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Perspectives in Practice

## The Prediabetes Detection and Physical Activity Intervention Delivery (PRE-PAID) Program

Chip P. Rowan MSc<sup>\*</sup>, Michael C. Riddell PhD, Veronica K. Jamnik PhD

School of Kinesiology and Health Science, York University, Toronto, Ontario, Canada

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## ABSTRACT

Inspired by increases in the prevalence and incidence of prediabetes, the Pre-diabetes Detection and Physical Activity Intervention Delivery Project (PRE-PAID) is a multiphasic program that identifies persons at high risk for developing type 2 diabetes, provides an opportunity for culturally appropriate, community-based physical activity and facilitates training of qualified exercise professionals on diabetes screening as well as prediabetes-specific training recommendations. This article provides an overview of the PRE-PAID project and includes some preliminary screening data, as well as lessons learned from the implementation of community-based physical activity programs that target specific, high-risk ethnicities. Recommendations and special considerations involving physical activity that targets persons with prediabetes also are discussed. A total of 691 individuals have undergone the PRE-PAID risk-identification process, which involves a brief questionnaire and point-of-care finger-prick hemoglobin A1C testing. The mean hemoglobin A1C level was  $6.0 \pm 0.90\%$  (mean  $\pm$  standard deviation). Questionnaire scores showed that, on average, the individuals screened had 3 to 5 typical risk factors for type 2 diabetes, such as high body mass index, waist circumference, physical inactivity or family history of diabetes. Community-specific breakdowns of these results also are presented in this article. Sharing experiences from the PRE-PAID project can help formulate a framework for future prediabetes screening and physical activity interventions that are community based, target persons with prediabetes and are culturally appropriate.

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## R É S U M É

Inspiré par les augmentations de la prévalence et de l'incidence du prédiabète, le projet PRE-PAID (*Pre-diabetes Detection and Physical Activity Intervention Delivery*) est un programme multiphasique qui détermine les personnes exposées à un risque élevé de développer le diabète de type 2, donne une occasion d'activité physique communautaire adaptée à la culture et facilite la formation de professionnels de l'exercice qualifiés sur le dépistage du diabète ainsi que sur les recommandations d'entraînement liées au prédiabète. Cet article donne un aperçu du projet PRE-PAID et inclut certaines données préliminaires de dépistage ainsi que des enseignements tirés de la mise en place de programmes communautaires d'activité physique qui ciblent des ethnies particulières qui sont exposées à un risque élevé. Les recommandations et les considérations particulières visant l'activité physique qui cible les personnes ayant le prédiabète y sont également discutées. Un total de 691 individus ont subi le processus d'identification des risques du PRE-PAID, qui comprend un bref questionnaire et une analyse de l'hémoglobine A1c par prélèvement de sang au bout d'un doigt, et ce, au point de service. La concentration moyenne de l'hémoglobine A1c était de  $6,0 \pm 0,90\%$  (moyenne  $\pm$  écart-type). Les scores du questionnaire montraient qu'en moyenne les individus dépistés avaient de 3 à 5 facteurs de risque typiques de diabète de type 2, comme un indice de masse corporelle et un périmètre abdominal élevés, une inactivité physique ou des antécédents familiaux de diabète. Les conclusions relatives à la communauté concernant ces résultats sont également présentées dans cet article. Le partage des expériences liées au projet PRE-PAID peut aider à l'élaboration future d'un cadre de dépistage du prédiabète et d'interventions en activité physique qui soient communautaires et adaptés à la culture, et qui ciblent les personnes ayant un prédiabète.

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<sup>\*</sup> Address for correspondence: Chip P. Rowan, MSc, Norman Bethune College, York University, 4700 Keele Street, Room 358, Toronto, Ontario M3J 1P3, Canada.

E-mail address: [rowanc@yorku.ca](mailto:rowanc@yorku.ca).

## Introduction

The diabetes epidemic is a global healthcare concern that continues to dominate the attention of healthcare practitioners, researchers, qualified exercise professionals (QEPs), non-health community workers and policy-makers. Over the past 2 decades, the incidence of prediabetes, which is the precursor to type 2 diabetes for most individuals, has been increasing in Canada and projections indicate that based on current lifestyle and population trends, the prevalence of type 2 diabetes will become financially overwhelming for the current Canadian healthcare system (1). Emerging evidence suggests that focusing on lifestyle interventions for prediabetes is more effective and cost saving for diabetes prevention compared with pharmacologic approaches (2–4). Early insulin therapy in prediabetes is not effective for diabetes prevention or reduction in cardiovascular disease risk (5). Moreover, based on results from the US Look AHEAD (Action for Health in Diabetes) trial, intensive lifestyle intervention after a diabetes diagnosis typically fails to cause disease remission (6), although it can reduce body adiposity obesity and improve glycemic control in patients who already have type 2 diabetes (7).

The Public Health Agency of Canada estimates that approximately 4 million Canadians (12.5%) between the ages of 40 and 74 have impaired fasting glucose and approximately 1.8 million (5%) have impaired glucose tolerance (8). Both conditions are recognized antecedents to type 2 diabetes and commonly are included in the definition of prediabetes, which refers to a state of suboptimal glycemic control. The study of lifestyle intervention on prediabetes, specifically, is a relatively new research area and the majority of theories and knowledge have been adapted from what has been shown in people with type 2 diabetes. Physical activity (PA) can elicit several positive outcomes in persons with type 2 diabetes including improved glycemic control, improved insulin sensitivity and reductions in diabetes-related comorbidities, such as cardiovascular disease (9). Despite prediabetes emerging as a specific research area, research typically uses progression to type 2 diabetes as the primary outcome and, consequently, the role of PA has yet to be fully explored with respect to quantifying the potential improvements in glycemic control, as measured by glycated hemoglobin (A1C) level in persons with prediabetes (2–4). Furthermore, the majority of studies involving PA in prediabetic populations involve lifestyle modifications, which include both PA intervention and dietary modification (2–4). Although dietary modification is an important and recommended addition to any PA regimen, we sought to determine the effect of PA on glycemic control, independent of any modification to diet, to inform the allocation of future resources put toward type 2 diabetes prevention. In Ontario, although several diabetes awareness programs exist that may be culturally appropriate, they primarily are education based and there is a lack of PA-specific approaches that offer structured opportunities to become active at the community level in an environment where the PA is provided by people who are qualified to recommend and supervise these programs. Culturally appropriate PA options, such as group fitness classes offered in different languages that use music and movements specific to different cultures, may be more enjoyable, may provide a more comfortable environment and may enhance adherence to PA compared with conventional exercise sessions.

This article presents important perspectives regarding front-line screening to detect individuals with prediabetes and provides strategies for implementing culturally appropriate PA interventions to reduce the incidence of type 2 diabetes.

### *A culturally appropriate approach*

Canada has an ethnically diverse population composed of specific groups that have shown higher rates of metabolic syndrome,

impaired glucose tolerance, abdominal obesity and insulin resistance. More specifically, these groups have South Asian, Chinese, African, Latin or Aboriginal ancestry (10–16). It is believed that the causes for ethnic disparity in diabetes prevalence are linked to both genetic and environmental factors (11). There are also health system barriers such as socioeconomic status, inaccessibility to healthcare and lack of health insurance coverage (11). These same barriers likely impact health behaviours (17).

There is limited evidence regarding the use of PA, specifically among prediabetes populations from these high-risk groups. South Asian individuals in a large-scale study from the United Kingdom have been shown to self-report less PA participation and to be less likely to engage in vigorous PA compared with white Europeans (18). A recent systematic review of PA and dietary interventions for South Asian populations concluded that evidence for the effectiveness of such interventions regarding type 2 diabetes prevention is limited and that further evaluations using objective measures are warranted (19). Among Chinese individuals, the Da Qing study showed that lifestyle intervention involving PA and dietary modification is an effective method for reducing the incidence of type 2 diabetes over 6 years among prediabetic individuals (3). Studies of African American populations have shown that African Americans are less likely to use diabetes prevention services and have poorer self-management behaviours (20). Lifestyle interventions involving PA among African Americans with type 2 diabetes have been shown to reduce A1C levels, but this has not been shown in prediabetic populations (21). In Aboriginal populations, PA intervention has been shown to improve various health outcomes such as waist circumference, blood lipid profiles and systolic blood pressure (22). The specific effects of PA on glycemic control among Aboriginal populations with prediabetes have not been described in the literature.

### *The role of community health employees*

It would appear that a fundamental shift is required from the traditional, physician-centric healthcare provision paradigm such that a greater portion of responsibility falls on other healthcare providers in the community to reduce the increasing financial burden and monopolization of healthcare resources attributable to diabetes treatment and management. For this shift to occur, QEPs, non-allied healthcare community workers in addition to healthcare and allied health providers who typically have postsecondary education in health-related fields, must be provided the opportunity to become more engaged in screening for prediabetes and diabetes as well as the identification of potential barriers to PA participation within their community. The evidence-based Canadian Diabetes Association Clinical Practice Guidelines (23) include information pertinent to all healthcare providers for the implementation of PA prescriptions involving aerobic and resistance exercise. It should be noted that the majority of information provided by the Canadian Diabetes Association Clinical Practice Guidelines is directed toward individuals with diagnosed diabetes, rather than prediabetes, although the minimum prescription of PA for the prevention of diabetes likely is identical to that prescribed for patients with a diabetes diagnosis (i.e. 150 minutes of accumulated aerobic exercise plus resistance exercise 2 to 3 times per week). The National Diabetes Prevention Program (NDPP) in the United States, which aims to deliver prevention programs modelled after the original Diabetes Prevention Program (2) at the community level (24), has recently developed a PA strategy through various partnerships, including major support from the YMCA. This program is now providing educational workshops about nutrition and PA and is reaching large numbers of individuals at risk for diabetes; however, it is still in its infancy and currently lacks the federal funding structure to reach a significant portion of those persons with prediabetes in the United States (24). The NDPP represents a solid foundation for a national strategy targeting type 2 diabetes prevention. However, it does

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