CHANGE
Canadian Health Advanced by Nutrition and Graded Exercise

Family physician–led, team-based, lifestyle intervention in patients with metabolic syndrome: results of a multicentre feasibility project

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Abstract

Background: Metabolic syndrome (MetS) is a medical condition with major complications and health care costs. Previous research has shown that diet and exercise can improve and reverse this condition. The goal of this study was to test the feasibility and effectiveness of implementing the Canadian Health Advanced by Nutrition and Graded Exercise (CHANGE) Program into diverse family medicine practices to improve MetS.

Methods: In this longitudinal before–after study, 305 adult patients with MetS were recruited from 3 diverse family medicine team-based organizations to the CHANGE personalized diet and exercise program. Participants were followed for 12 months. Primary outcomes included feasibility and reversal of MetS. Secondary outcomes included improvement in MetS components, changes in diet quality, aerobic fitness and cardiovascular risk.

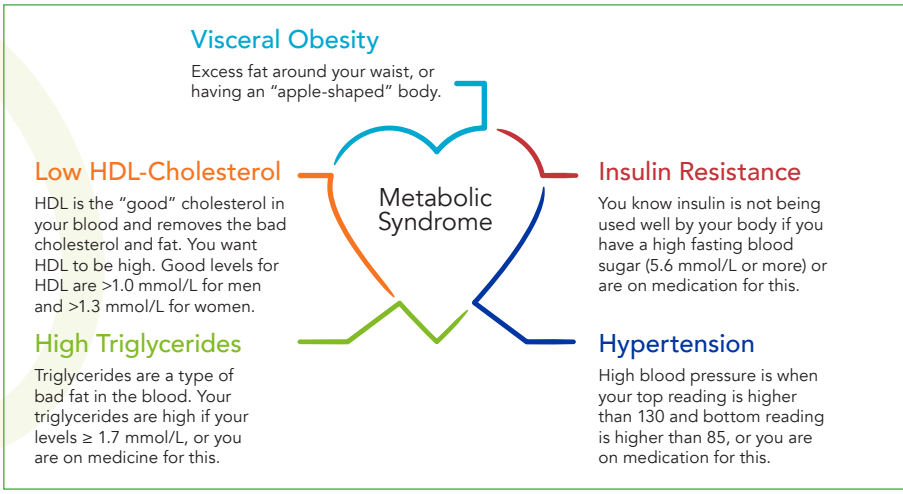
Results: Participants attended 76% and 90% of the kinesiologist and dietitian visits, respectively. At 12 months, 19% of patients (95% confidence interval [CI] 14%–24%) showed reversal of MetS, VO2max increased by 16% (95% CI 13%–18%), and Healthy Eating Index and Mediterranean Diet Scores improved by 9.6% (95% CI 7.6%–11.6%) and 1.4 points (1.1–1.6) on a 14 point scale, respectively. In addition, the Prospective Cardiovascular Munster (PROCAM) 10-year risk of acute coronary event decreased by 1.4%, from a baseline of 8.6%.

Interpretation: A team-based program led by the family physician that educates patients about the risks of MetS, and with a dietitian and kinesiologist, empowers them to undertake an individualized supervised program of diet modification and exercise, is feasible, improves aerobic capacity and diet quality, reverses MetS and improves MetS components at 12 months.

Background

Metabolic Syndrome and Lifestyle modification in primary care

- Metabolic syndrome is a cluster of five risk factors that greatly increase an individual's likelihood of developing cardiovascular disease and type 2 diabetes [1]
- Approximately 21% of Canadian adults have MetS [2] and its prevalence increases to 39% of adults aged 60–79 [3]
- Those with MetS are reported to have double the annual health care costs and use health services more frequently than those without [4]
- Diet and exercise trials have shown the potential to improve clinically relevant outcomes and lifestyle modification is being emphasized as key therapy in primary care [5]
- Uptake of lifestyle preventive care for cardiovascular risk in Canadian primary care settings is limited [6]
- An efficacious diet and exercise intervention aimed at improving MetS in primary care is needed
- The Canadian Health Advanced by Nutrition and Graded Exercise, The CHANGE program is an evidence based program designed by Metabolic Syndrome Canada to reverse MetS in primary care settings



Study Hypothesis

A team-based program (The CHANGE Program) led by the family physician that educates patients about the risks of MetS, and with a dietitian and exercise specialist, empowers them to undertake an individualized supervised program of diet modification and exercise, would be feasible, improve aerobic capacity and diet quality, reverse MetS and improve its components at 12 months.

Methods

Setting & Design

Prospective, longitudinal before–after feasibility study conducted from 2012-2015 at 3 Canadian clinics:

- Edmonton Oliver Primary Care Network
- Unité de médecine familiale Laval, Québec & Polyclinic
- Family & Specialty Medicine, Toronto

Inclusion criteria:

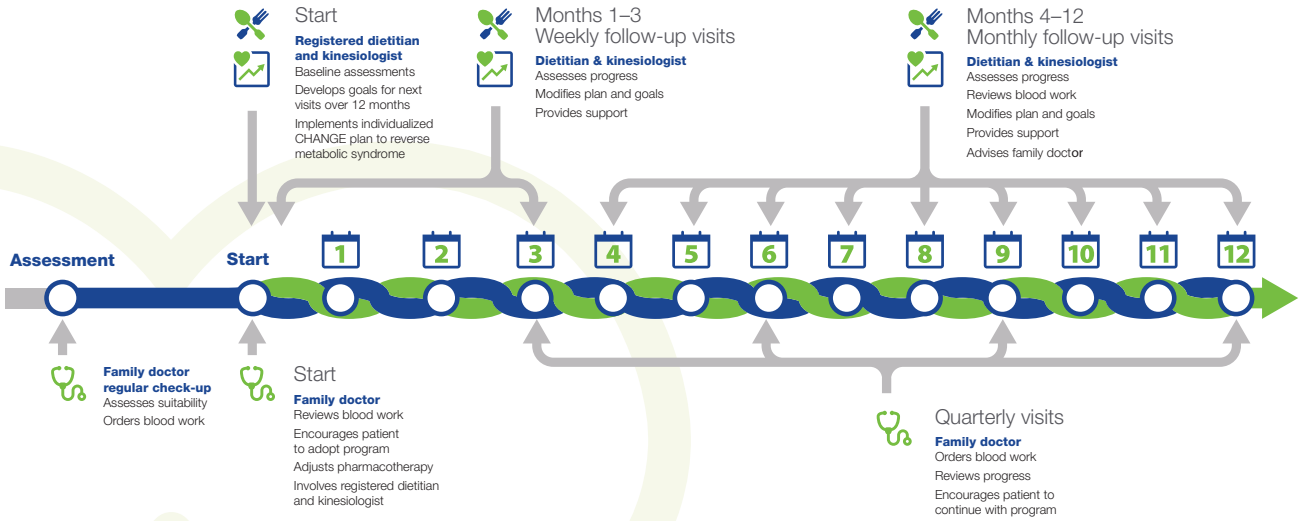
1. at least 18 yrs age
2. Presence of 3 out of 5 criteria for MetS (see figure on page 1)

Exclusion Criteria:

- inability to adhere to longitudinal study due to medical, safety or logistic reasons
- those deemed not to benefit from the intervention

Program Overview

Eligible patients were approached for consent, placed in the CHANGE Program and followed for 12 months. Individualized diet and exercise counselling and ongoing encouragement was provided to support the patient in making lifestyle changes based on progress achieved in MetS components.



Evaluations

At every diet and fitness visit (baseline, weekly X12, monthly X9)

Attendance, setting of visit, delivery method, food behaviour goals, type duration & intensity of exercise

At Baseline, 3 months, 6 months, 9 months and 12 months

- Fasting blood glucose, fasting lipids, blood pressure, waist circumference, weight
- Medications for blood glucose, blood pressure or lipids

At Baseline, 3 months and 12 months

- barriers to dietary behaviour changes, goals, 24 hr recall, Healthy Eating Index[7] and Mediterranean Diet Score,[8] validated diet quality tools
- aerobic capacity (estimated Vo2 max), resistance and flexibility tests

At Baseline and 12 months

Cardiovascular diseases risk scores i.e. Prospective Cardiovascular Munster Score (PROCAM)[9] and continuous Metabolic Score (cMetS)[10]

Statistical Analyses

- All patients with any follow-up data regardless of compliance with the program were included
- All p values are 2-sided without adjustment for multiplicity of tests. All analyses were performed using SAS version 9.4

Patient Recruitment and Feasibility

- Patients enrolled at mean rate of 4 patients per month per site over 2 yrs
- Of 293 patients, 40 (14%) did not have laboratory data at 12 months
- Diet contacts over 12 months: 90% of the 21 prescribed visits
- Fitness contacts over 12 months: 76% of the 21 prescribed visits

Results

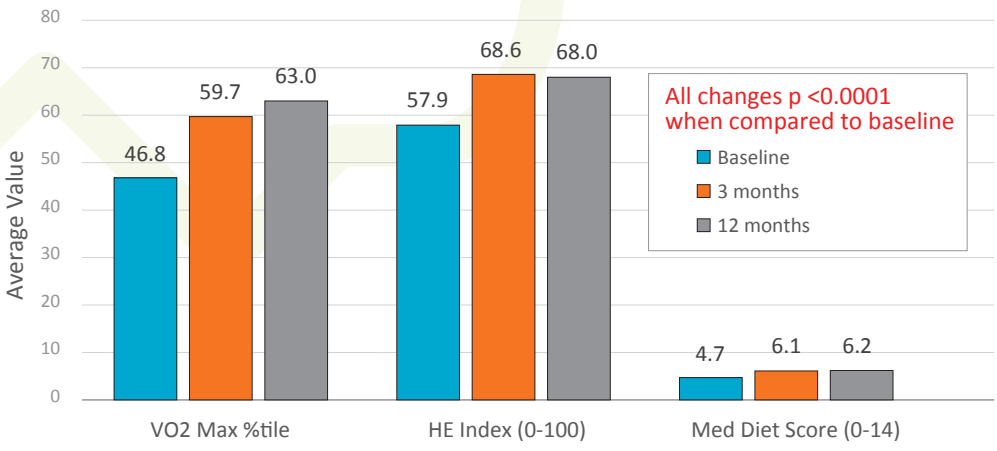
From 2012-2014, of 305 patents enrolled, 293 met the inclusion criteria at baseline

Baseline patient characteristics	All patients (n=293)
Age (years)	59.1±9.7
Female	152 (52%)
Height (meters)	1.7±0.1
Weight (kg)	90.8±14.7
BMI (kg/m2)	31.9±3.3
Metabolic Syndrome Criteria Met n (%)	
1. Blood pressure or pharmacotherapy	**256 (87%)**
Systolic blood pressure (mmHg)	133.5±14.5
Diastolic blood pressure (mmHg)	80.6±9.1
On pharmacotherapy for blood pressure	218 (74%)
2. Fasting blood glucose or pharmacotherapy	**240 (82%)**
Blood glucose (mmol/L)	6.6±1.4
On pharmacotherapy for blood glucose levels	129 (44%)
3. Triglyceride or pharmacotherapy	**187 (64%)**
Triglyceride level (mmol/L)	2.2±1.7
On pharmacotherapy for triglycerides	11 (4%)
4. High density lipoprotein cholesterol	**138 (47%)**
HDL-C (mmol/L)	1.2±0.3
5. Waist circumference	**277 (95%)**
Waist circumference (cm)	108.1±9.4

Continuous outcome data at each time point are presented as raw mean and standard deviation (SD)

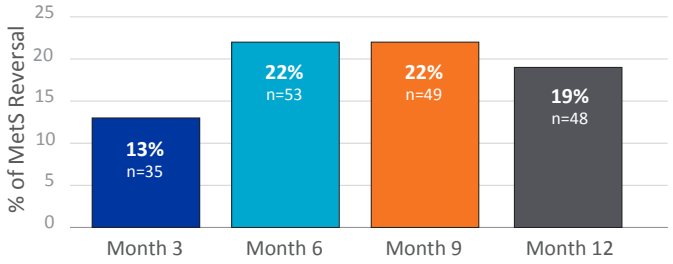
Aerobic Capacity and Diet Quality

The aerobic capacity (measured by estimated VO2max), Healthy Eating Index and the Mediterranean Diet Score all improved significantly at 12 months compared to baseline (16%, 9.6% and 1.4 points respectively, all p<0.0001)



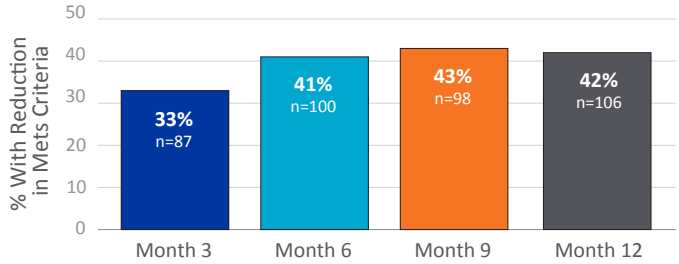
Metabolic Reversal

Defined as <3/5 criteria for MetS



Metabolic Syndrome Components

Patients with fewer MetS criteria compared to baseline



PROCAM and continuous Metabolic Scores

At 12 months, the mean PROCAM 10-year risk of myocardial infarction or acute coronary event decreased by 1.4% (95% CI 0.9%–2.0%, p < 0.0001) from a baseline risk of 8.4%.

Patients with the highest baseline risk showed the most substantial improvement in the PROCAM risk score. The cMetS score decreased by 0.4 (95% CI 0.3–0.5, p < 0.0001) at 12 months which translates into a significant reduction in coronary heart disease over 9 years.

Conclusions and interpretation

This multicentre feasibility study shows that the CHANGE Program:

- is feasible in a primary care setting with diet and exercise visits being well attended
- was associated with significant improvements in V02 max, Healthy Eating Index and Mediterranean diet scores at 12 months (all p <0.0001)
- was associated with improvements in blood pressure, triglyceride levels and waist circumference at 12 months (all p <0.0001)
- was associated with a significant reversal rate in MetS at 3 months that was sustained at 12 months
- was associated with a 17% relative risk reduction in 10 yr. risk of acute myocardial infarction at 12 months (as per changes in the PROCAM risk score)
- was associated with a 19% relative reduction in incidence of cardiovascular disease and 17% reduction in coronary heart disease over 9 years (as per changes in the cMetS score)

Our work confirms that structured lifestyle programs are feasible and effective in primary care. Such programs should be available to all Canadians with metabolic syndrome from their family doctors offices.

References

1. Alberti KG et al. Harmonizing the metabolic syndrome: a joint interim statement of the International Diabetes Federation Task Force on Epidemiology and Prevention; National Heart, Lung, and Blood Institute; American Heart Association; World Heart Federation; International Atherosclerosis Society; and International Association for the Study of Obesity. Circulation. 2009;120(16):1640-5.
2. Riediger ND, Clara I. Prevalence of metabolic syndrome in the Canadian adult population. CMAJ. 2011;183(15):E1127-34.
3. Canada Health Measures Survey Government of Canada, Statistics Canada http://www.statcan.gc.ca/pub/82-625-x/2012001/article/11735-eng.htm
4. Bélanger A et al. Population projections for Canada, Provinces and Territories, 2005-2031. Catalogue 9520. Ottawa: Statistics Canada; 2005.
5. Chatterjee A et al. Cardiometabolic Risk Working Group (Canadian). Managing cardiometabolic risk in primary care: summary of the 2011 consensus statement. Can Fam Physician. 2012;58(4):389-93, e196-201.
6. Teoh H et al. Identification and management of patients at elevated cardiometabolic risk in canadian primary care: how well are we doing? Can J Cardiol. 2013;29(8):960-8.
7. Garriguet D. Diet quality in Canada. Health Rep. 2009;20(3):41-52.
8. Martínez-González MA et al. PREDIMED Study Investigators. A 14-Item mediterranean diet assessment tool and obesity indexes among high-risk subjects: The PREDIMED Trial. PLoS ONE. 2012;7(8):e43134.
9. Assmann G et al. Simple scoring scheme for calculating the risk of acute coronary events based on the 10-year follow-up of the prospective cardiovascular Münster (PROCAM) study. Circulation. 2002;105(3):310-5. Erratum in: Circulation 2002 Feb 19;105(7):900.
10. Hillier TA et al. D.E.S.I.R. Cohort. Practical way to assess metabolic syndrome using a continuous score obtained from principal components analysis. Diabetologia. 2006;49(7):1528-35.