Addressing poor nutrition to promote heart health: Moving upstream

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Current dietary recommendations for cardiovascular disease prevention suggest dietary patterns that promote achieving healthy weight, emphasize vegetables, legumes, fruit, whole grains, fish and nuts, substituting mono-unsaturated fats for saturated fats and restricting dietary sodium to less than 2300 mg/day. However, trends in nutrient intake and food consumption patterns suggest that the need for improvement in the dietary patterns of Canadians is clear. Influencing eating behaviour requires more than addressing nutrition knowledge and perceptions of healthy eating – it requires tackling the context within which individuals make choices. A comprehensive approach to improving nutrition includes traditional downstream strategies such as counselling to improve knowledge and skills; midstream strategies such as using the media to change social norms; and upstream strategies such as creating supportive environments through public policy including regulatory measures. While the evidence base for more upstream strategies continues to grow, key examples of comprehensive approaches to population change provide a call to action.

Key Words: Cardiovascular; Evidence; Nutrition; Policy; Population intervention; Public health

Improving dietary behaviour continues to be the foundation of cardiovascular disease (CVD) prevention and treatment. The 2009 Canadian Cardiovascular Society guidelines (1) for the prevention of adult CVD recommend “a diet low in sodium and simple sugars, with substitution of unsaturated fats for saturated and trans fats, as well as increased consumption of fruits and vegetables”. The guidelines also recommend achieving and maintaining a healthy body weight. However, despite well-accepted guidelines that have been refined – but have remained relatively consistent for decades – the dietary practices and nutritional status of many Canadians continues to be suboptimal. For example, from 1978 to 2004, measured age-adjusted obesity rates increased from 14% to 23% of Canadian adults (2). The obesity ‘epidemic’ suggests that addressing diet and physical inactivity as significant behavioural risk factors for chronic diseases remains a major challenge. With respect to other risks, Canada has made significant progress in tobacco reduction – decreasing the smoking rates of Canadians over the past 30 years from 50% to 19% (3). Tobacco reduction strategies have focused on multilevel ‘upstream’ interventions (eg, taxation, restricting access and advertising bans) that may hold promise or lessons for improving nutrition.

The present article briefly reviews evidence related to key dietary factors that are important for cardiovascular health, followed by a presentation of Canadian trends in nutrient intake and food consumption patterns that will help paint a picture of how Canadians are faring relative to meeting recommendations. Finally, potential upstream approaches to promote healthy eating are offered as alternatives or adjuncts to current practice, focusing on counselling for individual behaviour change. When available, evidence of intervention effectiveness will be reviewed.

Se pencher sur la mauvaise alimentation pour promouvoir la santé cardiaque : Agir en amont

Les recommandations alimentaires actuelles en vue de prévenir les maladies cardiovasculaires visent des habitudes alimentaires qui favorisent l'atteinte d'un poids santé, mettent l'accent sur les légumes, les légumineuses, les fruits, le grain entier, le poisson et les noix, la substitution des graisses mono-insaturées par des graisses saturées et la diminution du sodium alimentaire à moins de 2 300 mg/jour. Cependant, les tendances de consommation d'éléments nutritifs et les habitudes alimentaires indiquent clairement la nécessité que les Canadiens améliorent ces habitudes. Pour influencer sur les comportements alimentaires, il ne faut pas se limiter à agir sur les connaissances et les perceptions d'une saine alimentation, mais tenir compte du contexte dans lequel chaque individu fait ses choix. Une démarche globale pour améliorer l'alimentation inclut des stratégies classiques en aval, comme les conseils pour améliorer les connaissances et les compétences, des stratégies intermédiaires, comme l'utilisation des médias pour modifier les normes sociales, et des stratégies en amont, comme la création de milieux coopératifs grâce à des politiques publiques, y compris des mesures en matière de réglementation. Les données probantes à l'appui de l'adoption d'un plus grand nombre de stratégies en amont continuent d'augmenter, mais des exemples clés de mesures globales pour modifier les attitudes de la population justifient un appel à l'action.

DIET AND CARDIOVASCULAR HEALTH: CURRENT EVIDENCE

As previously stated, the 2009 Canadian Cardiovascular Society guidelines (1) for the prevention of adult CVD that are relevant to diet include recommendations for reducing sodium and simple sugars, substituting unsaturated fats for saturated and trans fats, increasing consumption of fruits and vegetables, and caloric restriction to enable achieving and maintaining an ideal body weight. The authors acknowledge that dietary guidance is controversial, but years of epidemiological and experimental evidence have led to the general acceptance of recommended dietary patterns.

A recent systematic review (4) of prospective cohort studies (146 references) and randomized controlled trials (RCTs) (43 references) linking dietary factors and coronary artery disease (CAD) revealed evidence supportive of these recommendations. Specifically, the systematic review found strong evidence that vegetables, nuts and monounsaturated fatty acids are protective dietary factors. High-quality dietary patterns, in particular, Mediterranean dietary patterns (which emphasize vegetables, legumes, fruit, whole grains, fish, nuts, cheese or yogurt, and a high ratio of monounsaturated to saturated fat), provide the strongest evidence emerging from RCTs. Strong evidence supporting a link with CAD was also found for the following harmful dietary factors: trans fat, high glycemic index/load and western dietary patterns. Moderate evidence supporting a protective effect was found for fish, marine omega-3 fatty acids, folate, whole grains, dietary vitamins E and C, beta-carotene, alcohol, fruit and fibre. Only weak evidence supporting a protective effect was found for vitamin E and C supplements, polyunsaturated fatty acids, alpha-linolenic acid, eggs and milk, while weak evidence of harm was found for meat,

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saturated fatty acids and total fat. The bulk of the evidence, therefore, supports dietary patterns – as opposed to individual nutrients – as the most important causal links to CAD.

In addition to adopting a high-quality dietary pattern for the prevention of CAD, dietary changes are also recommended to address other risk factors for CVD such as hypertension and obesity. The 2009 Canadian Hypertension Education Program's evidence-based recommendations for the prevention and management of hypertension (5) suggest the dietary patterns described above, plus a strong focus on sodium reduction (to less than 2300 mg/day for prevention; to less than 1500 mg/day for treatment) and weight management (body mass index [BMI] of 18.5 kg/m² to 24.9 kg/m²).

To summarize, the current dietary recommendations for CVD prevention advocate dietary patterns that promote achieving healthy weight, an emphasis on vegetables, legumes, fruit, whole grains, fish and nuts, substituting monounsaturated fats for saturated fats and restricting dietary sodium to less than 2300 mg/day.

CANADIAN DIETARY TRENDS: NEED FOR IMPROVEMENT

How well are Canadians eating with respect to these recommendations? For the majority, there is need for improvement. According to the 2004 Canadian Community Health Survey (CCHS) (2) – the most comprehensive and representative survey of Canadians' diets since the 1970s – 23.1% of Canadians 18 years of age and older were obese (defined as a BMI of 30 kg/m² or greater), and an additional 36.1% were overweight (BMI of 25.0 kg/m² to 29.9 kg/m²), meaning that the majority (59.2%) of Canadians measured exceeded healthy weight standards. Increasing weight was associated with a greater risk of both reported hypertension and heart disease. The likelihood of being obese was increased in men and women who reported eating fruit and vegetables fewer than three times a day, even when age and socioeconomic status were taken into account. However, because the CCHS was cross-sectional in design, no causality between obesity and a health behaviour or outcome can be inferred (2).

Additional dietary patterns observed from the CCHS revealed that the majority of Canadians do not eat the recommended daily minimum of five servings of vegetables and fruit. At ages nine to 13 years, 62% of girls and 68% of boys consume less than five servings, while among adults, approximately one-half fall short of five servings (55% of men and 45% of women 31 to 50 years of age). More than one-quarter of men (27%) and women (28%) in this same age group obtain more than 35% of their calories from fat. Canadians of all ages get more than one-fifth of their calories from 'other' foods and beverages (fats and oils; foods with high sugar content; high-fat and/or high-salt foods; beverages such as soft drinks, tea, coffee and alcohol; and herbs and condiments) that are not part of the four major groups. A small number of items account for two-thirds of the calories derived from this category in the following descending order: soft drinks, salad dressing, sugars/syrups/preserves, and beer and oils/fats. In addition, approximately 25% of Canadians consume food prepared at a fast-food outlet on any given day (6).

Regarding salt and sodium, Statistics Canada estimates the average sodium consumption for Canadians older than one year of age to be 3092 mg/day (7) – with the addition of table and stove salt, 3500 mg/day would be a more realistic estimate (8). The 2004 CCHS revealed that 85% of men and 60% of women 19 to 70 years of age had sodium intakes exceeding the Institute of Medicine upper recommended limit of 2300 mg/day (7).

The need for improvement in the dietary patterns of Canadians is clear. However, traditional efforts to improve eating behaviours through dietary guidance and counselling directed toward individual behaviour change have met with less than optimal success, especially considering the significant proportion of the population in need of change. Individual influences on personal food choices (food preferences, nutrition knowledge, perceptions of healthy eating and psychological factors) are necessary – but not sufficient – to explain eating

behaviour, which is highly contextual (9). Logically, influencing eating behaviour requires more than addressing nutrition knowledge and perceptions of healthy eating – it requires addressing the very context within which individual choices are made.

PROMOTING HEALTHY EATING: MOVING UPSTREAM

One way of conceptualizing approaches to promote healthy eating is in terms of upstream and downstream approaches (10). Downstream approaches focus on direct dietary behaviour interventions, such as individual nutrition education. This is probably the most familiar approach for health professionals working within an acute care system. Midstream approaches are more diffuse and target larger numbers of people, such as using the media to change food norms. Social marketing campaigns for public health interventions could be categorized as midstream approaches. Upstream approaches attempt to address the problem behaviours at their source (ie, 'root cause'). Upstream approaches include policies that change the food supply, providing a wider variety of healthy alternatives to choose from or limiting access to unhealthy alternatives.

Ideally, a comprehensive or 'ecological' approach to promoting healthy eating incorporates a full spectrum of interventions. A comprehensive approach addresses multiple levels including intrapersonal factors (knowledge and skills), interpersonal processes (social supports), organizational and community factors (local rules and norms), and public policy (voluntary and/or regulatory measures, tax incentives) (11). To illustrate, a comprehensive approach to reducing sodium intake may include individual and public education on the importance of reducing dietary sodium and strategies for dietary change (individual/downstream), combined with point-of-choice (restaurant or supermarket) incentives (reduced prices and/or on menu/label promotion of lower sodium content) for purchasing lower sodium products (organizational/midstream), plus industry regulations to reduce the sodium content of processed foods (policy/upstream).

But what is the evidence base for moving upstream to promote healthy eating? Unlike clinical decision making, which draws predominantly from RCTs, upstream organizational and policy interventions draw on a broad range of evidence from epidemiological observations, parallel evidence from other health behaviours (tobacco, physical activity), various designs to test 'real world' interventions, theory and informed opinion. In addition, as the potential population impact increases, the promise of impact is such that intervention is warranted even in light of lower certainty of evidence (12). The urgency to improve the population's nutrition demands action before certainty of effectiveness; while at the same time, evaluation of interventions is an essential contribution to the evidence base.

The Task Force on Community Preventive Services, led by the Centers for Disease Control and Prevention in the United States, have conducted systematic reviews of the effectiveness of interventions to improve the public's health, including the effectiveness of nutritional interventions (13).

Downstream interventions or individual-level nutrition counselling reviewed by the Task Force are limited to disease-specific interventions such as the management of type 2 diabetes. The Task Force found sufficient evidence of effectiveness to recommend self-management education for adults in community settings (14).

Midstream interventions, such as programs to reduce overweight and obesity through the workplace including employee education, building coworker support networks, and improving access to healthy foods through cafeteria offerings and vending options, have also been found to be effective and, are therefore, recommended by the Task Force (14). Unfortunately, reviews of nutritional programs in schools have shown insufficient evidence of effectiveness (15). However, in the Canadian context, a comprehensive school health approach (incorporating nutrition, physical activity and changing the school environment) was demonstrated to be very effective in reducing childhood overweight and obesity, as well as increasing fruit and vegetable intake (16).

The impact of upstream interventions, including policy changes to improve the nutritional quality of foods available to the population may be more difficult to implement and evaluate (especially if attribution is the goal). However, they represent the most far-reaching potential for changing population trends of complex problems such as diet. Parallel evidence from tobacco reduction strategies suggests that Canada's significant progress in decreasing smoking rates from 50% to 19% of Canadians over the past 30 years (3) has been associated with multilevel interventions aimed at population policy such as increased taxation, advertising restrictions, restricted access to minors and smoke-free spaces legislation. Even within the nutritional arena, there are lessons to be learned from fortification policies for single nutrients (eg, folic acid) that have successfully decreased the population risk of deficiencies and their adverse effects (17). Legislative efforts to reduce the trans fat and sodium content of the food supply would be relevant examples for the prevention of cardiovascular disease.

A 2009 report by the Canadian Centre for Science in the Public Interest (www.cspinet.ca) – "Salty to a Fault" – revealed wide variations in the sodium content of packaged and restaurant foods, suggesting that reducing the sodium content of Canadian foods is feasible (18). However, voluntary reductions by industry have led to only a few food companies acting to reduce sodium in processed foods, suggesting the need for regulatory controls and the development of standards. Wide variations in the sodium content of foods not characteristically perceived as 'salty' (eg, bread), also suggests that consumers may be unwittingly ingesting higher levels of sodium than intended. Offering lower sodium products as the default would, in effect, enhance consumer choice in controlling their sodium intake, leaving it to the discretion of the consumer – not industry – to add salt to their foods.

Beyond a focus on individual dietary components, however, are comprehensive strategies to create environments supportive of healthy food choices. The American Heart Association calls for "the need for comprehensive promotion of healthful eating, physical activity and energy balance" as a means of population-based CVD reduction (19). The 2008 Canadian Heart Health Strategy and Action Plan (20) estimates that up to 80% of premature CVDs are preventable through risk factor reduction. Their first broad recommendation was to "create heart healthy environments" and, further, "To create healthy environments, Canada can and should use a combination of education, legislation, regulation and policy to promote healthy eating and physical activity, to reduce smoking, and to address the underlying 'upstream' social inequities that affect health" (20).

The evidence base is still thin for some of the proposed strategies within a comprehensive approach because the practice of changing environments to promote health is still developing compared with behavioural and clinical interventions (21), and traditional research methodologies have limitations for evaluation. However, the sense of urgency for change, particularly related to the obesity epidemic, has led to implementing programs and policies based on best available evidence, including expert opinion; research is rapidly accelerating. Recently, the Centers for Disease Control and Prevention published recommended community strategies to prevent obesity, which included 11 strategies relevant to promoting healthy eating. Strategies varied from limiting advertisements of less healthy foods and beverages, regulating portion sizes in food service outlets, zoning to ensure accessibility to supermarkets with larger selections of fresh fruits and vegetables, and policies to limit unhealthy food choices at schools and public venues (22).

While evidence of each of these recommended strategies continues to grow, a lesson from tobacco control continues to be the importance of multiple, interrelated strategies that function to create an environment and culture whereby the healthier choices are normalized (23). A long history of comprehensive chronic disease prevention/heart health programs, beginning in 1972 with the North Karelia project in Finland (24,25), provides models of successful population-based intervention. The North Karelia project was one of the first to integrate public education, policy and legislation that extended beyond tobacco

reduction to food content (such as fat and salt reformulations, and even changing agricultural policy to convert dairy farms to berry farms). The resulting environmental changes had a significant impact on reducing fat intake, sodium intake (by 40%) and cardiovascular mortality over the long term (20 years) (24). While Canada has been an international leader in developing public health/research partnerships for chronic disease prevention through the Canadian Heart Health Initiative from 1986 to 2006 (26), the impact of the interventions has not been as dramatic, an observation that may be associated with a relatively diffuse 'dose' of intervention combined with varied contexts and difficulties with the 'trial approach' (27).

CONCLUSION

The present article briefly reviewed evidence related to key dietary factors that are important for cardiovascular health. Current dietary recommendations for CVD prevention advocate dietary patterns that promote achieving healthy weight, emphasize vegetables, legumes, fruit, whole grains, fish and nuts, substituting monounsaturated fats for saturated fats and restrict dietary sodium to less than 2300 mg/day. However, Canadian trends in nutrient intake and food consumption patterns suggest that Canadians are not meeting recommendations. The need for improvement in the dietary patterns of Canadians is clear. Influencing eating behaviour requires more than addressing nutrition knowledge and perceptions of healthy eating – it requires addressing the very context within which individual choices are made. A comprehensive approach to improving nutrition includes traditional downstream strategies, such as counselling to improve knowledge and skills; midstream strategies such as using the media to change social norms; and upstream strategies such as creating organizational and community environments through public policy, including regulatory measures. While the evidence base for more upstream strategies continues to grow – drawing on a broad range of types of evidence from epidemiological observations – parallel evidence, theory and informed opinion, key examples of comprehensive approaches to population change provide success stories. The urgency to improve the population's nutrition demands action. The missing link in the Canadian context appears to be the political will to invest in prevention in sufficient 'doses' for effectiveness. While swimming upstream has its challenges and barriers, there is hope in movement.

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