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Translating Diabetes Prevention Programs:

Implications for Dissemination and Policy

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Abstract

Numerous studies have translated the Diabetes Prevention Program (DPP) for community-based settings, and the results are encouraging. This commentary discusses one community-based DPP translational study, Healthy Living Partnerships to Prevent Diabetes, in detail, as well as the implications of DPP translational studies for public policy.

Although the Diabetes Prevention Program (DPP) and the Finnish Diabetes Prevention Study were landmark studies demonstrating that the incidence of type 2 diabetes could be reduced by almost 60% in patients with prediabetes, through lifestyle weight loss programs involving changes in diet and physical activity [1, 2], the prevalence of type 2 diabetes and its corresponding disease burden continue to increase [3, 4]. Translation of diabetes prevention programs has been challenging, and it has been suggested that the lack of large-scale implementation of effective diabetes prevention programs is due to a general lack of understanding of translational research [5].

Recently, a number of researchers have tested a variety of methods for translating the DPP lifestyle weight loss intervention to increase access and cost-effectiveness [6–14]. The DPP lifestyle intervention has been translated into primary care settings [10, 12], cardiac rehabilitation programs [14], churches [9], YMCAs [7], health care facilities [8], and community-based facilities (eg, parks and recreation centers) [13]. The personnel employed to deliver the interventions have included public health nurses [6], nurse practitioners [11], volunteer medical personnel [9], YMCA trainers [7], and community health workers (CHWs) [13]. Taken together, these interventions typically yield weight losses of approximately 6% at 1 year of follow up. More importantly, one study reported significant

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decreases in fasting blood glucose level, insulin level, insulin resistance, and adiposity that were comparable to those observed in the DPP [13]. Therefore, the cumulative evidence suggests that translations of the DPP can be successfully implemented across a variety of settings and with diverse personnel.

However, numerous barriers to the widespread translation of effective diabetes prevention programs still exist, from conflicting conceptual models of health care to more-practical issues, such as fiscal and logistical feasibility. The purpose of this commentary is to describe 2 successful translational models of diabetes prevention and to discuss the implications of these models for overcoming barriers to the large-scale implementation of diabetes prevention interventions.

Healthy Living Partnerships to Prevent Diabetes (HELP PD)

HELP PD was designed to translate the methods of the DPP to the community setting by incorporating the following key modifications to enhance logistical and fiscal feasibility and long-term dissemination: the partnering of an existing community-based diabetes education program with empowered CHWs in the implementation and administration of a group-based lifestyle weight loss intervention [13, 15]. Our goal was to develop and test a model of diabetes prevention that could be translated to any community that has a diabetes education program and that could be implemented and administered with existing community resources and independent of research-based resources. We randomly assigned 301 overweight and obese volunteers (body mass index [BMI; calculated as the weight in kilograms divided by the square of the height in meters], 25–40) with a fasting blood glucose level of 95–125 mg/dL to participate in a 24-month group-based translation of the DPP lifestyle weight loss intervention that was administered through a local diabetes education program and delivered by CHWs or to receive an enhanced usual care condition. The main outcome of the study was fasting blood glucose level, and secondary outcomes included adiposity (determined on the basis of body weight, BMI, and waist circumference), insulin level, and insulin resistance (as assessed by the homeostasis index ratio [calculated as the fasting insulin level times the fasting glucose level, divided by 22.5]). We also assessed numerous psychosocial variables, derived from social cognitive theory, to examine predictors of adherence and mediators of study outcomes. Outcomes were assessed at baseline and at 6, 12, and 24 months thereafter. The details of this study have been published elsewhere [13, 15].

Because HELP PD was designed as a translational intervention to prevent type 2 diabetes, the eligibility criteria were chosen to target a sample of individuals at risk for diabetes (referred to as prediabetes) that was representative of the local community. As such, participants were required to have a BMI of 25.0–39.9, as well as evidence of prediabetes on at least 2 occasions. Prediabetes on the first occasion was defined as a fasting blood glucose level of 95–125 mg/dL or a random blood glucose level of 120–199 mg/dL (inclusive) that was recorded during the previous 3 months at the participant's usual source of care, at a community-based screening event, or at a study screening visit. Prediabetes on the second occasion was defined as a fasting blood glucose level of 95–125 mg/dL that was recorded during a visit to the study center.

Community-based implementation

Key features of our translation of the DPP lifestyle weight loss intervention included (1) administration of the DPP through a local diabetes education program, (2) implementation of the intervention at community-based sites, and (3) performance of intervention-related tasks by CHWs. Study investigators and staff conducted study administration and evaluation (eg, clinical assessments), but registered dietitians and certified diabetes educators employed

by the diabetes education program managed the day-to-day operations of the intervention, as well as the training and monitoring of the CHWs. CHWs were lay community members with type 2 diabetes, a well-controlled hemoglobin A_{1c} level, and a history of healthy eating and physical activity. CHWs were recruited through our diabetes education program by the study investigators and registered dieticians and were responsible for conducting the intervention group sessions, managing participants, and entering data on participants' body weight, which was measured during group sessions. CHWs were compensated $100/week during the first 6 months for weekly sessions and $200/month for the rest of the study. CHW training consisted of a 36-hour program conducted over 6–9 weeks and involved experiential learning, didactic instruction, peer mentoring, and observation. Ten CHWs were trained in 2 groups of 5; one group started before recruitment started, and the other started 4 months after recruitment began.

Lifestyle weight loss intervention

The 24-month lifestyle weight loss intervention was designed to induce a total weight loss of 5%–7% during the first 6 months of treatment, through decreased caloric intake (goal, 1,200–1,800 kcal/day) and increased caloric expenditure through moderate physical activity (goal, ≥180 minutes/week). During the subsequent 18 months, participants were encouraged to continue to meet or maintain their weight loss goals as long as their BMI did not decrease to <20. Participants met weekly for CHW-led group sessions during the first 6 months. Fourteen different lifestyle weight loss groups of 8–12 participants met at various community sites (eg, parks and recreation centers) throughout Winston-Salem, North Carolina. Participants also met with the registered dietician during months 1, 3, and 6. During months 7–24, participants met for group sessions once per month and were also contacted via telephone by the CHW once per month. We standardized the intervention content by creating a DVD series that covered basic concepts in nutrition and physical activity, energy balance, healthy eating, goal setting, and problem solving. We also included presentations by experts from businesses in the local community (eg, the YMCA, local grocery stores, and specialty athletic footwear stores) to enhance awareness of existing community resources.

Enhanced usual care

The enhanced usual care condition was designed to exceed the usual care provided to patients with prediabetes and to enhance participant retention. Enhanced usual care consisted of 2 individual sessions with a nutritionist during the first 3 months, who provided education about healthy eating and physical activity to support weight loss. Participants who received enhanced usual care also received a monthly newsletter that included topics related to healthy lifestyles and information about community resources.

Findings

At 12 months of follow up, participants in the lifestyle weight loss intervention experienced statistically significantly greater changes from baseline for fasting blood glucose level (−4.3 mg/dL), insulin level (−6.5 μU/mL), insulin resistance (homeostasis index ratio, −1.9), body weight (−7.2 kg [−7.34%]), BMI (−2.1), and waist circumference (−5.8 cm) than those achieved by participants in the enhanced usual care group ($P < .001$ for all comparisons) (Table 1). Importantly, HELP PD had effects very similar to those of the DPP. Therefore, HELP PD, which used a community-based model of diabetes prevention that included local community resources and CHWs, appears to be equally effective as the landmark Diabetes Prevention Program, which used an individualized, professional interventionist–based model. What remains to be determined, however, is whether HELP PD proves to be more cost-effective than DPP. We have collected cost data and will publish our analyses in the

upcoming months. However, our preliminary analyses indicate that the HELP PD model cost per participant is approximately half that of the DPP.

Dissemination of HELP PD

To inform future dissemination efforts, we collected data on the capacity and interest of diabetes education programs in North Carolina and other states in implementing the HELP PD intervention. We collected data on staffing, patient load and service area, funding and reimbursement policies, resources, perceived ability to implement the intervention, and interest. Results from both the state and national samples indicate that most existing programs are not only confident in their abilities to implement a group-based diabetes prevention intervention but are also interested in programs like HELP PD. Programs expressed less confidence in their abilities to recruit and retain CHWs and participants and to provide staff for training. While analysis of these data is ongoing and will be published in the coming months, these preliminary findings confirm that, while there may be logistical and operational hurdles in the implementation of a program like HELP PD, community interest is high. Diabetes education programs represent a major dissemination channel for diabetes prevention, as there are >3,000 American Diabetes Association–recognized diabetes education programs in the United States. Moreover, several states (eg, Massachusetts and Minnesota) have adopted reimbursement policies for CHWs, demonstrating the potential for long-term sustainability of CHW-led programs.

Diabetes Education and Prevention With a Lifestyle Intervention Offered at the YMCA (DEPLOY)

The DEPLOY study translated the DPP lifestyle weight loss intervention by partnering with the YMCA in Indianapolis, Indiana [7]. Ninety-two participants with prediabetes were randomized to a 12-month, group-based DPP lifestyle weight loss program or to a control condition involving brief counseling. The intervention was delivered through 2 local YMCAs by YMCA staff. At 12 months, mean body weight among participants in the DPP lifestyle weight loss program had decreased by 6%, compared with a mean decrease of 1.8% among control participants; the mean total cholesterol level in the intervention group also decreased significantly. There were no significant between-group differences in other cardiometabolic outcomes (eg, hemoglobin A_{1c} level). The DEPLOY study demonstrates that the DPP lifestyle weight loss intervention can be delivered through YMCAs and can achieve weight loss comparable to the DPP. YMCAs offer tremendous potential for widespread dissemination of this intervention, as there are approximately 2,600 YMCAs in the United States.

Implications of Successful Diabetes Prevention Translation

Lack of reimbursement for diabetes prevention services is a major barrier to implementation and dissemination of programs like HELP PD and DEPLOY. At present, no viable reimbursement models exist to fund either type of program. Fortunately, the Division of Diabetes Translation at the Centers for Disease Control and Prevention has established the National Diabetes Prevention Program (NDPP). Development of reimbursement policy is a major pillar of the NDPP strategic plan. Already, 2 major insurance companies have agreed to reimburse for diabetes prevention services delivered by NDPP-certified sites. The processes and criteria for certification are under development, and it seems likely that other insurance companies will follow suit. It is notable that the Centers for Medicare and Medicaid Services has also recognized the need to develop reimbursement policies for diabetes prevention services and has announced plans to fund demonstration programs in

this area. Reimbursement policies cannot come fast enough for the >70 million US adults with prediabetes.

Future Directions

In light of the success of HELP PD, our research group has developed a partnership with the North Carolina Division of Public Health's Diabetes Prevention and Control Branch to disseminate diabetes prevention programs throughout the state. Our plan is to implement the HELP PD lifestyle intervention through county health departments in association with Diabetes Today and the Diabetes Education Recognition Program. Diabetes educators will be trained by the HELP PD research team at Wake Forest School of Medicine and will then recruit and train CHWs from their respective counties to deliver the lifestyle weight loss program to residents at risk for diabetes or cardiovascular disease. We intend to collaborate with 6 counties in our initial efforts and to expand the program throughout the state. We are confident that this partnership will provide additional evidence as to the importance of community-based diabetes prevention efforts that harness the innate capabilities of community members and use existing resources.

The success of HELP PD and the other DPP translational studies indicates that new models of diabetes prevention can be effective at improving the primary factors associated with type 2 diabetes. Ultimately, however, significant public health impact cannot be achieved until such models are disseminated at the state and national level. Of the numerous barriers to large-scale, upstream, community-participatory interventions, reimbursement schedules for program implementation, and administration represent the most significant challenges to widespread dissemination and public health impact.

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HELP PD Research Team

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Table 1

Twelve-Month Changes in Adiposity and Metabolic Indicators Among 301 Individuals Randomized to a Lifestyle Weight Loss Intervention Group or to an Enhanced Usual Care Group

Variable	Lifestyle weight loss group	Enhanced usual care group
Glucose level, mg/dL	−4.3	−0.4
Insulin level, μU/mL	−6.5	−2.7
HOMA IR[a]	−1.9	−0.8
Body weight, kg	−7.2	−1.4
Weight lost, percentage	−7.3	−1.3
Waist circumference, cm	−5.8	−0.8
Body mass index[b]	−2.1	−0.3

Note. Values represent within-group differences that were based on analysis of covariance, controlling for baseline values. All between-group differences in change are statistically significant (ie, $P < .001$ for all comparisons). HOMA IR, homeostasis index ratio.

[a]Calculated as the fasting insulin level times the fasting glucose level, divided by 22.5.

[b]Calculated as the weight in kilograms divided by the square of the height in meters.