ul style="list-style-type: none"> Further testing recommended - Further testing includes using an ambulatory 24-hour BP or home BP monitor. - Return to clinic within one month 	≥140/90 mmHg using an electronic BP or ≥135/85 mmHg using an automatic BP
Visit 2	<ul style="list-style-type: none"> Diagnosed hypertension 	≥135/85 mmHg using the mean home BP or ambulatory (awake hours only) ≥130/80 mmHg using the mean ambulatory 24-hour BP
	<ul style="list-style-type: none"> White coat hypertension - An ambulatory 24-hour BP monitor may be advised or repeat home BP monitor to confirm that hypertension is not present. - Annual clinic BP is recommended. 	>135/85 mmHg using the mean home BP

Adults with a high-normal BP of 130 – 139 mmHg systolic and/or 85 – 89 mmHg diastolic are at very high risk of developing hypertension.^{4,6}

Hypertension

Applicable to: Nurses, Physicians, and Other Health Professionals

What are the targets for blood pressure?

Treatment targets for hypertensive patients vary by age and co morbidity.³ To reduce the risk of CVD:⁴

- Support adults <60 years of age to lower their BP to <140/90 mmHg
- Support adults >60 years of age to lower their BP to <150/90 mmHg
- Support adults with diabetes to lower their BP to <130/80 mmHg

What is the role of nutrition and lifestyle interventions in the treatment of hypertension?

Hypertension can be controlled or treated with lifestyle modifications and/or medications. Lifestyle strategies and interventions should be encouraged for all patients with hypertension and may include assessing and managing diet and lifestyle patterns to support improved blood pressure and weight management including:

- dietary fibre
- caffeine
- alcohol
- sodium
- electrolytes (potassium, calcium and magnesium)
- omega-3 fatty acids
- physical activity
- smoking cessation
- relaxation therapy and stress reduction
- assess use of natural health products

Antihypertensive medications are often prescribed to patients with hypertension especially if unresponsive to the above lifestyle interventions.

Dietary Patterns

What dietary patterns are helpful for the prevention and treatment of hypertension?

It is recommended that patients with hypertension consume a diet similar to the Dietary Approaches to Stop Hypertension (DASH) diet, vegetarian (portfolio) diet, and Mediterranean diet.⁶ All individuals should be encouraged to adopt healthy eating habits to lower their CVD risk.

What is the DASH dietary pattern?

The DASH dietary pattern is lower in sodium and includes lean protein sources such as fish, poultry, milk and legumes. It limits saturated fat and sugar.

The DASH diet encourages foods that are high in potassium, calcium, and magnesium which are important minerals to lower BP (refer to the *Electrolytes* section next for more details). The DASH diet aims to provide 4700 mg of potassium, 1250 mg of calcium and 500 mg of magnesium.⁷ These values are based on patients consuming 2100 kcal per day.^{7,9}

Nutrition Guidelines Cardiovascular Care

For Professional Reference Only

Hypertension

Applicable to: Nurses, Physicians, and Other Health Professionals

Table 2. Comparison of the DASH Diet to the Dietary Reference Intake Guidelines^{7,8,9}

Dietary Nutrient	DASH Diet Recommendation	Dietary Reference Intake
Total Fat	27%	20 – 35%
Saturated Fat	6%	<10%
Protein	18%	10 – 35%
Carbohydrate	55%	45 – 65%
Fibre	30 grams	22 – 34 grams
Sugar	Limited sugar	<10%

The DASH diet originated as a randomized multicentre study that tested the effects of a specific dietary pattern on BP outcomes. In this study, the BP decreased by 11.4/5.5 mmHg in patients with hypertension and 3.5 / 2.1 mmHg in patients without hypertension.¹⁰

What are the main recommendations for the DASH dietary pattern?

Emphasize a diet that is:^{6,11,12}

- Rich in vegetables and fruit
- Good sources of fibre from whole grain cereals
- Sources of low fat dairy products
- Plant sources of proteins
- Low in sodium
- Moderate intake of lean unprocessed meat, poultry and fish
- Moderate intake of unsaturated fats
- Low intake of saturated and trans-fat

Table 3. Recommended Foods and Beverages for the DASH Dietary Pattern⁶

Food Group	Food and beverage choices
Choose these foods daily	
Whole grains	Whole wheat breads, cereals, oatmeal, rice, pasta, quinoa, barley, low fat, low sodium crackers
Vegetables	Dark green and orange fresh or frozen vegetables Tomatoes, leafy greens, carrots, peas, squash, spinach, peppers, broccoli, sweet potato
Fruits	Have fruit more often than juice. Apples, apricots, bananas, grapes, oranges, melons, peaches, berries, mango
Milk and alternatives	Skim and 1% milk, fortified soy beverage, yogurt, low fat (6-18% M.F.) cheese
Meat, poultry and fish	Select only lean meats. Trim away fat. Broil, roast or boil. No frying. Low sodium and low fat deli meats. Remove skin from poultry. Choose fish like char, herring, mackerel, salmon, sardines and trout.
Fats and oils	Soft margarines, mayonnaise, vegetable oil (olive, corn, canola, safflower), salad dressing
Choose these foods weekly	
Nuts, seeds, legumes	Almonds, walnuts, sunflower seeds, soybeans, lentils, peanuts, chick peas, dried peas, beans, tofu
Limit these foods	
Sweets	Sugar, jelly, jam, hard candy, syrups, sorbet, chocolate.

Note: The DASH eating plan is available at: http://www.nhlbi.nih.gov/files/docs/public/heart/hbp_low.pdf

Hypertension

Applicable to: Nurses, Physicians, and Other Health Professionals

When would the DASH diet not be appropriate?

This DASH dietary pattern may not be appropriate for lowering BP in patients with chronic kidney disease who have or are at risk for metabolic complications due to the fact that the diet is high in potassium, phosphorus and protein.¹³

The DASH diet is high in potassium (about 4700 mg/day) and therefore may not be appropriate for patients on certain medications known to increase serum potassium levels (e.g. ACE inhibitors, ARBs and aldosterone antagonists).⁶ A dietitian referral is suggested if persistent elevated potassium levels are observed following medical management.

Electrolytes

What are the benefits to lower dietary sodium (salt) in patients with hypertension?

Too much sodium in the diet can increase BP in patients with hypertension.⁴ A high sodium diet significantly increases the risk for stroke and CVD.¹⁴ Sodium intake is also associated with kidney disease, vascular and cardiac damage (independent of BP), osteoporosis – detrimental effects on calcium and bone metabolism, increased risk for stomach cancer, and asthma severity worsening.^{9,14}

Canadians are consuming about 3400 mg/day of sodium daily. This is likely higher as the reported levels are by self-reported studies, where underestimating intake is likely.¹⁴

A Canadian based calculator has been developed to help patients and health professionals estimate sodium intake based on frequency of consumption of restaurant meals and other packaged items. To determine if your patient is consuming too much sodium in their current diet, use a salt calculator found at <http://www.projectbiglife.ca/sodium/>

What amount of sodium (salt) is recommended daily for patients with hypertension?

Encourage patients with hypertension to aim for a total dietary sodium intake of 1500 to 2300 mg/day.⁴ As the current Canadian consumption of sodium is about 3400 mg/day, CHEP suggests a sodium reduction towards 2000 mg/day to help decrease BP.⁶

Reducing sodium intake to improve BP and reduce CVD risk is most beneficial in patients who already consume a high sodium diet.¹ Those with low to moderate sodium intake already do not see as much benefit.

Although nearly all patients can benefit from sodium reductions, there are some patients that are more sensitive to sodium and can see more benefits to BP lowering than others. Patients who are typically sodium sensitive include the elderly, African Americans, people with elevated blood pressure, diabetes or chronic kidney disease.¹⁵

Hypertension

Applicable to: Nurses, Physicians, and Other Health Professionals

Is it safe to consume less than 1500 mg or more than 2300 mg of sodium daily?

The adequate intake of sodium is 1500 mg/day reflecting the minimum needed to achieve a diet adequate in essential nutrients and to cover sweat losses in acclimatized people exposed to high temperatures or who are engaging in physical activity.¹⁶ The tolerable upper intake level (UL) is based on data on the effects of sodium on BP and is set at 2300 mg/day.

How can patients lower their sodium (salt) intake?

Canadians consume most (77%) of their sodium from processed foods.¹ The average restaurant meal (sit down) contains 1,455 mg of sodium per serving. A quarter of sit-down restaurant meals contain >2300 mg of sodium per serving. The top five food group sources of sodium in Canada are breads, processed meats, vegetable based dishes including tomato juice, soups and pasta based dishes.¹⁴

Tips to lower sodium intake:¹⁷

- Eat fresh, unprocessed foods.
- Limit or avoid adding salt when cooking.
- Remove the salt shaker from the table.
- Limit restaurant meals and fast foods.
- Limit use of processed foods and condiments.
- Avoid salty snack food.
- Eat smaller portion sizes of foods with salt.
- Read the Nutrition Facts table on food labels. Choose foods with $\leq 5\%$ Daily Value for sodium.
- Read the ingredient list on food packages. If the word "salt", "sodium" or "soda" appear in the first three ingredients, choose another food.

Is sea salt better than table salt?

The use of sea salt is not recommended over the use of other salts. Sea salt is obtained directly through the evaporation of seawater, and therefore it contains trace minerals such as magnesium, potassium, calcium and other nutrients. Table salt is processed to remove any other minerals. Sea salt may seem more attractive to patients however there are no real health advantages. The minerals found in sea salt are in minute amounts and are much greater in other dietary sources.

As sea salt (and kosher salt) is coarser than table salt, it contains slightly less sodium by volume than table salt which has about 2300 mg of sodium per teaspoon.¹⁸ They all have the same effect on BP and should be limited.¹⁹

Are salt substitutes (potassium chloride) safe to include in the diet?

Spice and herb mixtures with no salt added are safe to use for most individuals (e.g. Mrs. Dash®). Read the list of ingredients to ensure there is no salt added.

Some salt substitutes like "no-salt" or "half-salt" contain potassium chloride instead of sodium chloride. These are not recommended for individuals who need to limit the amount of potassium in their diet. Encourage patients to check with their healthcare provider before using salt substitutes.

Hypertension

Applicable to: Nurses, Physicians, and Other Health Professionals

Why is dietary potassium beneficial for patients with hypertension?

High dietary potassium intake is significantly associated with a reduction in BP.^{2,6,20,21} Foods high in potassium typically contain >200 mg per serving.

Common foods that are high in potassium include:

- Avocado, banana, cantaloupe, oranges (raw and juice), kiwi, nectarine, beets, Brussel sprouts, baked potato, sweet potato, tomato (sauce, paste, juice), legumes (beans, peas, lentils), nuts/seeds and nut butters, milk and milk alternatives, whole grains and dried fruit

Consider that some patients may require a potassium restriction and would need to be aware of potassium in foods. Medical conditions associated with impaired potassium excretion include diabetes, chronic renal insufficiency, heart failure and stage 3 or 4 chronic kidney disease with an e-GFR of <60mL/min may need to restrict potassium.² Patients taking potassium sparing diuretics, angiotensin-converting-enzyme (ACE) inhibitors and angiotensin receptor blockers (ARB's) have an increased risk of hyperkalemia and may require a potassium limit within their diets.²²

Why is dietary calcium beneficial for patients with hypertension?

The adequate intake of calcium is 1000 mg/day for adults aged 19-50 years and 1200 mg/day for adults over 50 years old.¹⁶ Low calcium intake is associated with elevated BP.²³ Consuming at least 800 mg of dietary calcium daily reduced systolic BP up to 4 mmHg and diastolic BP up to 2 mmHg.⁶ The beneficial BP lowering effects are seen when calcium intake meets the adequate intake and there is minimal additional benefits if intake is above this.²³

Encourage calcium rich food sources:^{9,24}

- Dairy (cow and goats milk, fortified milk alternatives [soy, rice, nut beverages], yogurt, cheese, buttermilk, dry powdered milk), tofu (prepared with calcium sulfate), fish (sardines, canned salmon with bones) and smaller amounts in green leafy vegetables

Why is dietary magnesium beneficial for patients with hypertension?

It remains unclear what the relationship is between dietary magnesium and its effect on BP in patients with hypertension.⁶ Magnesium is one of the nutrients with the highest prevalence of inadequate intake in the Canadian population (along with calcium, vitamins A and D). Nearly one third of adults consume less than the estimated average requirement for magnesium.²⁶

Encourage food sources rich in magnesium:^{9,24}

- Nuts and seeds/butters (pumpkin, sunflower, Brazil, almonds, cashews), soy proteins (soybeans, fermented tempeh, and soy nuts), black-eyed peas, and salmon

Hypertension

Applicable to: Nurses, Physicians, and Other Health Professionals

Should patients with hypertension use supplements of these minerals?

An adequate intake of potassium, magnesium and calcium is important for BP management and can be achieved by consuming the recommended servings of all food groups from *Eating Well with Canada's Food Guide*. Current research has shown that taking these minerals in supplemental form does not significantly lower BP. CHEP does not recommend supplementing potassium, calcium or magnesium for the prevention or treatment of hypertension.⁶

Potassium

Some studies have shown that potassium supplementation reduces systolic BP by 2 – 5.9 mmHg and diastolic BP by 0.5 – 3.5 mmHg, however the results are not consistent and support dietary intake of high potassium (>350 mg potassium per serving) and low sodium foods.²⁵

Calcium

Inadequate intake of calcium from food alone is prevalent in adults in Canada. 27 – 80% of males and 48 – 87% of females are not meeting the estimated average requirement for calcium.²⁶ For patients who are unable to meet their calcium requirements with dietary sources, discuss supplement use.^{13,23}

Taking a calcium supplement to achieve the adequate intake recommended may help to reduce BP by up to 3/2.5 mmHg in patients with hypertension.^{6,27} There may be a more pronounced effect on those with a low calcium intake to start with.^{21,27}

There have been questions about a possible link between calcium supplements and an increased risk of heart disease. Calcium supplementation of ≥ 1000 mg/day may increase the risk of CV events and mortality and therefore higher doses are not suggested.²⁸ The maximum dose of elemental calcium at one time should not exceed 500 mg as over use of calcium decreases absorption.²⁹

Magnesium

A supplement of 600 – 1000 mg/day of magnesium has shown to reduce diastolic BP by 2.2 mmHg in patients with mild to moderate hypertension.^{21,30} Studies show that lower doses do not have the same BP lowering effect.³⁰ High doses of magnesium supplements are shown to have adverse gastrointestinal effects.⁴

Hypertension

Applicable to: Nurses, Physicians, and Other Health Professionals

Weight Management

Can weight reduction lower blood pressure?

A substantial body of evidence documents that weight is directly associated with BP,² therefore all patients with overweight or obesity with hypertension should be advised to lose weight.^{6,11} A weight loss of 5kg in patients who are overweight can reduce BP by 4.4 mmHg systolic and 3.6 mmHg diastolic. All adults with hypertension are encouraged to achieve a normal weight and waist circumference and to maintain this weight to help reduce BP, however a modest weight loss of 4 – 5 kg in patients who are overweight can reduce BP by 4 – 7 mmHg systolic and 3 – 6 mmHg diastolic.^{4,6,31} The more weight loss that is achieved the greater the reduction in BP.⁴

What is a healthy body weight?

Body mass index (BMI) is measurement based on height and weight. BMI classifies the person's risk for developing health problems based on the categories of BMI.³² Normal weight is a BMI of 18.5 – 24.9 kg/m² which is associated with the least risk for developing health problems. Being overweight or obese increases the risk for developing health problems. Below are the BMI categories for overweight and obese:

- Overweight is a BMI of 25.0 – 29.9 kg/m²
- Obesity class I is a BMI of 30.0 – 34.9 kg/m²
- Obesity class II is a BMI of 35.0 – 39.9 kg/m²
- Obesity class III is a BMI >40.0 kg/m²

Note that patients who are very muscular (athletes) may have a low percent body fat and large amount of muscle mass. This may result in an elevated BMI calculation, and overestimate their health risk. For this population the waist circumference is a better tool to assess health risk.

Patients over the age of 65 have a slightly higher BMI range, than other adults. The ideal BMI range is 22 to 29.9 kg/m².³³

Waist circumference measurements can be used for patients with a BMI between 18.5 and 34.9 kg/m².³² A high waist circumference indicates that there is an increased risk of developing health problems such as type 2 diabetes, heart disease, and hypertension.³²

Table 4. Waist Circumference^{20,34}

Measurement	Country or Ethnic Group	Categorical cut-off points	
		Men	Women
Waist circumference	North American	> 102 cm	> 88 cm
	Europid*, Sub-Saharan African, Eastern Mediterranean, and Middle East (Arab)	≥ 94 cm	≥ 80 cm
	South Asian, Chinese (Chinese, Malay, Asian Indian), Japanese, South and Central American	≥ 90 cm	≥ 80 cm

*Europid ethnic group can use both European and North American cutoff points to allow better comparisons.

Using both the BMI and waist circumference together can help to provide additional information on health risk.³² Using BMI alone as a tool to establish weight loss goals is not recommended.

Hypertension

Applicable to: Nurses, Physicians, and Other Health Professionals

Table 5. Health Risk Based on Both BMI and Waist Circumference

		BMI		
		Normal weight	Overweight	Obese Class I
Waist Circumference	Less than the cut-off point listed in Table 4	Least Risk	Increased Risk	High Risk
	More than the cut-off point listed in Table 4	Increased Risk	High Risk	Very High Risk

What is the best way to lose weight?

The best approach to managing patient's weight loss goals is using a multidisciplinary approach that includes dietary education, increased physical activity, and behavioural intervention.³⁵ Portion control should be included as part of a comprehensive weight management program. Portion control at meals and snacks results in reduced energy intake and weight loss.²²

For weight loss in patients with overweight or obesity energy intake of 1200 – 1500 kcal per day for women and 1500 – 1800 kcal per day for men, provides nutritional adequacy and promotes weight loss and maintenance.³¹ An energy deficit of 500 – 750 kcal per day from their current dietary intake can aid in weight loss goals.³¹ To attain this energy deficit, utilize a dietary pattern that restricts intake of high-carbohydrate foods, low-fibre foods or high-fat foods.³¹

What tips at restaurants can patients use to make their meals healthier?

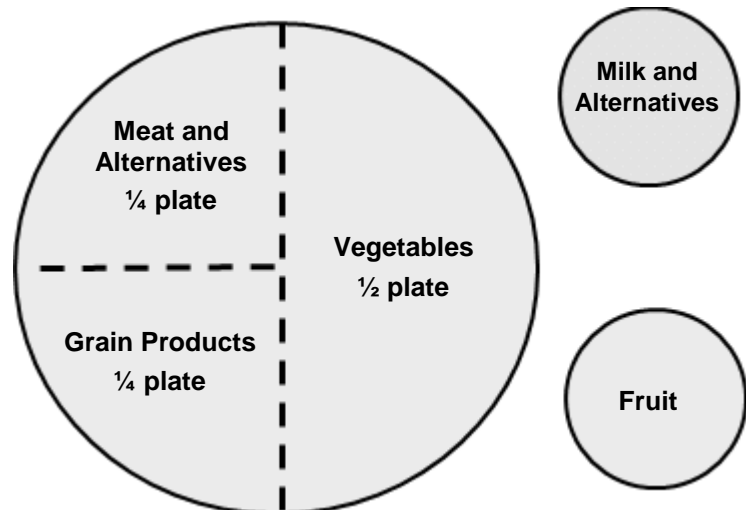
The following tips can help individuals control what they eat when they go out:

- Ask questions. The server can usually tell an individual how the food is made and what ingredients are in the dish. Lower the fat content of the meal by asking for healthier cooking methods or substituting high fat foods for healthier choices.
- Don't go out to eat when really hungry. Eat a piece of fruit an hour before going out to help decrease the feeling of hunger. If an individual goes out when really hungry they will likely eat too much.
- Many restaurant chains provide nutritional information for their menus online or in store. Use the nutritional information to pick foods that are lower in fat, sodium, and sugars, and higher in fibre.
- Individuals may share their meal with someone else. Restaurants often give more food than they would eat at home.
- Ask for leftovers to be packed up. The leftovers can be eaten at another meal.
- Don't add salt or butter to food at the table. Restaurant food is often already high in fat and sodium.

What does a healthy meal look like?

A healthy meal will include one food from at least three of the four food groups from *Eating Well with Canada's Food Guide*. To build a healthy meal, see the picture below:

- fill ½ of the plate with Vegetables
- fill ¼ of the plate with Meat and Alternatives
- fill ¼ of the plate with Grain Products
- have 1 serving of Milk and Alternatives
- have fruit on the side



For portion sizes of some common foods, refer to *Eating Well with Canada's Food Guide*. A healthy meal will help with portion control and meeting recommended servings from the four food groups.

Some convenient ways to measure food are:

- A baseball equals a serving of salad or two servings of pasta (1 cup or 250 mL).
- The size of a hockey puck equals a serving of meat, fish, or poultry (2½ ounces or 75 grams).
- Two golf balls equal a serving of dried fruit, nuts, or seeds (¼ cup or 60 mL).
- A golf ball equals a serving of peanut or nut butter (2 Tbsp or 30 mL).
- Two white erasers equals a serving of most cheeses 1½ ounces (50 grams).
- Choosing smaller portions of food will promote weight loss.

Fibre

Does fibre intake affect hypertension?

A diet that has about 30 grams of total fibre (>14 grams per 1000 kcal/day) and is high in soluble fibre can reduce BP in patients with hypertension.⁴ A dietary fibre supplement does not support improvements in BP.⁴

Alcohol

How does alcohol affect blood pressure?

Available evidence demonstrates a direct, dose-dependent relationship between alcohol intake and BP, particularly as the intake of alcohol increases above 2 drinks (>27g of alcohol) per day. Discuss risks and benefits of alcohol consumption on an individual basis with patients.

Hypertension

Applicable to: Nurses, Physicians, and Other Health Professionals

Moderate alcohol intake may increase BP in patients with hypertension.⁴ High alcohol intake is considered more than two to three drinks per day. Chronically consuming high levels of alcohol is associated with increased mortality in patients with hypertension.⁴ When patients who consume moderate to high levels of alcohol can beneficial effects on BP when intake is lowered (either low intake or abstinence).^{4,6}

Note: The timing of alcohol intake affects BP levels.¹² BP is the lowest several hours following intake. BP is the highest about 10 to 15 hours after intake.

What are Canada's Low-Risk Drinking Guidelines?

The Canadian Hypertension Education Program (CHEP) states that alcohol intake should be in accordance with *Canadian Low-risk Alcohol Drinking Guidelines: Low-Risk Alcohol Drinking Guidelines* to lower BP.⁴ Adults with hypertension who consume alcohol should be encouraged to stay within the following limits for alcohol:^{35,36}

- ≤ 2 drinks per day
- ≤ 14 drinks per week for men
- ≤ 9 drinks per week for women

A standard drink is considered 13.4g of alcohol:³⁵

- 44 mL (1.5 oz) of 40% spirits
- 355 mL (12 oz) of 5% beer
- 148 mL (5 oz) of 12% wine

Caffeine

How much caffeine is safe for patients with hypertension?

In the treatment of hypertension, there have been no set restrictions to caffeinated beverages.³⁷ Health Canada suggests that there are no associated adverse effects when healthy adults consume up to 400 mg per day of caffeine.³⁸ Women who are planning to become pregnant, pregnant women and women who are breastfeeding have no associated adverse effects when consuming up to 300mg of caffeine per day.³⁸

People react differently to caffeine, which may be attributed to tolerance/adaptation, withdrawal, and genetic polymorphisms affecting the adenosine receptor function or the metabolism of caffeine.³⁷ Some people may experience side effects to caffeine intake such as nervousness, anxiety, gastrointestinal upset, tachycardia and insomnia.³⁷ People who have built-up tolerance to caffeine may report withdrawal symptoms which may include headaches, fatigue, drowsiness, and irritability.³⁷

Studies have shown an increase in BP for about one to three hours following consumption of 200-300 mg of caffeine (equivalent to 1 ½ to 2 cups of filtered coffee). However, long term studies have shown no association between moderate caffeine consumption and elevated BP in patients with hypertension.⁴

Hypertension

Applicable to: Nurses, Physicians, and Other Health Professionals

What products contain caffeine?

Caffeine is a chemical found naturally in plants. Natural sources include coffee beans, cocoa beans, kola nuts, tea leaves, yerba mate and guarana.³⁷ Caffeine is added to energy drinks and carbonated beverages. The table below provides some common sources of caffeine.

Common sources of caffeine are:

- Brewed Coffee
- Espresso shot
- Instant coffee
- Tea, brewed
- Tea, green
- Cocoa powder
- Carbonated drink, cola
- Energy drink, various
- Chocolate bar, dark

Omega-3 Fatty Acids

Does omega-3 fats help improve blood pressure?

Omega-3 fatty acids from marine sources including docosahexaenoic acid (DHA) and eicosapentaenoic acid (EPA). Studies suggest that EPA and DHA supplementation (average of 3,400 mg/day) have a modest effect on lowering BP by: [Grade B – PEN]⁴

- Systolic 2.5 - 4.5 mmHg
- Diastolic BP by 1.5 - 3 mmHg

A dose response relationship has not yet been established and therefore supplementation of EPA and DHA is not yet recommended for patients with hypertension.

Encourage patients to get EPA and DHA through dietary intake. In additions to omega-3 fats, fish contains several potentially beneficial nutrients not contained in fish oil supplements.³⁹ Suggest at least two servings of fatty fish per week. If patients do not eat fish, fortified foods like eggs, margarines, yogurts and juices may contain EPA and DHA. Also seaweed and kelp have rich sources of EPA and DHA as alternative to fish.³⁹

Supplements

Do patients with hypertension require supplementation with vitamins, minerals, or natural health products?

Some natural health products (NHP) have benefits. This depends on the population, health condition and the NHP. Products that have been thought to help improve blood pressure are listed below.

There are studies to show that NHPs with antioxidant properties such as vitamin C, Coenzyme Q10, and Cocoa/chocolate, may help to reduce oxidative damage. Antioxidants act as scavengers for superoxide anions. These anions are inhibiting the nitric oxide production in the endothelium walls of the arteries preventing vasodilation. Along with the antioxidants, garlic may help to relax smooth muscles and increase vasodilation of the arterial walls. As the studies for NHP are limited and some of the studies have conflicting evidence, there is no current recommendation for NHP in the prevention or management of hypertension.^{4,6}

Hypertension

Applicable to: Nurses, Physicians, and Other Health Professionals

What are some potential food – drug interactions that patients with hypertension may have?

There are a number of NHPs shown to have interactions with medications, ranging from mild effects to life threatening. Due to limited quality studies available, it is difficult to identify all specific NHPs and medication interactions. NHPs may cause problems with medications when the NHP alters the absorption, metabolism or excretion of a medication. Information about specific NHPs can be found the *Natural Medicine Comprehensive Database* <http://naturaldatabase.com>

What is the role of vitamin D in hypertension management?

Some population studies have suggested that patients with a lower serum vitamin D status are associated with a higher risk of developing hypertension compared to patients with higher vitamin D status.⁴⁰ The evidence is inconclusive and contradicting therefore no recommendations are made for promoting vitamin D supplementation for the management or treatment of hypertension. [Grade C – AND]⁶

Physical Activity

How much physical activity is recommended for the prevention and treatment of hypertension?

Patients with hypertension can modestly reduce their BP with moderate intensity aerobic activity.⁴ The more physical activity achieved by the individual, the greater the health benefits.¹¹ In addition to the routine activities of daily living, patients with or without hypertension are recommended to accumulate 30 to 60 minutes of moderate intensity aerobic exercise (such as walking, jogging, cycling or swimming) four to seven days per week.⁶ Exercising at higher intensities than this is no more effective at prevention or treatment of hypertension.³⁵

All those considering initiating a vigorous exercise program are encouraged to consult their physician or health care team professionals.¹¹

The Public Health Agency of Canada (PHAC) and The Canadian Society for Exercise Physiology (CSEP) have detailed information and physical activity recommendations. The resources and handouts are available at: <http://www.phac-aspc.gc.ca/hp-ps/hl-mvs/pa-ap/04paap-eng.php>, and <http://www.csep.ca/>

What type of physical activity is recommended?

A moderate reduction in BP is seen with moderate intensity aerobic exercise such as walking, jogging, cycling or swimming.⁶ Yoga may show beneficial effects in reducing diastolic BP.⁴ Adding resistance exercises that use major muscle groups, at least two days per week is beneficial to overall health outcomes.¹¹

Hypertension

Applicable to: Nurses, Physicians, and Other Health Professionals

Smoking

Should patients with hypertension avoid smoking and second hand smoke?

All individuals should be encouraged to quit smoking to support CV and pulmonary health.⁴ Smoking and exposure to second hand smoke increases the risk of CV events in patients with hypertension.⁴ All patients should be asked if they use tobacco and should have their tobacco use status documented on a regular basis. All healthcare professionals should strongly advise all patients who smoke to quit and provide brief advice.¹¹ Consider that weight gain (about 5 kg) is common in patients who quit smoking.⁴

Stress Management

Can stress management help to lower blood pressure?

Chronic stress in the body (without making adjustments or adaptations to the stress) may contribute to sustained elevated BP levels.⁴ Consider stress management techniques for those patients who seem to have stress related elevated BP.⁶ Relaxation therapy may help lower BP, however, the specific features of different therapies that aid in BP management are not net consistently understood.⁴

Patient Resources

Refer to approved provincial Alberta Health Services cardiology nutrition handouts to support patient education. For more information, contact Nutrition.Resources@albertahealthservices.ca

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Nutrition Guidelines

Cardiovascular Care

Hypertension

For Professional Reference Only

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Nutrition Guidelines Cardiovascular Care

For Professional Reference Only

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