**Evidence- and practice-informed nutrition therapy care map for metabolic syndrome**

## A. Introduction and Rationale

Metabolic syndrome (MetS) refers to a cluster of common abnormalities consisting of at least three of the following: elevated waist circumference, high blood pressure, high fasting glucose, high triglycerides, and/or low HDL-cholesterol [1]. The presence of MetS leads to a 1.25 to 2-fold increased relative risk of cardiovascular disease (CVD) [2], some cancers and viral diseases like COVID-19 [3]. The estimated prevalence for MetS in Canada has increased to 32% (combined 2012-15 data) [4]. No one combination of abnormalities predominates. Those with MetS represent a high-risk group who can benefit from secondary prevention lifestyle interventions, specifically dietary change and increased exercise to prevent its complications.

Lifestyle change for the management of MetS is promoted in a general way by all relevant medical practice guidelines, yet access and uptake of such services varies widely across Canada. Implementation research has been ongoing to improve the effectiveness and efficiency of such programs using various combinations of features, mainly with a focus on weight loss, online vs in-person group approaches, peer support, use of different self-monitoring technology, etc. A key issue for diet therapy, however, is that many published meta-analyses and reviews have not provided enough detail on key aspects of the diet services to know what elements are 'critical' vs are 'nice to have' in developing new programs for wider spread in the health care system. For example, diet was recently reviewed in Practice-based Evidence in Nutrition (PEN) and showed fair evidence of benefit [5]. To quote from PEN: "In the included studies, the details of the dietary interventions were not reported, but they generally focused on healthy eating and weight loss and sometimes included reducing carbohydrates or fats, keeping a food diary, grocery store tours, cooking classes and motivational interviewing."

Diet therapy is a complex intervention. The challenge of implementing these multiple practice guidelines into dietetic practice is compounded by the need to incorporate behavioural strategies and individualize counselling to promote long-term food habit change. Meta-analyses have been helpful in advancing the field, but have limitations, as noted in the PEN review. Practice experience and feasibility in the health care system are also important to consider. There is a need for a dietetics driven process to develop best practice guidance, as registered dietitians (RDs) are most familiar with complexities of diet counselling in the health care system, and the limitations of and potential harms of a weight loss focus, including the known wide variability of weight loss, increased stigma and physiological counter-regulatory effects [6].

Fortunately, newer tools and methods are available to facilitate combining evidence and experience to develop best practice guidance for diet therapy. The timing for such a project is also opportune as numerous health care practices across Canada are beginning to address MetS.

The co-investigators to this LOI are uniquely positioned to lead this project. We (Brauer, Royall) were co-investigators for a national demonstration pre-post project (CHANGE) involving 300 patients and have published in detail on dietary aspects (ClinicalTrials.gov Identifier: NCT01616563) [7-9]. Detailed studies on the exercise, genetic components, blood pressure, measurement error and responsiveness to therapy have also been published or submitted. Metabolic Syndrome Canada (MetSC), a non-profit organization funded the original study, and has since implemented the program in British Columbia (Pacific Northwest Division of Family Medicine), Alberta, Ontario, Manitoba, and other locations across Canada. Some past projects have been documented on the MetSC website at https://www.metabolicsyndromecanada.ca/. The success by the Northwest BC Division of Family Practice is particularly important to highlight as the area is remote, with many Indigenous

communities. Learnings from their experience exemplify models that could be used in many parts of the country (https://www.changebc.net/news/change-video).

There is a unique opportunity to provide better evidence- and practice- informed guidance for diet therapy for MetS for the Canadian health care context. Therefore, a mixed method approach is proposed to update a care map previously used in the original CHANGE study [10], combining insights from new evidence on the details of diet programs with insights from Canadian RDs currently working with CHANGE programs and others who are experienced in treating MetS.

**B. Research Project Objectives**

A small expert advisory committee (8-10 people) will be formed to guide the project. This expert advisory group will be drawn from several groups with relevant expertise, including the Nutrition Committee of Diabetes Canada, Metabolic Syndrome Canada, Dietitians of Canada, the Canadian Nutrition Society, and the Cardiometabolic Research Network (CMRN), a national group of researchers doing research in this arena. Groups who support patient advocacy will be approached for a representative. Participation will be voluntary and meetings held remotely. Project objectives are:

1) To review recent meta-analyses for studies that identify key diet therapy components for MetS, in terms of mode(s) of delivery, intensity, program length, food foci, topics, behaviour change theories frameworks and strategies, and self-monitoring tools, especially for non weight loss approaches. From the review, statements describing each aspect of the care process will be generated, along with any variations seen in the literature.
2) To complete a modified Delphi process among experienced practitioners (RDs and others) to determine the most feasible and important aspects to be included in a series of care maps, including for rural and remote contexts, Indigenous and other equity seeking groups.
3) To develop the final recommendations for key components to include in the care map(s).
4) To disseminate recommendations and resources widely through Metabolic Syndrome Canada and nutrition / dietetic organizations.

**C. Methodological Approach for Each Objective**

1. Recent efficacy and translation meta-analyses for pre-diabetes and MetS and primary studies will be searched for studies that include a diet component, with the help of a research librarian. The primary studies in these meta-analyses will be screened for detailed descriptions of the diet aspects using Endnote and Covidence software (https://www.covidence.org/). This latter software, released in 2014, speeds up review processes and is flexible for our needs. From the review, statements describing each aspect of the care process will be generated, along with any variations seen in the literature. A project manager and two students will be hired to complete the work.

2. A two round modified Delphi process (online surveys and teleconferences) will be used to garner the ratings of diet counsellors across Canada who treat MetS on importance and feasibility of each care process in practice. Delphi process is an excellent process for linking evidence to experience and allows a much larger group of professionals to contribute their expertise to the development of recommendations. One of the co-investigators has experience using the process. It was used in 2022 to develop recommendations for nutrition care in long-term care (LTC) [11] and to develop recommended measures to be used in lifestyle studies for MetS and other cardiometabolic conditions [12]. Key insights from the LTC process were that RDs supported most practice recommendations but several were not feasible in their practice contexts. Feasibility is critical to adoption in the health system.

3. Care maps, which document and guide the care process, have emerged as an important tool in program planning [13], and methods of creation vary, but usually involve a smaller expert committee to create the map and then solicit wide review. The expert advisory committee will be tasked to take the evidence and the results of the Delphi process and update our previously developed care map. Multiple care maps are likely to be needed to address issues in rural and remote communities, as well as the special needs of selected subgroups, especially Indigenous communities, and other groups to be identified by practitioners themselves.
4. Dissemination through multiple channels (webinars, peer review papers, resources) will be done through Metabolic Syndrome Canada and Dietitians of Canada.

**D. Study Timeline Overview**

| | **2024** | **2025** | | | | **2026** | |
|---|---|---|---|---|---|---|---|
| | **Oct-Dec** | **Jan-Mar** | **Apr-Jun** | **Jul-Sep** | **Oct-Dec** | **Jan-Mar** | **Apr-Jun** |
| **Lit Review - statement creation** | **x** | **x** | | | | | |
| **Delphi process** | **x** | **x** | **x** | | | | |
| **Develop recommendations and care map(s)** | | | | **x** | **x** | | |
| **Creation of Resources** | | | | | **x** | **x** | |
| **Dissemination** | | | | | | **x** | **x** |

**E. Budget (20,000)**

A technician with RD credentials (MSc or experience) will be hired to oversee the review of meta-analyses and develop the list of Delphi statements with the help of the advisory committee. Only RDs have sufficient experience in the details of diet counselling. Training on review processes will be provided. They will also oversee the Delphi process. Accordingly, pay will be in the range of a University of Guelph band C technician (2024 rates, 51,797 + 19% per year FTE = 61,640/y x 0.2FTE x 8 months = **$8200.** Senior 4$^{th}$ year dietetics students will be hired to complete the review and Delphi process ($17/h x 11%)=18.87/h x 5h/week x 36 weeks x 2 = **$6800**. Creation of resources and dissemination = **$3000**. Patient partner honoraria will be offered, as per SPOR guidelines [14] = **$1000**. The open access Article Processing Charge for the Can J Diet Pract Res is **$1000** for DC members. **Total = $20,000.** Other resources to be provided in-kind by the University of Guelph, Metabolic Syndrome Canda (and others to be approached at full proposal development).

**F. Significance/relevance of project findings to dietetic practice**

The overall benefits of medical nutrition therapy, in secondary prevention of MetS, are well established, yet it has been challenging to link key features of such counselling to intermediate outputs, such as changes in food intake. The proposed study will provide a common basis for MetS dietetic practice in Canada to begin to address the efficacy-effectiveness gap using the latest approaches for creating best practices care maps. The best practices care maps will provide benchmarks for program planning in primary and community care to address MetS. The approach may have application to dietetic best practices for other health issues.

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