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An integral role of the dietitian:

Implications of the Diabetes Prevention Program

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Obesity and type 2 diabetes have become increasingly prevalent worldwide. Cross-sectional data from the Behavioral Risk Factor Surveillance System indicate that in 2000, over 56% of US adults were overweight, and during the 1990s the proportion of survey participants reporting that they had diabetes rose by 49% (1). Lifestyle changes (increasingly sedentary lifestyle and increasing dietary energy density) have resulted in a dramatic rise in obesity and type 2 diabetes in the developing economies of Latin America as well in the market economies of North America, Europe, and Australia (2). Higher fat diets and increased adiposity have also been linked to a rise in diabetes in Asia, where much of the population develops type 2 diabetes at a lower relative body weight than in Western population groups (2). The worldwide population with diabetes is expected to more than double from an estimated 135 million people in 1995 to 300 million by 2025 (2).

Intermediate blood glucose levels between normal and diabetic are associated with insulin resistance and greater risk of macrovascular disease. Impaired glucose tolerance and impaired fasting glucose can be used to classify intermediate glucose values (3). The American Diabetes Association added impaired fasting glucose (defined as a fasting glucose of ≥ 6.1 mmol/L and < 7.0 mmol/L) as a classification in 1997 to more readily identify people with intermediate glucose levels in clinical settings.

Studies conducted in Da Qing, China, and in Finland provided early evidence that lifestyle intervention can reduce the risk of developing diabetes in individuals with impaired glucose tolerance. The Da Qing Impaired Glucose Tolerance and Diabetes Study ($n = 577$) found that diet, exercise, and the combination of diet and exercise appeared to reduce the risk of developing diabetes in people with impaired glucose tolerance (4). The Finish Diabetes Prevention Study ($n = 523$) demonstrated that a lifestyle intervention could reduce the risk of developing diabetes by 58% in individuals with impaired glucose tolerance over a 3.2-year follow-up (5). The Diabetes Prevention Program (DPP) was a large ($n = 3,234$), 27-center randomized clinical trial to evaluate the safety and efficacy of interventions in delaying or preventing diabetes in diverse populations of high-risk individuals in the United States (6).

OVERVIEW OF DPP

The DPP compared three treatment groups: intensive lifestyle modification, standard care plus metformin, and standard care plus placebo in a diverse group of individuals ($n = 3,234$) with impaired glucose tolerance (6). A fourth intervention using troglitazone was discontinued

because of safety concerns. The DPP eligibility criteria included ≥ 25 years of age, body mass index ≥ 24 kg/m² and a fasting plasma glucose of 5.3–6.9 mmol/L in addition to having impaired glucose tolerance. Asian Americans were eligible with a BMI ≥ 22 kg/m² because visceral obesity and insulin resistance occur at a lower relative body weight among the Asian population (2). American Indians did not have to have a minimum fasting glucose of ≥ 5.3 mmol/L because impaired glucose tolerance and the risk of diabetes may occur at a lower fasting glucose among Pima and perhaps other American Indian tribes.

The DPP participants had a mean BMI of 34.5 kg/m² and a mean age of 51 years, with age ranging from 25 to 85 years. Two-thirds of the DPP participants were women, and 45% were from high-risk minority groups (20% were African American, 16% were Hispanic, 5% were American Indian, and 4% were Asian American). Among the DPP participants, 66.2% reported having a family member with diabetes, 37.3% reported having hypercholesterolemia, and 29.0% reported having hypertension.

The DPP intensive lifestyle intervention was designed to help participants increase their activity level to at least 150 minutes per week and to promote a weight loss of at least 7% of initial body weight. These treatment goals are consistent with established recommendations for weight loss among over-weight/obese individuals and the general public recommendation for physical activity (7). The DPP intensive lifestyle participants achieved a mean weight loss of 7% after 1 year of intervention and maintained a 5% weight loss at 3 years. Their mean level of physical activity was 208 minutes per week at one year and 189 minutes per week at 3 years (7). Walking was the most common physical activity chose.

The DPP provided conclusive evidence that diabetes can be delayed or prevented with lifestyle modification

In this study population with impaired glucose tolerance, the 3-year rate for developing overt diabetes was 29% in the placebo group, 22% in the metformin group, and 14% in the intensive lifestyle intervention group. Compared to the placebo control, intensive lifestyle intervention reduced the risk of developing diabetes by 58%, and metformin reduced it by 31% (7). Although longer-term follow-up is needed to determine the effects of intervention on cardiovascular risk, the DPP findings indicate that intervention is warranted to reduce the risk of developing diabetes in high-risk individuals. The role of the dietitians in the DPP provides valuable insights about potential roles that dietitians may assume in clinical research trials and in translating the DPP findings into clinical practice. The DPP dietitians worked closely with nurses, physicians, and other health care professionals in developing, implementing, and evaluating the DPP protocol.

THE ROLE OF DIETITIANS AS DPP LIFESTYLE COACHES

The lifestyle coaches, who were usually dietitians, met with participants individually to review a 16-module lifestyle change core curriculum over the first 24 weeks. Topics included the importance of healthy eating and exercise in preventing diabetes, self-monitoring of eating habits and activity, reducing fat intake, increasing physical activity, problem solving, and strategizing to deal with eating out, stress, and lapses.

Lifestyle participants were to complete the 16-module core curriculum during the first 24 weeks of participation. After participants completed this core curriculum, they moved on to the “post-core” intervention activities. Lifestyle coaches contacted participants a minimum of once monthly during the post-core period to address issues related to achieving or maintaining the intervention goals. Participants also attended group classes (termed “post-core classes”). The post-core classes were short courses lasting 4 to 6 weeks, offered quarterly, and were focused

on a variety of specific nutrition, exercise, and behavioral topics. Several national campaigns were developed as a way to deliver post-core group classes. These classes were designed to promote team cooperation and competition to enhance motivation and adherence. Examples included the “10,000 Steps” campaign using a pedometer to monitor success in achieving the goal of 10,000 steps per day (approximately five miles/day; 2000 steps = 1 mile), holiday campaigns (to keep weight stable rather than gaining weight during the holiday season) and a lifestyle survival skills (relapse prevention strategies) campaign.

If participants had difficulty achieving the weight loss and physical activity goals, the lifestyle coach could tailor the intervention using the DPP toolbox approach, defined as finding and using specific strategies/methods to address individual barriers to reaching the DPP weight loss and physical activity goals. To use the toolbox, each lifestyle coach assessed existing barriers to achieving or maintaining the physical activity and weight loss goals separately and then selected a toolbox approach to help improve or maintain physical activity or weight loss performance. Toolbox options may include additional telephone reminders, a buddy system, meal replacements, structured menus, incentives, subsidizing gym membership, etc.

Although the core curriculum and minimum frequency of contact were protocol driven, lifestyle coaches needed to use their counseling skills to build the rapport with participants that was essential to retain them in the study and negotiate goals and contracts for behavior change. In some cases, lifestyle coaches met weekly with participants for the duration of the study to help them solve problems and work toward or maintain their goals. In other cases, lifestyle coaches changed the frequency of visits according to participants’ support needs. For example, visit frequency varied from weekly, to every two weeks, to every three weeks, to monthly based on weight nad activity levels at each visit. Each lifestyle coach selected toolbox strategies that were specific to a participant’s barriers. For example, if a participant had difficulty making decisions about food, the lifestyle coach could provide structured menus or a specified number of meal replacements. If a participant had problems with little or no access to a place, equipment, or facilities to exercise, the coach might use toolbox funds to help with enrollment in a health club or exercise class. In addition, lifestyle coaches could tailor courses to the needs of their lifestyle group by either creating a specific post-core course or selecting a course from a preapproved list of classes that were developed and disseminated to each center.

Thus, lifestyle coaches helped participants change their eating and exercise behaviors through a combination of individual counseling, group programs, and campaigns. Initially, these activities were mostly content driven, and they became progressively more oriented to skill building, sustaining adherence, and motivation.

THE ROLE OF DIETITIANS AS DPP CASE MANAGERS

The dietitian’s role as a case manager began as early as the screening process in many centers. Dietitians often interviewed potential study volunteers to assess: a) past experiences with weight loss (weight cycling, number of previous weight loss attempts, types of weight loss programs); b) willingness to accept random assignment to either lifestyle intervention or medication/placebo; c) ability to commit to the visit schedule and goals of either intervention assignment in light of other life circumstances and stressess; and d) performance on behavioral tasks, which involved keeping a 14-day record of food intake and portions, activity and placebo medications taken. The dietitians shared insights in the team decision making about the suitability of a volunteer to be randomized.

Once participants were randomly assigned to the lifestyle intervention, dietitians began the process of active case management. This involved scheduling quarterly outcome assessment visits for participants within appropriate time windows, reporting and documenting any adverse events, reviewing each participant’s progress with lifestyle goals at weekly team meetings and

referring participants when appropriate to the exercise specialist or psychologist on the team. Dietitians' interactions with team members included problem solving to promote retention and adherence of study participants. As case managers, dietitians collaborated with the retention coordinator about ideas for individual and group retention activities and with nurses and program coordinators about the accurate reporting of adverse events. In addition, dietitians participated in monthly conference calls to discuss case management issues and approaches.

THE ROLE OF DIETITIANS IN THE DPP CENTRAL MANAGEMENT

Dietitians also participated in the central management of the DPP in several capacities. In some centers, dietitians were program coordinators. Other dietitians participated on national study committees—the Recruitment/Retention Committee, the Ancillary Studies Committee, the Protocol Oversight Committee, the Quality Control Committee, and on the Lifestyle Advisory Group, which was part of the Intervention Committee. In fact, as in the Diabetes Control and Complications Trial, dietitians designed and conducted ancillary substudies within the DPP, participated in writing groups for primary results papers about the effects of the lifestyle intervention, and also participated in the Post DPP Study Group. The Lifestyle Advisory Group included physicians, exercise specialists, program coordinators, and a majority of dietitians. This group had monthly conference calls to discuss the lifestyle performance of each center, had an on-site representative visit teams on an as-needed basis, and created ongoing materials and campaigns to sustain the lifestyle intervention. As representatives of the Lifestyle Advisory Group, dietitians conducted monthly conference calls with the staff at specific centers to discuss issues and share ideas related to the conduct of the lifestyle intervention and provide guidance and support for lifestyle case management. In addition, they often participated in site visits to offer more detailed assessments and recommendations to specific centers to improve lifestyle performance.

Dietitians played a key role in the overwhelmingly positive DPP finding that lifestyle intervention is more effective than medication in the prevention of type 2 diabetes

IMPLICATIONS OF DPP FOR DIETITIANS/NUTRITIONISTS

The DPP provided conclusive evidence that diabetes can be delayed or prevented with lifestyle modification. Thus, the DPP findings confirmed the results of the smaller diabetes prevention trials from China and Finland conducted earlier (4,5). Moreover, lifestyle modification achieved a greater reduction in the risk of diabetes than medication. Dietitians played a key role in the overwhelmingly positive DPP finding that lifestyle intervention is more effective than medication in the prevention of type 2 diabetes.

The DPP provided the opportunity for dietitians to expand their role even beyond the major expansion of the dietitians' role in the Diabetes Control and Complications Trial (8). The Figure lists examples of how dietitians might use the DPP findings to transform and expand their roles. Reimbursement of medical nutrition therapy has greatly expanded in recent years, especially after outcomes research provided evidence of the cost savings of providing diabetes medical nutrition therapy in "real world" practice settings (9). However, current third-party coverage for obesity treatment and disease prevention is limited. Dietitians need to work with policy makers to address the implication of the DPP findings for reducing the health care burden associated with diabetes, especially the potential cost savings related to preventing diabetes with lifestyle intervention.

On a national level, the American Dietetic Association and its Diabetes Care and Education dietetic practice group will continue their collaborations with various government agencies

and voluntary organizations to focus on the primary prevention of diabetes as well as on secondary prevention of diabetes complications. Much of this collaboration is coordinated through the National Diabetes Education Program partnership activities with public and private organizations (10,11). These partnerships will be able to address community and environmental factors, such as the ready availability of energy-dense foods and lack of access to physical activity. The latter results in an unhealthy environment that is conducive to the development of obesity and has been described as “obesogenic” (12). As obesity has become a major public health concern, techniques that have been used to generate funding for smoking prevention programs, such as taxes on cigarettes, are being considered for obesity prevention programs. Suggestions include using tax revenues from snack foods and low-nutrient density beverages for community and school nutrition education programs (13,14). Now is the time for dietitians to make concerted efforts to help translate the DPP findings into their various practice settings and reduce the forthcoming health care burden of the emerging epidemic of type 2 diabetes.

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Dietitian's Work Setting	Possible Action Steps
Ambulatory Care	<ul style="list-style-type: none"> • Help identify patients/families at risk for developing diabetes (family diabetes history, fasting blood glucose levels) in consultation with primary care provider • Use toolbox* approach to tailor weight control counseling • Conduct campaigns to reinforce weight reduction efforts • Assume case manager role to integrate effort with other health professionals
Community/Public Health	<ul style="list-style-type: none"> • Collaborate with others to assess community-related risks and resources • Plan/implement programs in collaboration with others to create environmental resources conducive to achieving/ maintaining a healthy body weight
School Lunch/Food Service	<ul style="list-style-type: none"> • Survey consumers (students, teachers, etc) about health awareness in making food choices • Collaborate with consumer groups to plan/promote healthful food options • Conduct campaigns to promote lifestyle changes to reduce diabetes risk • Provide nutrition and other educational information
Inpatient	<ul style="list-style-type: none"> • Integrate diabetes risk evaluation into nutrition assessment of patients • Develop plan for follow-up of lifestyle issues for at-risk patients • Address prevention of diabetes with/for family members of patients with diabetes

FIG. Implications of DPP for dietitians in various practice settings.

* A toolbox approach involves identifying individual barriers to achieving intervention goals and selecting a tailored approach that addresses such barriers.