

# Facilitating Treatment Adherence with Lifestyle Changes in Diabetes

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**Healthy eating and increased physical activity can prevent or delay diabetes and its complications. Techniques that facilitate adherence to these lifestyle changes can be adapted to primary care. Often, the patient's readiness to work toward change must be developed gradually. To prepare patients who are reluctant to change, it is effective to assess and address their conviction and confidence. Patients facing the long-term task of making lifestyle changes benefit from assistance in setting highly specific behavior-outcome goals and short-term behavior targets. Individualization is achieved by tailoring these goals and targets to the patient's preferences and progress, building the patient's confidence in small steps, and implementing more intensive interventions according to a stepped-care model. At each office visit, physician follow-up of the patient's self-monitored goals and targets enhances motivation and allows further customization of the plan. A coaching approach can be used to encourage positive choices, develop self-sufficiency, and assist the patient in identifying and overcoming barriers. More intensive intervention using a team approach maximizes adherence. (Am Fam Physician 2004;69:309-16,319-20,323-4. Copyright© 2004 American Academy of Family Physicians.)**

► Two patient information handouts on making and maintaining lifestyle changes in diabetes, written by the authors of this article, are provided on pages 319 and 323.

**T**ype 2 diabetes can be predicted by age and obesity, so a dramatic rise in the incidence of this disorder in this country is expected as a consequence of increases in life expectancy and obesity, and continued physical inactivity. The percentage of U.S. adults who are obese (i.e., body mass index [BMI]  $\geq 30$  kg per  $m^2$ ) has grown from 11.6 percent in 1990 to 21 percent in 2001.<sup>1</sup> The percentage of U.S. adults who are not engaging in any regular physical activity has held steady at about 30 percent, with another 45 percent who are below the recommended levels of physical activity.<sup>1</sup> From 1997 to 2000, the prevalence of diagnosed diabetes in the United States increased by 12 percent, to 4.5 percent, with the Centers for Disease Control and Prevention (CDC) estimating that one third of cases are not diagnosed.<sup>2</sup>

The percentage of overweight children in this country has increased from 6.5 percent in 1978-1980 to 15.3 percent in 1999-2000,<sup>3</sup> with evidence of obesity-related impaired glucose tolerance in children as young as six years and

overt type 2 diabetes in children as young as eight years.<sup>4</sup> The Nurses' Health Study found that BMI was a powerful predictor of diabetes onset in middle-aged female nurses, with diet and exercise predicting diabetes risk even within each category of BMI.<sup>5</sup> Diabetes is a large and growing problem for all ages; BMI is a major predictor of the development of type 2 diabetes, and diet and exercise practices predict diabetes risk.

Evidence now demonstrates that changes in diet and physical activity can prevent or delay diabetes and its complications.<sup>6-8</sup> [References 6 through 8—Evidence level A, randomized controlled trial (RCT)] After intensive multi-year treatment of adult "prediabetics," with a focus on diet and increased physical activity, large multisite studies in three countries have found that development of overt diabetes decreased by 32 to 58 percent, compared with usual care (*Table 1*).<sup>6-9</sup>

The term "prediabetics" describes participants in these studies who had impaired glucose regulation (*Table 2*)<sup>10,11</sup> and participants with impaired glucose regulation who were overweight. Many of these participants would now meet the newer criteria for diabetes (early phase).<sup>10</sup>

See page 249 for definitions of strength-of-evidence levels.

See editorial on page 269.

TABLE 1

## Specific Outcome Goals and Short-Term Behavior Targets of Diabetes Prevention RCTs

Study	Intervention	Specific outcome goals	Short-term behavior targets
Da Qing Impaired Glucose Tolerance and Diabetes Study <sup>6</sup>	Six-year intervention; nine group sessions in first year, four per year thereafter	BMI $\leq 23$ kg per $m^2$ ; increase physical activity by at least one to two units per day	Use exchange diet with individually set goals for calories, and for daily quantities of cereals, vegetables, meats, milk, and oils; use individually chosen physical activities selected from a list of suggested activities.
Finnish Diabetes Prevention Study <sup>7,9</sup>	Three-year intervention; seven individual sessions in first year, four per year thereafter	BMI $< 25$ kg per $m^2$ ; 5 to 10 kg (11 to 22 lb) weight loss was common intermediary goal; increase physical activity	Use exchange diet in which daily calories comprise $> 50$ percent carbohydrates; $< 10$ percent saturated fat and $< 20$ percent other fat; $< 300$ mg cholesterol; 15 g per 1,000 kcal of fiber; and 1 g protein per kg for ideal weight. Use stepped approach: initial focus on food proportions; if no weight loss, then food amounts tracked; if no loss, then use very-low-calorie-diet option.
Diabetes Prevention Program <sup>8</sup>	Three-year intervention; minimum of 20 individual sessions in first year, minimum of six per year thereafter, plus other types of contact	7 percent weight loss, more encouraged if goal is achieved; at least 150 minutes of physical activity per week	Stepped approach, starting with self-monitoring of foods eaten, then fats, then calories (if needed), then options (if needed); phased-in physical activity and lifestyle activities

RCT = randomized controlled trial; BMI = body mass index.

Information from references 6 through 9.

The largest of these studies, the Diabetes Prevention Program,<sup>8</sup> found that intensive lifestyle intervention was more effective than metformin in reducing the incidence of type 2 diabetes. The Finnish Diabetes Prevention Study<sup>7</sup> found that three years of intervention focused on diet and increased physical activity resulted in an incidence of diabetes of 11 percent, compared with an incidence of 23 percent among control subjects. The Da Qing Impaired Glucose Tolerance and Diabetes Study<sup>6</sup> demonstrated that lifestyle change lowered diabetes incidence in lean and overweight participants. In a 12-year follow-up of non-randomized groups, the Malmö Preventive Trial<sup>12</sup> found that lifestyle change lowered the mortality rate of participants with impaired glucose tolerance almost to the rate of normal control patients.

A central feature of these studies was high patient adherence to lifestyle recommendations. Ninety-two percent of patients completed each of these RCTs.<sup>6-8</sup> At completion (average follow-up of 2.8 years) of the Diabetes Prevention Program,<sup>8</sup> 58 percent of participants were at their physical activity goal of at least 150 minutes per week; 38 percent were at their weight loss goal of at least 7 percent of initial body weight. All of these studies included frequent, intensive contact with allied health professionals or highly trained case managers (*Table 1*),<sup>6-9</sup> but because few primary care offices can approximate the intensive nature of these interventions, the critical question is, "What are the

active ingredients of these interventions that can be adapted for use in the primary care setting?"

The definitive answer will require years of study using subsets of these intensive protocols to identify the essential components; meanwhile, this article presents evidence-based intervention strategies for improving adherence to lifestyle change in patients with diabetes who are treated in primary care. The focus of the article is early diabetes and impaired glucose tolerance, a point at which lifestyle change is a clear priority.

## Getting Started

### READINESS TO CHANGE

Patients with diabetes vary in their adherence to different self-management tasks. Adherence to one task (e.g., diet) is a poor predictor of adherence to others (e.g., glucose monitoring),<sup>13</sup> so categorizing patients as compliant or noncompliant is not accurate. Because it is best to assess and work on adherence to one behavior at a time, physicians should limit intervention to one or two major behaviors at each visit.

At any given moment, a patient will fall somewhere along a continuum of readiness to change a complex lifestyle behavior. Patients make such major lifestyle changes in stages. If patients are not ready to start such a program, the physician's goal is to move them toward the next stage of change (*Table 3*).<sup>14,15</sup>

**TABLE 2**  
**Current Criteria for Diabetes-Related Classification**

Test	Classification*		
	Normal	Impaired glucose regulation (prediabetes†)	Provisional diagnosis of diabetes
Casual plasma glucose (any time of day, without regard to last meal)	—	—	≥200 mg per dL (11.1 mmol per L) plus Symptoms of diabetes (e.g., polyuria, polydipsia, unexplained weight loss)
or			
Fasting plasma glucose	<110 mg per dL (6.1 mmol per L)	≥110 mg per dL and <126 mg per dL (7.0 mmol per L): impaired fasting glucose	≥126 mg per dL
or			
Oral glucose tolerance‡	<140 mg per dL (7.8 mmol per L)	≥140 mg per dL and <200 mg per dL: impaired glucose tolerance	≥200 mg per dL

NOTE: Each cell in the table is sufficient for classification.

\*—In the absence of unequivocal hyperglycemia with acute metabolic decompensation, these criteria should be confirmed by repeat testing on a different day. The oral glucose tolerance test is not recommended for routine clinical use.<sup>10</sup>

†—The Centers for Disease Control and Prevention now uses the term “prediabetes” in its patient education materials to describe such high-risk patients. We have found this term useful in patient education.<sup>11</sup>

‡—Two-hour postload glucose measurement after using the equivalent of 75 g of anhydrous glucose dissolved in water.

Information from references 10 and 11.

**TABLE 3**  
**Stages of Lifestyle Change**

Stage	Behavior	Physician's goal for visit (to move patient forward)	Tips
Precontemplation	Not considering change	Move toward thinking about change	Get patient talking: “Have you ever considered this before?” “What would have to happen to get you to consider this?” Emphasize patient's autonomy: “I'm concerned about your health ... of course, this is entirely your decision ... I can help when you are ready to change...”
Contemplation	Considering change	Move toward preparing for change	“How have your friends or family members made this change?” “Would you like a list of local programs?” “I have some new information comparing various approaches to weight loss.”
Preparation	Preparing for change (e.g., reading about diets, asking friends about gyms)	Move toward taking action	Praise preparation, discuss options, assist in setting initial goals and behavior targets, and set a start date.
Action	Establishing the change	Maintain change	Praise all efforts, limit suggestions of additional changes to one or two, and begin to anticipate obstacles.
Maintenance	Struggling to maintain the gains	Maintain change	Praise all efforts, limit suggestions of additional changes to one or two, and help patient deal with obstacles.
Identification	Incorporating the change into routine and view of self (the new pattern is now automatic, there is little temptation to lapse)	Maintain change	Praise all efforts.

NOTE: Relapse—patients often slide backward through these stages, and most attempt major lifestyle changes numerous times before succeeding. Do not expect an uninterested patient to progress through all the stages in one office visit.<sup>14</sup>

Information from references 14 and 15.

## COMPONENTS OF MOTIVATION

While motivation has many components, conviction and confidence have practical use in the primary care setting.<sup>14,16,17</sup> When patients do not seem to be ready to change, conviction may be assessed by asking, "How important is it for you to eat healthier food?" To assess confidence, the physician could ask "How confident are you in your ability to succeed in eating a healthier diet?" Or, the physician could ask patients to rate each component from one to 10. It is helpful for the physician to tailor his or her

approach to the patients' answers (*Table 4*).<sup>14,17</sup> If conviction and confidence are low, the physician might focus initially on conviction.<sup>14</sup> Addressing conviction and confidence can help patients move through the stages of change.

## Treatment Planning to Maximize Adherence

### PSYCHOSOCIAL FACTORS

Several studies have documented the role of psychosocial factors in the course of diabetes. For example, the

**TABLE 4**  
**Making Lifestyle Changes: Tips for Enhancing Conviction and Confidence**

#### Enhancing conviction

If conviction is very low, emphasize patient autonomy. "Perhaps now is not the right time to talk about this...I don't want to push you into a decision, it's clearly up to you. I suggest you take time to think about it..."

If conviction is very low, ask permission to provide new information. Avoid giving the same old lecture—vary the message.

Expand on limited conviction. "You said it was somewhat important that you change this behavior. Why did you score a 4 and not a 1? What would have to happen to move you up to a 6 or 7?"

Identify ambivalence. Avoid hard confrontation, which causes the patient to defend the attacked position. Identifying ambivalence helps the patient believe you understand his or her perspective: "So, you have considered this before, but you do not like people telling you what to do."

Identify barriers to considering change. Brainstorm replacements: "Watching television seems to help you relax. What else have you noticed helps you relax? How might you combine your goals of relaxing and improving physical fitness?"

Brainstorm around obstacles. "What will make it hard to increase your activity level?"

Address stated worries directly. "Because you are uncomfortable exercising in public, let's think of some other ways to increase your physical activity."

Discuss pros and cons. Have the patient list the benefits and costs of no change versus change. Start with benefits of no change—there are obviously benefits to the patient or he or she would not be continuing that behavior. Summarize and let patient draw conclusions.

Take a hypothetical look over the fence. "So you're not too sure about changing your diet. Let's imagine for a moment that you did make this change. How would that make you feel?"

#### Enhancing confidence

Review previous change successes, praising positive steps and exploring obstacles. "Have you tried this before? How long did you continue that effort? What helped you succeed for that long? What do you think will work for you now? What obstacles were there? What might help with those obstacles now? Tell me about some of the things you have successfully changed in the past."

Expand on limited confidence. "You said you had some confidence that you could change this. Why did you score a 4 and not a 1? What would have to happen to move you up to a 6 or 7?"

Brainstorm solutions, coaching patient to select small, easy steps based on patient's previous experiences and preferences.

Facilitate the shift from success or failure to a stage model. "Most people have partial success several times before they succeed for good. Previous attempts to change increase the odds of success. People go through a period of not wanting to think about it, thinking about it, considering options, deciding to change, struggling to change, struggling with temptations or slips, and finally feeling like it's behind them. Sometimes people cycle through all or parts of that process several times before changing for good."

Address relapse prevention. Discuss "slips" rather than failures; brainstorm ways to break any pattern of slips that leads to a sense of failure; anticipate triggers and plan solutions.

*Information from references 14 and 17.*

high prevalence rate (15 to 20 percent) of depression in persons with diabetes is associated with less adherence to self-care behaviors and decreased glycemic control.<sup>18</sup> Recent intervention study results show that treatment with antidepressants or behavior therapy improves depression and glycemic control.<sup>18-21</sup>

Family interventions that improve regimen adherence and metabolic control include involvement of family members in diabetes management, appropriate task sharing and assignment, decreasing family conflict, and improving communication and family-based behavior procedures (e.g., goal setting, behavior contracting).<sup>19</sup>

Patients who are having difficulties with basic needs (e.g., housing, finances, job, safe environment) have little motivation to address complex long-term lifestyle issues. These patients are better served through case management that addresses their immediate needs and ultimately improves the likelihood of treatment adherence. Screening for psychosocial problems is recommended initially and again if treatment adherence is poor.<sup>22</sup>

#### OUTCOME GOALS AND BEHAVIOR TARGETS

Although the clinical goals might be prevention of diabetic complications and normalization of glucose tolerance, it is critical to present patients with specific outcome goals they can assess and short-term behavior targets they can achieve<sup>14,22-27</sup> (*Table 1*).<sup>6-9</sup> An initial weight loss goal of 7 to 10 percent of baseline weight and a physical activity goal of 150 minutes per week to be achieved within six months are suggested. In addition, a single waist measurement (measured at the maximum horizontal girth) should be used to help track high-risk visceral fat,<sup>23,24</sup> which correlates with fasting plasma glucose levels, hemoglobin A<sub>1c</sub> levels, and insulin sensitivity, independent of BMI.<sup>28</sup> A waist measurement is considered a high risk when it is more than 40 inches in men and more than 35 inches in women.

#### INDIVIDUALIZED PLANS

Individual tailoring of diet and physical activity treatment plans is recommended by major guidelines focused on diabetes, obesity, and exercise.<sup>22,23,29-31</sup> The Diabetes Prevention Program<sup>8</sup> individually tailors short-term behavior targets (e.g., adjusting targets to match progress) and specific methods used to achieve them (e.g., trying ethnic foods).

*Changes in diet and physical activity can prevent or delay diabetes and its complications.*

#### STEP BY STEP

*Shaping.* Patients often are overwhelmed by large goals that seem unachievable. Target behaviors should be phased in using small steps.<sup>24,27</sup> The physical activity target can be gradually increased from 60 minutes per week of any enjoyable physical activity to more intense activity for longer periods. By starting gradually, the patient can build confidence in small steps, with each step having a higher likelihood of lasting success. Small steps also yield many opportunities for physician praise. The approach is designed to gradually improve adherence by praising small steps made toward the goals.

*Stepped Care.* The technique is to start simple, adding more complex or expensive interventions only when needed. If self-monitoring and simple self-selected dietary changes result in weight loss, the focus can shift to maintenance. If patients are following the plan but no weight loss results, the physician can coach them to expand dietary changes and see what happens. If patients are not following the plan, the physician can explore the obstacles, brainstorm solutions with the patients, and adjust the plans. Patients with continuing problems may need to be referred to a diabetes educator (<http://www.diabeteseducator.org>), a registered dietitian (<http://www.eatright.org>), a qualified nurse case manager, or a behavior counselor.<sup>22</sup>

#### LONG-TERM ASSISTANCE

Achieving permanent changes in diet and physical activity patterns is a multiyear project. The longer the period of intervention, the more likely that improvements in weight loss and physical activity will be maintained.<sup>23,26</sup> In the studies of patients who improved impaired glucose tolerance, the intensity of the interventions decreased after an initial six- to 12-month period. Thus, frequent visits with a member of the health care team for at least six months, gradually tapering to no less often than every three months, is advised. This decrease in the intensity of medical care can coincide with referral to nonmedical community supports for maintenance (e.g., diet groups, organized physical activities). Adherence and office visit compliance

*It is good to keep a trial-and-error approach in the forefront—a slip is not a failure but rather an opportunity to learn what works and what does not work in facing particular obstacles to lifestyle changes.*

can be enhanced by regular mail or telephone contact by trained staff between office visits.<sup>32</sup>

## Techniques to Use at Each Session

### SELF-MONITORING

Long-term change and maintenance require patients to assess their own behavior.<sup>27</sup> The physician can provide a simple system for these patients to follow, strongly encourage its use, and check up on it in office visits. One approach, used in the Diabetes Prevention Program,<sup>8</sup> requires patients to track all foods eaten and all physical activities, gradually coaching patients to monitor themselves and test what works for them.<sup>33</sup>

### HOMEWORK FOLLOW-UP

If homework is assigned, it should be added to the progress note and checked at the next visit. The physician should keep track of the major countable behaviors (e.g., physical activity, average calories consumed) or goals (e.g., weight, waist circumference). Office visits are a time

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to ask about any changes in behavior or obstacles that may have arisen. It's helpful for the physician to look for any positive points and to praise all activity and self-monitoring, even partial adherence to homework. At each visit, the physician should make only one to two additional suggestions for the next visit, starting with the simplest step that is most likely to result in change.<sup>33</sup>

### PROVIDE CHOICES

It is effective to give patients choices about the methods used to achieve their goals. As in the Diabetes Prevention Program,<sup>8</sup> the physician can assist patients in choosing whether to start with physical activity or weight loss through healthy eating. Later, if needed, patients can be offered the option of counting calories or following a meal plan. It may be useful to have on hand materials that can be loaned (or rented) to patients (e.g., aerobic exercise videos, cookbooks), or to have prepared lists of local diet groups and organized physical activities, to expand patient options.<sup>24,33</sup>

### EMPOWER PATIENTS

Physicians often use a patient education approach to problems—doctors talk and patients listen, and then patients are quizzed to check comprehension. However, information alone is not a sufficient tool in the struggle involved in a major lifestyle change. Physicians also have experience with a training approach in which trainees are taught by modeling and practice, but this approach teaches patients to depend on the physician. A coaching model is the best approach for patients facing complex lifestyle changes. Patients are guided in developing skills in self-sufficiency, which builds their confidence while enhancing their competence. The coach (physician) provides patients with the initial tools, encourages their use, and offers tips to move patients toward their goals.<sup>16,20,30,34</sup>

### IDENTIFYING AND OVERCOMING BARRIERS

Physicians often ask patients if they see specific barriers ahead when starting something new. This is a fruitful approach that works even better when used at every office visit. The physician can focus on one behavior at a time and ask patients about specific obstacles to their diet or physical activity plans. Next, the physician can brainstorm with patients to find possible solutions, perhaps offering tips or options. Patients can be encouraged to pick a possible solution to try. Once patients begin to show some changes, it is important to focus on preventing slips by

**TABLE 5**  
**Advanced Skills in Maintaining Lifestyle Changes**

Skills	Behavior target	Action
Controlling cues	Learn to recognize and change environmental and social cues for eating and physical activity.	Shop from a list, eat in one place in the house, add exercise cues to several rooms in the house, and add physical activity to social life.
Problem solving	Use problem-solving approach to obstacles.	Describe, brainstorm, choose, plan, try, and see.
Eating out	Learn skills for eating at restaurants and the homes of others.	Plan ahead, choose carefully, and assertively ask for what you want.
Cognitive change	Talk back to common negative thoughts.	Recognize "all or nothing" thinking, excuses, "shoulds," competing with others, and self-defeating thoughts. Use thought stopping and reality testing to break patterns.
Relapse prevention	Anticipate slips and get back on track.	Identify previous triggers of slips, plan ahead for likely triggers, challenge thoughts that a slip means failure (i.e., "get back on the horse") and problem solve about how to deal with triggers.
Avoiding boredom	Vary physical activity to keep motivated.	Change some aspect of physical workout each month; take exotic cooking classes.
Coping	Learn stress management techniques.	Prevent stress by saying no, asking for help, setting realistic goals, problem solving, organizing, planning, and prioritizing. Cope with unavoidable stress by identifying stress, taking breaks, and using self-soothing techniques, relaxation, physical activity, and social support.
Social support	Enhance support for lifestyle change.	Involve significant others in activities, and develop new social supports compatible with lifestyle changes.

Information from references 23, 27, and 33.

anticipating problems. A trial-and-error approach is kept in the forefront—a slip is not considered a failure but rather an opportunity to learn what works and what does not work in overcoming particular obstacles.

#### SKILL DEVELOPMENT

Sometimes patients lack skills that are necessary to deal with problems that interfere with their long-term adherence (*Table 5*).<sup>23,27,33</sup> In the primary care setting, such skills are more efficiently addressed by having someone on the health care team moderate group sessions for "lifestyle modification" patients or by referring these patients to a local behavior-oriented diabetes educator or behavior specialist.

#### Team Approach

Although the techniques outlined here have been shown to help with lifestyle changes, the number of techniques needed to maximize treatment adherence is not known. Smaller studies done in primary care settings have suggested that more intense interventions are associated with

more behavior changes (and more disease prevention).<sup>26,35</sup> It appears that the longer the intervention lasts, the more likely the behaviors are to be maintained.

RCTs<sup>6-8</sup> demonstrating the positive effect of lifestyle interventions on diabetic parameters used nurses, dietitians, and diabetes educators who received additional training in the study protocol. A team approach may be necessary to maximize the techniques described here. In the office setting, a nurse case manager might be part of a team offering continuity of care and long-term follow-up.

Excellent educational materials for patients and health care professionals are available from national health organizations (*see the patient information handouts*).

**Sources of funding:** The work of Drs. Koenigsberg and Bartlett was partially supported by a Residency Training in Primary Care Grant (#5D15HP1050303) from the Department of Health and Human Services Health Resources and Services Administration. The work of Dr. Cramer was partially supported by a Physician Faculty Development Grant (#6D14HP0012802) from the Department of Health and Human Services Health Resources and Services Administration.

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