

Identification of Self-Care Behaviors and Adoption of Lifestyle Changes Result in Sustained Glucose Control and Reduction of Comorbidities in Type 2 Diabetes

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Diabetes is a chronic progressive disease that usually requires lifestyle changes, especially in the areas of nutrition and physical activity.¹ People with diabetes report that making lifestyle changes is one of the greatest challenges they face in managing their diabetes.² Research has shown that self-care behaviors that result in sustained glucose control reduce comorbidities associated with diabetes.³

The American Association of Diabetes Educators (AADE) has adopted behavior change as the outcome of diabetes self-management education (DSME). The primary goal of diabetes education is to provide knowledge and skill training, as well as help individuals identify barriers, facilitate problem solving, and develop coping skills to achieve effective self-care management and behavior change.⁴ The American Diabetes Association has consistently included behavior change as a primary focus of DSME, which is reflected in the criteria for the ADA's recognition programs as well as their standards for diabetes self-management.⁵

The case study presented below illustrates lifestyle changes and self-care behaviors initiated and maintained. The result is sustained glucose control, which to date has prevented diabetes comorbidities.

Case presentation

R.W. is a 58-year-old African-American woman who presented to the endocrinology and metabolism clinic in 2001 with a history of type 2 diabetes since 1986. She has a history of hyperlipidemia and hypertension since 1998. She is a nonsmoker and does not drink alcohol.

This case presentation covers 3 years of diabetes management history for this patient. She originally presented with a hemoglobin A_{1c} (A1C) of 10.9% (normal range 3.95–6.1%); height of 5 feet 1 1/2 inches and weight of 171 lb (BMI 32 kg/m²); blood pressure of 147/102 mmHg; heart rate of 94 bpm; and LDL cholesterol < 130 mg/dl. The patient was on a sulfonylurea and a biguanide. Physical exam was unremarkable except for evidence of decreased vibratory response in first metatarsal bilaterally. Family history included a parent who had type 2 diabetes, and high blood pressure.

R.W. has had some college education and lives with her husband, who also has type 2 diabetes. She expressed interest in learning what she can do to manage her diabetes and achieve her goal of overall health improvement. On her own, she reads diabetes-related educational materials and attends both clinic- and community-sponsored educational programs.

Through continued support, diabetes education, physical activity, and adjustment of her diabetes medication, including the addition of insulin, her A1C has continued to decrease. However, as is often the case with the lowering of A1C because of euglycemia, rehydration, and no change in food portion or activity, her weight has continued to increase. Although she had made strides in her behavioral changes to achieve her improved glucose control, she realized she needed and requested additional support. At past visits, seeing a registered dietitian (RD) was offered by the health care team, but the patient had refused. This time, at the request of the patient, a visit to see the RD was scheduled.

Question

How can ongoing interaction with an RD assist this patient in learning self-care behaviors and adopting lifestyle changes that can help her sustain her blood glucose control and also to manage her weight loss with the long-term goal of reducing her risk of diabetes-related complications?

Discussion

For most people with diabetes, food choices and increased physical activity are challenging lifestyle changes. On the initial visit with the RD, R.W. stated that she had seen a dietitian previously but was still confused about carbohydrate counting and wanted to lose weight.

At the time of her visit with the RD, R.W.'s weight had increased to 181 lb, her BMI was 34.2 kg/m², and her A1C had decreased to 6.4%. She had been concentrating on eating meals on schedule but had not used carbohydrate counting as a meal planning method. Providing this patient the tools to carry out carbohydrate counting would allow her to continue to control her blood glucose levels and help her with portion control. As her A1C has improved without any change in her food intake, she has gained weight. Before seeing the RD, she ate three meals and three snacks per day consistently. She did check her blood glucose levels on a daily basis, but with no schedule for when and how often, and she did not use the results of her blood glucose monitoring to change her food intake or physical activity.

R.W. stated that she is busy most of the day but would not consider herself physically active. She used to walk daily for exercise but says she

has recently stopped because she is too busy. Further discussion revealed that she would like to learn how to use carbohydrate counting but did not know where to find information on the carbohydrate content of the foods she eats. During this session, carbohydrate-counting resources and label-reading skills were reviewed, and using portion size tools was reviewed to demonstrate the information on a label and to bring the carbohydrate counting process to life, helping R.W. visualize how to use these resources. Label reading provides consumers the exact calorie and carbohydrate content per serving. Often, this knowledge helps patients better understand what they are consuming and adjust their caloric intake through attention to portion sizes.

Treatment algorithms for glycemic control in diabetes are difficult to create because therapy should be individualized for each patient. An individualized meal plan was developed, and carbohydrate amounts per meal were established. Goals set by the patient during this visit included recording foods eaten, how they were prepared, and the amounts consumed. The patient was asked to keep a diary that contained the carbohydrate content in a food recall log, check blood glucose levels three times per day using a staggered schedule, and document beginning a walking program for exercise. Blood glucose goals were < 100 mg/dl before meals and < 140 mg/dl 2 hours after meals. The goals were shared with the rest of the diabetes care team members.

Subsequent visits reinforced her carbohydrate counting skills and trouble-shooting abilities for either meal timing or individual food choices that result in higher-than-goal postprandial blood glucose levels. For example, during the summer months, she enjoys a presweetened lemonade that she had been drinking for years but which she was unaware contained carbohydrates and calories that result in higher-than-target blood glucose levels.

Since her first clinic visit, R.W. has seen the RD for follow-up visits. Interestingly, although she often did not complete her food records or check her blood glucose levels as suggested, she did return for follow-up visits with the RD and diabetes team

to get herself “back on track.” It is important to support patients at whatever stage they are in their self-care regimen and to not underestimate the value of patient-educator interaction, even when it seems as though the patient is not following up on goals.

R.W. enjoyed her walks and believed in the benefit of regular physical activity but stated that she was too busy to walk for exercise. With further discussion, it became clear that the real issue was not wanting to walk alone rather than being too busy to walk. A walking buddy or location where others also walked were explored. R.W. was able to identify a time when she could take her walks. Pedometers were provided for herself and her husband, and a walking program with a log were also provided. The combination of increased physical activity, carbohydrate counting, and following the medical regimen improved R.W.’s glycemic control.

Blood glucose monitoring is an essential component of diabetes management that provides the patient with objective feedback and information to help identify potential areas of needed change. R.W. began checking her blood glucose levels three times per day using a staggered schedule that included a fasting blood glucose and one pre- and one postmeal check daily. She soon learned the influence of her food intake and activity on her blood glucose levels. As her activity increased and consistency in mealtime carbohydrate intake improved, her A1C decreased. At month 36, her A1C was reduced to 5.6%, and her weight had decreased, for a BMI of 31 kg/m². Her medication regimen included insulin, a biguanide, a sulphonylurea, and a thiazolidinedione (Table 1). The patient reported that adherence to the regimen was stressful and difficult at times.

The level of problem-solving skills seems to be a powerful predictor of health outcomes. Observing patients in the process of solving health problems can help in assessing problem-solving skills.⁶ Since coming to the clinic, R.W. has had acute illnesses that cause fluctuations in blood glucose. She developed a finger abscess that had to be drained. She had dental infections that required antibiotic treatment. She also developed a

Morton neuroma in her right foot that required treatment. Fluctuating blood glucose levels accompanied each problem, and she was able to adjust her medication to keep her glucose levels at goal.

R.W. is a spiritual person and has close association with her church and its members. Her community has a high incidence of diabetes. Her family, especially her husband, who also has diabetes, are encouraging her to manage her diabetes. She seeks support when needed and exhibits healthy coping. Healthy coping skills are behaviors that eliminate or modify the stressors common to diabetes (e.g., rigid regimen, fear of complications), which might cause emotional distress and impair self-care.⁷ She also has a sense of humor, which adds to her coping abilities.

Health care providers need to teach patients how to reduce risk factors for complications of diabetes. As a non-smoker and motivated individual, R.W. sought out experts in diabetes management to teach and support her in the challenges diabetes posed for her. Following is additional information to help diabetes health care professionals support their patients in making lifestyle changes.

Healthy food choices

Improved metabolic control is essential in reducing the risks of complications of diabetes. Food-related behaviors have a direct impact on metabolic control and can be the most challenging of the self-care behaviors for patients and health care professionals.⁸ Healthy eating and an individualized food plan should be included in all care plans for people with diabetes. The food plan should be communicated to the rest of the diabetes health care team and periodically reevaluated with the patient for appropriateness. Medical nutrition therapy provided by an RD is recommended in the national standards for DSME.⁵

Physical activity

The benefits of physical activity for people with and without diabetes is well known. Physical activity helps improve glucose utilization, lipid profiles, blood pressure, and stress levels and is a primary goal of self-

Table 1. R.W.'s Progress Throughout Ongoing RD Care

Months	A1C (%)	Blood pressure (mmHg)	BMI (kg/m ²)	LDL cholesterol (mg/dl)	Number oral medications	Insulin
Baseline	10.9	147/102	32	< 130	2	None
12	7.0	95/59	34.5	> 130	3	Glargine, 28 units; aspart, 10 units
24	6.5	106/62	34.0	> 130	3	Glargine, 24 units
36	5.6	114/72	31.0	> 130	3	Glargine, 12 units

management education. It is important for educators to collaborate with patients to address barriers to physical activity, such as physical, environmental, psychological, and time limitations. Working with an educator, patients can determine the entry level of frequency, duration, and intensity of physical activity with the long-term goal of daily physical activity. For most patients, a walking program is a basic physical activity recommendation, but educators should explore activities of interest to their patients, such as dancing, bicycling, or swimming. In general, patients will be more likely to engage in physical activities that they enjoy, feel good about doing, and can do without purchasing special equipment.

Blood glucose monitoring

Self-monitoring of blood glucose is an important component of the treatment plan because it provides immediate feedback and data for:

- achieving and maintaining specific glycemic goals.
- preventing and detecting hypoglycemia and avoiding severe hypoglycemia.
- adjusting care practices and medications in response to changes in lifestyle.
- determining the need for insulin therapy.
- evaluating the glycemic response to types and amounts of food and physical activity.⁹

Clinicians should assess patients' needs in recommending specific meters, as well. Multiple choices allow for individualization. Educators should demonstrate technique and teach about control solution, calibration, cleaning, and the value of using a log book. Data management systems allow for downloading the memory

stored in the meter to a computer for record keeping and graphing of results. For long-term management, measurement of A1C is also an important tool for assessing blood glucose control.⁹

Medication taking

Providers must assess self-efficacy of recipients of the diabetes management program. Patients' health beliefs and cultural influences must be explored. Patients' ability to assume personal responsibility for the regimen is the basis for success. The empowerment approach in diabetes self-management is to assist people with diabetes in their responsibility to carry out their daily treatment plan. Taking their medication daily and in a timely manner for maximum efficacy is an important consideration. Education about the indications, therapeutic action, dosages, precautions, and side effects for each medication must be provided. Adherence tends to be lower for regimens that are complex and life-long.⁴ It is important to individualize and modify by constant reassessment of lifestyle changes.

Patients' occupations and available financial resources have a significant impact on the design of the management program as well. A person with diabetes who has insurance coverage of prescription medications will face fewer challenges than someone who is uninsured.

Problem solving

Living well with diabetes requires a high level of problem-solving skills. Diabetes makes life more complicated, so people with diabetes have more decisions to make and problems to solve on a day-to-day basis than those without diabetes.³ One classic problem-solving model consists of six steps:

- Define the problem.
- If other people are involved, verify that everyone agrees with the problem definition.
- Brainstorm possible solutions.
- Evaluate solutions.
- Develop a goal-driven action plan.
- If not successful, evaluate and refine the action plan.⁶

Clinicians can support the efforts of people with diabetes in solving the problems they face every day. The lesson learned from the experience enhances their confidence in self-care and management.

Healthy coping

Diabetes coping skills are behaviors that eliminate or modify the stressors commonly found in diabetes.⁶ These stressors cause emotional distress and impair self-care. Some common stressors are fear of complications, rigid regimens that lead to weight gain, depression, frustration, and a sense of being overwhelmed.

Coping skills can be assessed by asking simple questions that focus on issues of stress, such as "What are you currently doing to try to cope with this stress?" and "Have you been successful in coping with stress in the past? If so, what did you do at the time?"⁶ Improved coping skills can lead to improved metabolic control indirectly, by facilitating self-care, and directly, by reducing the acute effects of stress on glycemia.⁶

Risk reduction

Chronic complications of diabetes significantly impact the cost of health care. Approximately 25% of the total Medicare budget is dedicated to the treatment of diabetes and its chronic complications.⁷ It is estimated that by reducing or eliminating risk factors, 85% of complications could be

delayed or their progression slowed. This would save Medicare \$17 billion annually.

Risk factors for diabetes complications can be either modifiable or non-modifiable. Modifiable risk factors include hyperglycemia, hypertension, dyslipidemia, increased platelet adherence, smoking, eating habits, increased homocysteine levels, obesity, increased insulin levels, lack of exercise, and type A personality.⁶ Nonmodifiable risk factors include duration of diabetes, age, genetics, race, height, and autoimmunity.

Steps to reduce modifiable risk factors can be easily remembered by a simple motto, "Have good 'CENSE' about diabetes," which stands for:

- **C**ontrol your glucose, blood pressure, and cholesterol
- **E**arly treatment of foot, eye, kidney, and heart problems
- **N**o
- **S**moking
- **E**ducation about diabetes, healthy eating, and physical activity.¹⁰

Summary

Self-care is a multidimensional construct that requires individuals to adopt and maintain a variety of behaviors in response to numerous influences, including health beliefs,

opposing motivations, economic conditions, and life events. Although relationships among self-care behavior, quality of life, metabolic control, and complications are complex, evidence supporting the existence of relationships among these variables has been increasing in recent years.⁷

References

¹Franz MJ: *Diabetes Management Therapies: A Core Curriculum for Diabetes Education*. 5th Ed. Chicago, American Association Diabetes Educators, 2003

²Schafer RG, Bohannon B, Franz M, Freeman J, Holmes A, McLaughlin S, Haas LB, Kruger DF, Lorenz RA, McMahon MM: Translation of the Diabetes Nutrition Recommendations for Health Institutions (Technical Review). *Diabetes Care* 20:96-105, 1997.

³Toobert DJ, Glasgow RE: Problem-solving and diabetes self-care. *J Behav Med* 14:17-86, 1991

⁴American Association of Diabetes Educators: Position statement: standards for outcomes measurement of diabetes self-management education. *Diabetes Educ* 29:804-816, 2003

⁵Mensing C, Boucher J, Cypress M, Weinger K, Mulcahy K, Barta P, Hosey G, Kopher W, Lasichak A, Lamb B, Mangan M, Norman J, Tanja J, Yauk L, Wisdom K, Adamset C: National standards for diabetes self-management education. *Diabetes Care* 29 (Suppl. 1):S78-S85, 2006

⁶Ley P: *Communicating With Patients*. London,

Croom Helm, 1998

⁷Anderson B, Rubin RR (Eds.): *Practical Psychology for Diabetes Clinicians: How to Deal With Key Behavioral Issues Faced by Patients and Healthcare Teams*. Alexandria, Va., American Diabetes Association, 1996

⁸Lorenz RA, Bubb J, Davis D, Jacobson A, Jannasch K, Kramer J, Lipps J, Schlundt D: Changing behavior: practical lessons from the Diabetes Control and Complications Trial. *Diabetes Care* 19:648-652, 1996

⁹Mulcahy K, Maryniuk M, Peeples M, M Peyrot, Tomky D, Weaver T, Yarborough P: Diabetes self-management education core outcomes measures (Technical Review). *Diabetes Educ* 29:768-803, 2003

¹⁰Squire R: A model of empathic understanding and adherence to treatment regimes in practitioner-patient relationships. *Soc Sci Med* 30:325-339, 1990

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