



AADE Guidelines for the Practice of Diabetes Self-Management Education and Training (DSME/T)

©2009, American Association of Diabetes Educators, Chicago, Illinois. Revised November 2010.

All rights reserved. No part of this publication may be reproduced electronically or mechanically, stored in a retrieval system, or transmitted in any form or by any means. The information contained in these files may not be copied to a diskette, mounted to a server, or otherwise distributed in any form without the express written permission of the American Association of Diabetes Educators. Printed and bound in the United States of America.

The American Association of Diabetes Educators and its officers, directors, employees, agents, and members assume no liability whatsoever for any personal or other injury, loss, or damage that may result from the application of the information contained herein.

Foreword

The American Association of Diabetes Educators (AADE) is a multidisciplinary professional association dedicated to providing diabetes educators with the tools, training, and support necessary to help patients change their behavior and accomplish their diabetes self-management goals. AADE is constantly working towards its vision of *successful self-management for all people with diabetes and related conditions*. With that vision in mind, AADE sets the scope and direction for the practice of diabetes self-management education and training (DSME/T) to promote healthy living through self-management of diabetes and related conditions.

The *AADE Guidelines for the Practice of Diabetes Self-Management Education and Training (DSME/T)* set forth in this document describe the implementation of *The Scope of Practice, Standards of Practice, and Standards of Professional Performance for Diabetes Educators*. These guidelines support the delivery of DSME/T within the framework of the AADE⁷™ Self-Care Behaviors and *The National Standards for Diabetes Self-Management Education*. The roles and responsibilities delineated in these AADE guidelines can be used by individuals and organizations involved in the facilitation and delivery of diabetes education, training and care for persons with or at risk for diabetes and their families/caregivers.

DSME/T practice is further described by the American Diabetes Association’s Clinical Practice Recommendations and AADE’s *Scope of Practice, Standards of Practice, and Standards of Professional Performance for Diabetes Educators*. The “Scope and Standards” is intended to distinguish DSME/T as a distinct health care specialty, promote DSME/T as an integral part of diabetes care, and facilitate excellence in DSME/T.

Introduction

Diabetes self-management education and training (DSME/T) is a collaborative process through which people with or at risk for diabetes gain the knowledge and skills needed to modify their behavior and successfully self-manage the disease and its related conditions.¹ The theory underlying the AADE7™ Self-Care Behaviors framework is one in which DSME/T is culturally appropriate and empowers patients to achieve optimal health status, attain a better quality of life, and reduce the need for costly health care.^{2,3} Clinical practice recommendations underlie the AADE7™ framework.⁴⁻⁶ Recognizing the value of this intervention, one of the goals of the Healthy People 2010 initiative is to increase the percentage of individuals who receive DSME/T from 40% in 1998 to 60% by 2010.⁷

DSME/T has been shown to be particularly supportive when clinicians interact collaboratively with patients in developing a plan of care that considers the clinician’s expertise and the concerns and priorities of the patient.^{8,9} The collaborative role operates to empower patients who are able to understand what to expect from their health care and what is expected of them—including being fully cognizant of risk-reducing activities.¹⁰ Through this understanding, patients gain a sense of empowerment in managing their health condition.

Facilitating positive self-care behaviors directed at successful diabetes self-management was formally adopted as a desired outcome of DSME/T in 2002.¹¹ Seven specific self-care behaviors developed by the American Association of Diabetes Educators, known collectively as the AADE7™, have been defined to guide the process of DSME/T and help patients achieve behavior change.¹² The field has been further advanced by blending the AADE7™ behavior change construct with findings from the Diabetes Attitudes, Wishes and Needs (DAWN) study which highlights the importance of provider-patient collaboration and access to care.^{13,14}

Diabetes prevention, treatment, education, and support is most effectively provided by multi-disciplinary teams.^{15,16} AADE further recognizes that DSME/T is delivered by multiple providers who function at different levels and in different roles. Hence, there is a need to clarify the roles/responsibilities of *all* persons involved in the facilitation and/or delivery of diabetes education and care across a continuum of clinical and community-based settings.¹¹

Scope, Purpose, and Use of these Guidelines

This document expands on the standards and training curricula developed by AADE, including *The Scope of Practice, Standards of Practice, and Standards of Professional Performance for Diabetes Educators*.¹¹ This

expansion is aimed at facilitating implementation of the AADE7™ Self-Care Behaviors framework in the delivery of DSME/T and empowering patients to change behavior and achieve success in self-management.

The purpose of these guidelines is to increase access to DSME/T and achieve better patient care by:

1. Delineating the roles of the multiple levels of diabetes educators
2. Suggesting a career path for diabetes educators
3. Clarifying the contribution that can be made by individuals who have the knowledge, capability, diversity, and language skills needed to address diabetes self-management and support in a variety of settings.

It is beyond the scope of these guidelines to address the range of activities that diabetes care practitioners may be educated and authorized to perform based on facility and organizational policies and bylaws, clinical privileging, state practice acts, and state occupational supervision regulations.

Who Should Use these Guidelines?

The roles and responsibilities delineated in this document are intended for use by all individuals and organizations involved in the facilitation and delivery of diabetes education, training and care for all persons with diabetes and their families/caregivers. The list of target users includes, but is not limited to: diabetes educators and other healthcare providers, healthcare payers and policy makers, voluntary health organizations, businesses, professional associations, governmental and non-governmental agencies, and other stakeholders.

Implementation and Criteria for Monitoring the Use of these Guidelines

To be successful in advancing the delivery of DSME/T, strategies are needed to help ensure effective implementation of the various recommendations set forth in the guidelines. Tools have been developed to support implementation (see the following section), and an ongoing outreach campaign will inform diabetes educators and the broader healthcare community about the guidelines' availability and intent. AADE will track the adoption and use of these guidelines via its bi-annual National Practice Survey and through interface with AADE members.

AADE will monitor the usage of these guidelines and reserves the right to make changes in these guidelines without prior notice. Monitoring criteria include the frequency in which the guidelines are cited in the literature and usage rates of these guidelines among healthcare practitioners.

Tools to Support Implementation of the Guidelines

An electronic database has been created to monitor behavioral goal setting and implementation of DSME/T by practitioners at the various practice levels. The AADE7™ System tools, which are available for voluntary use,

capture quality indicators based on the AADE7™ clinical and behavioral outcomes. Reports generated by the system help to track practitioner and patient DSME/T activities and assess the achievement of collaboratively set goals and changes in clinical and behavioral outcomes that result in better health for people with diabetes.

The guidelines are intended to be used in conjunction with the *Competencies and Skills for Diabetes Educators*,¹⁷ which provide a comprehensive description of the knowledge, skills, and competencies necessary for the delivery of DSME/T and care at various practice levels.¹⁸ In addition, AADE has developed a desk reference for diabetes self-management and collaborated with other groups to develop *The National Standards for Diabetes Self-Management Education*.^{19,20} Electronic and print materials were developed to support the practice of DSME/T such as a monograph on continuous quality improvement (CQI) and published systematic reviews on each of the healthy behaviors.

Methodology for Guidelines Development

The guidelines were developed by a volunteer writing group composed of diabetes care professionals with diverse educational backgrounds and various credentials representing all regions of the United States. The AADE Professional Practice Committee (PPC) provided oversight for the development and review process. The PPC is a technical committee consisting of 10 volunteers who provide technical advice, review, and input on a variety of issues relating to the practice of DSME/T. The PPC develops official AADE documents that articulate the association's views and mission, reflect current evidence, delineate standards of care, and support the AADE7™.

The writing group met in person two times to review and consider the published evidence, define the purpose of the guidelines, create the construct underlying the roles described herein, and discuss barriers to the adoption of the guidelines.

The guidelines have been critiqued and vetted by target users. Reviewers from diverse backgrounds and practice perspectives provided critiques at various points during the development process. The reviewers included individuals who are active in the practice of DSME/T, as well as representatives from nongovernment organizations, academic centers, consulting firms, and public health groups. The reviewers were asked to use the Appraisal of Guidelines for Research & Evaluation (AGREE) Instrument,²¹ which was modified slightly to better suit the purpose of this review. Comments from the external reviewers were considered by the AADE PPC, shared with the writing team, and integrated into the final version of the document.

Practice Questions

As a basis for developing the recommendations set forth in these guidelines, the writing group addressed five questions relevant to the role and importance of DSME/T in the self-management of diabetes:

1. Does diabetes self-management education and training improve outcomes?
2. What is the framework for diabetes self-management education and training education?
3. What is the process for implementing diabetes self-management education and training?
4. Who should deliver diabetes self-management education and training to persons with diabetes?
5. What are the unique roles and responsibilities of those who deliver diabetes self-management education and training for self-care?

The evidence (i.e., scientific evidence published in the literature) supporting the recommendations is shown as evidence statements, with grading levels for the evidence indicated at the end of each statement.

Role of Scientific Evidence in the Development of the Guidelines

Evidence-based clinical practice guidelines enhance the ability of healthcare providers to effectively address the needs of individuals with diabetes. The guidelines set forth in this document are evidence-based, and each piece of evidence is graded according to specific criteria. The grade for each piece of evidence used to develop this document is indicated at the end of each citation in the reference section. The evidence analysis inclusion criteria included studies conducted and published since 1984, documents relating to the practice of DSME/T published by professional organizations, DSME/T-related published manuscripts, peer-reviewed journals, articles, and relevant guidelines.

Steps were taken to determine the strength and quality of the specific studies and documents upon which the guidelines were crafted. Initially, the PPC considered the breadth of literature available. With this guidance, AADE staff systematically conducted literature reviews, seeking high-quality research (e.g., randomized controlled trials, meta-analyses and well-conducted quasi-experimental studies), consensus documents, and published standards of care and practice.

As the next step, the AADE PPC recommended published studies and documents that would serve as the foundation for development of the guidelines and recommended to the writing team papers that were widely cited (i.e., in more than 30 published documents) and deemed (based on their expert opinion) to be “embraced” by those who undertake the practice of DSME/T and are substantially influential to the field. These materials were provided to the writing team prior to their initial meeting. The AADE Research Committee advised on how the quality of specific studies and documents would impact the graded rating of the questions.

The evidence used in developing the guidelines included key meta-analyses, evidence-based reviews, clinical trials, cohort studies, epidemiologic studies, position statements, and consensus statements and guidelines (English

language only). The methods and process used for evidence gathering, development of the guidelines, and the subsequent review process are described below.

The writing group obtained relevant reports through a computerized search of the literature using PubMed and other search engines; reports also were obtained by scanning incoming journals in medical libraries and reviewing references in pertinent review articles, major textbooks, and syllabi from national and international meetings on diabetes subjects using relevant titles and text words (e.g., diabetes self-management, education, training, behavior change). The defined search terms varied only to reflect each of the specific self-care behaviors. An electronic database was created to include full reference information for each report; abstracts for most of the reports were included in the database. In total, 1,621 reports were identified. A review of recent guidelines, position statements, and articles not identified in the universal search also was conducted to obtain additional information that was potentially relevant to the questions. Key reports, whether supportive or not, were included and summarized based on their relevance to the practice questions addressed in the guidelines. Evidence relating to diabetes self-management diabetes education and diabetes self-management training was reviewed, graded, and cited as appropriate in this document.

Grading of Evidence

The AADE Research Committee rated the evidence cited to support the recommendations. This committee provides technical advice regarding matters of research (behavior, clinical, and other) and any other question pertaining to research as requested to support DSME/T. The development of the guidelines was driven by the strength of the evidence and revised to accurately reflect the recent science and body of knowledge.

Two members of the Research Committee rated each piece of evidence according to criteria presented in Table 1 (Appendix A). Whenever possible, practice recommendations were assigned a letter grade (A-D) based on the level of scientific substantiation (See Table 2 in Appendix A). An A grade is the strongest recommendation, indicating that the evidence derives from a methodically robust study, typically a randomized control trial (RCT) or a very high-quality quasi-experimental study. The AADE Research Committee noted that not all RCTs necessarily provide level 1 evidence. Rather, in some instances, RCTs could be level 2 or 3 if they were poorly executed or used inappropriate methodology. A grade of D indicates evidence that is built on consensus.

The following evidence grading process was used:

1. AADE posted all relevant articles to be graded—along with the criteria, score sheet, and guidelines—on a Web-based document sharing system.
2. Two evidence graders from the AADE Research Committee were assigned to each paper. If they agreed on a level of evidence (e.g., level 1), the work was considered done and the agreed-upon grade assigned. If they disagreed, a third grader was invited to grade the evidence and serve as a “tie breaker.”
3. Reviewers posted their grades to the score sheet document in the Web-based document sharing system.

4. The grades were provided to the writing team and were included in the reference section of the guidelines.

Finally, the quality and validity of the draft guidelines document was assessed by six reviewers using the AGREE instrument, which was modified to accommodate the intent of the guidelines.²² Reviewers then recommended adoption of the guidelines. See Table 1 and Table 2 in Appendix A for the grading criteria.

Summary of Recommendations

- All patients with diabetes should have access to diabetes self-management education and training. (A)
- Diabetes self-management education and training should focus primarily on supporting behaviors that promote effective self-management as described in the AADE7™ Self-Care Behaviors. (B)
- Diabetes self-management education and training should follow a comprehensive 5-step process that includes: assessment, goal-setting, planning, implementation, and evaluation. (C)
- Diabetes self-management education and training should be delivered by individuals who are prepared and competent. (A)
- People who deliver DSME/T and care services should function within the practice level articulated in these guidelines. (D)

Diabetes Self-Management Education and Training: Background

An estimated 24 million Americans have diabetes.²³ Of these individuals, approximately 18 million have been diagnosed with the disease, while 6 million are unaware that they have diabetes.²³ The highest prevalence of diagnosed and undiagnosed diabetes occurs among Native Americans, African Americans, and Hispanics.²³

Poorly controlled diabetes leads to complications such as macrovascular disease, retinopathy, neuropathy, nephropathy, and lower extremity amputations.²⁴⁻²⁶ Macrovascular complications are the leading cause of death in persons with diabetes.²⁷ The annual direct and indirect costs associated with diabetes and its complications are estimated to be \$174 billion.²⁸

Large controlled clinical trials have demonstrated that intensive treatment of diabetes can significantly decrease the development and/or progression of the complications of diabetes.^{24, 29,30} Studies differ on whether intensive management of all risk factors, including lipids, blood pressure, and glycemia had significant beneficial effects on cardiovascular-related deaths.^{31,32} This intensive therapy, however, was found to be cost-effective in primary practice settings.³²

Management of diabetes is predominantly self-directed, in that individuals are responsible for the day-to-day decisions related to controlling their disease.²⁰ Effective management requires patients to understand and use multiple technologies for glucose monitoring and medication administration as well as complex treatment strategies and problem-solving skills.^{24,29,33, 34, 35}

Approximately 90% of diabetes care is delivered by primary care providers (PCPs), often without the involvement of a qualified diabetes educator.³⁶ Although DSME/T is recognized as a crucial component in diabetes care,^{23, 37} and is both cost-effective and efficacious, many patients never receive formal training.^{38- 41} On average, only 14.3% of all diabetes-related primary care visits include diet or nutrition counseling, 10% include exercise counseling, and 3.6% include weight reduction counseling.³⁶ PCPs may only provide advice on risk reduction rather than training in diabetes self-management; therefore, patients may only receive information about diabetes care without receiving the education and skills training they need to effectively manage their diabetes.^{42,43}

Use of the term DSME/T has evolved over the years. For a summary of the rationale and evolution of this term, see Table 1.

Table 1. Evolution of the Term “Diabetes Self-Management Education and Training” (DSME/T)

- The diabetes education process has been called diabetes self-management education (DSME).
- DSME is the official term used in *The National Standards for Diabetes Self-Management Education*³ and in other important materials (e.g., *The Art and Science of Diabetes Self-Management Education: A Desk Reference for Healthcare Professionals*, American Association of Diabetes Educators; 2006).
- Diabetes self-management training is the official terminology used by the Centers for Medicare and Medicaid Services (CMS).
- In reality, diabetes educators provide more than training—they provide “education.” Because CMS and some other payers reimburse only for “training” and are unwilling to pay for “education,” AADE embraces both terms to reflect the accuracy of what is provided to the patient along with the pragmatism required by payer coverage and reimbursement policies.

DSME/T Practice Questions

Practice Question 1: Does diabetes self-management education and training improve outcomes?

DSME/T is recognized as an integral component of effective diabetes management.^{1,20} A large body of evidence supports the effectiveness of DSME/T in improving diabetes outcomes.⁴⁴⁻⁵⁷ Patients who received self-management

education in a group setting improved their diabetes knowledge and reduced their fasting blood glucose levels, hemoglobin A1C (A1C) levels, systolic blood pressure levels, and body weight, thus reducing their need for diabetes medication.⁴⁵

A systematic review of 71 trials by Warsi and colleagues also showed reductions in A1C and systolic blood pressure in patients who received formal training in diabetes self-management.⁴⁶ In addition, Norris and colleagues demonstrated that self-management education improves glycated hemoglobin (GHb) levels at immediate follow up, and that increased contact time is associated with an increased effect.⁵¹

Positive outcomes are linked to DSME/T that focuses on self-management, emphasizes behavioral strategies, and provides culturally relevant information.^{39,56,52} Models that encourage active engagement of patients and build self-efficacy have been shown to increase the effectiveness of self-management skills and improve outcomes.^{59,60} Norris and colleagues found evidence that supports the effectiveness of self-management training for people with type 2 diabetes.^{61,62}

Brown and colleagues demonstrated that culturally competent self-management education, in both individual and support group settings, improved health outcomes in Mexican-Americans, particularly those with an A1C level under 10%.⁶³ Similar benefits have been achieved when the educational intervention included face-to-face delivery, a cognitive reframing teaching method, and exercise content.⁵²

A study by Piatt and colleagues showed that DSME/T, when implemented within the context of the Chronic Care Model, improved clinical and behavioral outcomes in an underserved community.⁵⁵

A number of other studies have reported findings that strongly support cost reduction as a benefit of diabetes education.^{50,63-66} Duncan's recent actuarial analysis associated cost reductions with high quality care and DSME/T.³⁹

Practice Question 2: What is the framework for diabetes self-management education and training?

Traditionally, DSME/T has been perceived and applied as a “content-focused” activity. Within this paradigm, diabetes educators use primarily didactic presentations to transfer to patients information about diabetes, diabetes treatments, and necessary lifestyle modifications. Little or no emphasis was placed on addressing or achieving the behavioral changes needed to make those modifications.^{1,51,71}

New theories and findings have helped to transition DSME/T toward patient-provider interactions that are focused on patient concerns, and in which the patient is listened to and helped to work through issues.¹³ These interactions result in greater patient satisfaction than do those in which the provider does most of the talking and gives directions.¹⁶ A review by Glasgow and colleagues showed that patients who feel understood and supported by their providers are more likely to have high levels of self-confidence and to succeed at behavior change. This report also

documented that improved patient-provider communication and increased involvement of patients in decision-making are associated with improved behavioral, biological, and quality-of-life outcomes.⁷² In addition, diabetes educators are moving beyond a behavioral focus to integrate patient empowerment and psychosocial strategies into the AADE7™ Self-Care Behaviors construct.

AADE7™ Self-Care Behaviors

A workgroup of diabetes educators identified seven self-care behaviors that are essential for successful and effective diabetes self-management by mapping the 15 content areas of the 1995 *National Standards for Diabetes Self-Management Education* and by reviewing the literature and expert consensus.⁷³ Today, these seven self-care behaviors (AADE7™) are incorporated into *The National Standards for Diabetes Self-Management Education*.²⁰ They include: healthy eating, being active, monitoring, taking medication, problem solving, healthy coping, and reducing risks. Systematic reviews of the evidence supporting these behaviors were undertaken in 2007.

Table 2. AADE7™ Self-Care Behavior Definitions⁷⁴

Healthy eating: Making healthy food choices, understanding portion sizes and learning the best times to eat are central to managing diabetes. By making appropriate food selections, children and teenagers grow and develop as they would if they didn't have diabetes. And, by controlling their weight, many adults may be able to manage their condition for a time without medications.

Diabetes self-management education and training classes can assist people with diabetes in gaining knowledge about the effect of food on blood glucose, sources of carbohydrates and fat, appropriate meal planning and resources to assist in making food choices. Skills taught include reading labels, planning and preparing meals, measuring foods for portion control, fat control and carbohydrate counting. Barriers, such as environmental triggers and emotional, financial, and cultural factors, are also addressed.

Being active: Regular activity is important for overall fitness, weight management and blood glucose control. With appropriate levels of exercise, those at risk for type 2 diabetes can reduce that risk, and those with diabetes can improve glycemic control. Being active can also help improve body mass index, enhance weight loss, help control lipids and blood pressure, and reduce stress.

Diabetes educators and their patients collaborate to address barriers, such as physical, environmental, psychological, and time limitations. They also work together to develop an appropriate activity plan that balances food and medication with the activity level.

Monitoring: Daily self-monitoring of blood glucose provides people with diabetes the information they need to assess how food, physical activity, and medications affect their blood glucose levels. Monitoring, however, doesn't stop there. People with diabetes also need to regularly check their blood pressure, urine ketones, and weight.

Diabetes self-management education and training classes instruct patients about equipment choice and selection, timing and frequency of testing, target values, and interpretation and use of results.

Taking medication: Diabetes is a progressive condition. Depending on what type a person has, their healthcare team will be able to determine which medications they should be taking and help them understand how their medications work. They can demonstrate how to inject insulin or explain how diabetes pills work and when to take them. Effective drug therapy in combination with healthy lifestyle choices, can lower blood glucose levels, reduce the risk for diabetes complications, and produce other clinical benefits.

The goal is for the patient to be knowledgeable about each medication, including its action, side effects, efficacy, toxicity, prescribed dosage, appropriate timing and frequency of administration, effect of missed and delayed doses, and instructions for storage, travel, and safety.

Problem solving: A person with diabetes must keep their problem-solving skills sharp because on any given day, a high or low blood glucose episode or a sick day will require them to make rapid, informed decisions about food, activity, and medications. This skill is continuously put to use because even after decades of living with the disease, stability is never fully attained; the disease is progressive, chronic complications emerge, life situations change, and the patient is aging.

Collaboratively, diabetes educators and patients address barriers, such as physical, emotional, cognitive, and financial obstacles and develop coping strategies.

Healthy coping: Health status and quality of life are affected by psychological and social factors. Psychological distress directly affects health and indirectly influences a person's motivation to keep their diabetes in control. When motivation is dampened, the commitments required for effective self-care are difficult to maintain. When barriers seem insurmountable, good intentions alone cannot sustain the behavior. Coping becomes difficult and a person's ability to self-manage their diabetes deteriorates.

An important part of the diabetes educator's work is identifying the individual's motivation to change behavior, then helping set achievable behavioral goals and guiding the patient through multiple obstacles. They can provide support by encouraging patients to talk about their concerns and fears and can help them learn what they can control and offer ways for them to cope with what they cannot.

Reducing risks: Effective risk reduction behaviors such as smoking cessation and regular eye, foot, and dental examinations reduce diabetes complications and maximize health and quality of life. An important part of self-care is learning to understand, seek, and regularly obtain an array of preventive services.

Diabetes educators assist patients in gaining knowledge about standards of care, therapeutic goals, and preventive care services to decrease risks. Skills taught include smoking cessation, foot inspections, blood pressure monitoring, self-monitoring of blood glucose, aspirin use, and maintenance of personal care records.

Healthy eating. There is now good evidence to show the benefits of healthy eating for people with diabetes. These include: improvement in glycemic control and lipid profiles, maintenance of blood pressure in the target range, and weight loss or maintenance.⁷⁵⁻⁷⁷ Because there is no one set of nutrition recommendations or intervention that apply to all persons with diabetes, AADE believes nutrition and education should begin with an assessment of each individual's current eating habits and preferences. Then, in collaboration with the individual, the appropriate nutrition education program and goals should be determined. The healthy eating self-care behavior is addressed by two distinct, but interrelated healthcare services, DSME/T and medical nutritional therapy (MNT).⁷⁸ The emphasis on nutrition education, not MNT, serves as the basis for the healthy eating self-care behavior in the DSME/T program.

Being active. Exercise is important in both type 1 and type 2 diabetes.⁷⁹ For persons with type 2 diabetes, engaging in regular exercise may improve glycemic control and reduce the risk of microvascular and macrovascular complications, increase insulin sensitivity, reduce stress and depression, contribute to weight loss/maintenance, and

contribute to control of lipids and blood pressure, thereby reducing the risk of cardiovascular disease, which is the leading cause of death in persons with diabetes.^{26,79-85}

Patients with type 1 diabetes also can benefit from regularly engaging in exercise or physical activity.⁸⁶ Outcomes from exercise among type 1 diabetes patients may include: potential improvements in glycemic control (although findings on this outcome are mixed); reduction in the risk of cardiovascular disease; improvements in lipid profile and blood pressure; improvement in endothelial function (a marker for cardiovascular event risk); improvement in insulin sensitivity; and reduction of weight.^{47,48,77-90} Studies are needed to identify the most effective interventions regarding physical activity.⁹¹ However, current evidence strongly supports the benefits of becoming and remaining physically active as a component of diabetes management.⁹¹

Monitoring. Self-monitoring may include such assessments as blood glucose levels, blood pressure, foot checks, steps walked, weight, and achievement of goals.⁹²⁻⁹³

Self-monitoring behaviors aim to prevent or slow the progression of diabetes complications. Information and instruction on self-monitoring for foot care will promote self-care and reduce complications.^{93,34} Blood pressure monitoring is effective in detecting and helping to control hypertension, which is a major risk factor for cardiovascular and cerebral vascular disease and microvascular complications.⁹³

Self-monitoring of blood glucose (SMBG) is a tool that guides glycemic management strategies and has the potential to improve problem-solving and decision-making skills for persons with diabetes and their healthcare providers. SMBG can promote improved understanding of the impact of foods, physical activity, and medications on blood glucose levels. It can facilitate more timely adjustment of therapeutic regimens, and support flexibility in meal planning, physical activity, and medication administration.^{92,93}

Recommendations for use of SMBG in type 1 diabetes are clearly defined by various medical organizations.^{94,95} SMBG is also particularly valuable in pregnancy, as intensive glycemic control during pregnancy has been shown to significantly benefit fetal outcomes.⁹⁶⁻⁹⁸ Although results from randomized clinical trials assessing the impact of SMBG in non-insulin-treated individuals have been mixed,⁹⁸⁻¹⁰² a large number of observational trials have revealed a strong association between SMBG and improved diabetes outcomes.^{53,102,103} Healthcare providers should encourage individuals with diabetes to use SMBG.^{104,105}

Taking medication. The value of pharmacologic therapy in achieving and maintaining diabetes control has been clearly established. In addition to investigating pharmacotherapy and improved A1C, well-designed trials have explored the benefit of pharmacologic therapy in improving avoidable and costly microvascular and macrovascular outcomes of diabetes.^{24,104, 105}

Among patients who require pharmacologic therapy, adherence is essential for optimal diabetes outcomes and control. Reports characterizing common barriers to using diabetes medications have linked worse diabetes care outcomes to poor diabetes medication adherence.¹⁰⁶⁻¹⁰⁹ The most commonly cited factors for non-adherence to medication therapy include: regimen complexity (e.g., need to split tablets, mix products), dosing frequency greater than twice daily, cost, lack of self-confidence, lack of education about the use of the product, depression, and presence or fear of adverse effects.^{109,110} In an informal survey of diabetes educators in 2005, patient resistance and fear, weight gain, inconvenience, physician resistance, inadequate support, and cost were among factors suggested as barriers to using insulin.¹³ Diabetes educators are in a key position to promote medication-taking by (1) identifying potential barriers to medication adherence; (2) facilitating strategies to overcome barriers; and (3) providing follow-up assessment to ensure the ongoing medication-taking ability for patients.¹⁰⁴

Problem solving. Problem solving is a strategy that has been used in DSME/T to facilitate patients' attainment of each of the other self-management behaviors (healthy eating, being active, taking medications, monitoring, healthy coping, and reducing risks). Within the AADE core outcomes framework, problem solving is defined as "a learned behavior that includes generating a set of potential strategies for problem resolution, selecting the most appropriate strategy, applying the strategy, and evaluating the effectiveness of the strategy."¹² Problem solving is most commonly characterized as involving a sequence of rational steps, and it is recognized as a core component of effective diabetes self-management.¹¹⁰⁻¹¹⁵

A systematic review of problem solving in diabetes highlighted the complexity of problem solving, noting that it is a multidimensional concept.^{110,111-113} This review, used in developing these guidelines, yielded a small-to-moderate body of recent work addressing problem solving as a component of DSME/T. Few studies have actually included general measures of problem solving as part DSME/T interventions. However, a number of studies, including one by Glasgow and colleagues, assessed problem solving in response to hypothetical problem situations and found that an "increase in problem-solving was a partial mediator of outcomes."^{111,113,114}

Studies applying problem solving to specific self-management behaviors are most often associated with findings of problem solving as necessary and robust. Some evidence associates low levels of problem solving with poor glycemic outcomes. Less clear are associations of problem solving skills with other metabolic parameters such as lipids or blood pressure. Overall, the evidence suggests that problem solving training may be an effective intervention tool for select outcomes.¹¹¹⁻¹¹⁵ More studies are needed to elucidate mechanisms of action and optimal approaches to standardizing assessment and intervention.

Healthy coping. Health status and quality of life are affected by cognitive, emotional, social, and situational factors. Psychological distress may directly affect physiological aspects of health and indirectly influence a person's thoughts, motivation to keep his or her diabetes in control, and healthcare behaviors. When motivation is dampened, the commitment to and behavioral steps required for effective self-care are difficult to maintain. When barriers seem

insurmountable, good intentions alone cannot sustain the behavior. Coping efforts may become difficult and, in turn, a person's ability to self-manage his or her diabetes may deteriorate.¹¹⁶⁻¹¹⁹

A systematic review of the literature on coping, negative emotions, and diabetes management by Fisher and colleagues identified a number of well-controlled studies that evaluated cognitive-behavioral treatment of depression, coping/problem-solving interventions, support groups, and cognitive analytical therapy.¹¹⁹ While the diversity of intervention approaches limits understanding of the most optimal interventions to improve healthy coping, as a whole, the body of research supports the positive impact of coping interventions on quality of life in people with diabetes.^{116,119-123} The literature also has demonstrated the benefits of interventions to promote healthy coping on metabolic control.^{116,118,121,122,124-127}

Thus, an important part of the diabetes educator's work is identifying: (1) the patient's thoughts regarding living with diabetes; (2) the patient's motivation to change behavior; (3) the presence and intensity of negative emotions; and (4) the social/situational barriers to and facilitators of optimal self-care. Once these are identified, the diabetes educator helps in setting realistic and achievable behavioral goals and guiding the patient through multiple obstacles.^{10,11,12}

Reducing risks. Reducing risks is defined as implementing effective risk reduction behaviors to prevent or slow the progression of diabetes complications.^{94,95,128,129} Diabetes care processes and outcomes have improved over the past 10 years, but in one study, only approximately 7% of persons with diabetes have achieved established goals for glycemic control, blood pressure, and lipids.¹³⁰

The AADE7TM framework defines the following skills to be taught to people with diabetes as interventions that reduce diabetes complications and maximize health and quality of life: smoking cessation, foot checks, blood pressure monitoring, self-monitoring of blood glucose, maintenance of personal care records, and regular eye, foot, and dental examinations.¹ Addressing these behaviors is supported by other medical organizations.^{94,95}

Role of the AADE7TM Framework in DSME/T

The AADE7TM Self-Care Behaviors support a paradigm shift in DSME/T from a content-driven practice to an outcomes-driven practice, providing an evidence-based framework for assessment, intervention, and outcomes (evaluation) measurement of the diabetes patient, the DSME/T program, and populations. Through use of the AADE7TM Self-Care Behaviors, educators are able to determine their effectiveness with individuals and populations, compare their performance with established benchmarks, and measure and quantify the unique contribution that DSME/T makes in the overall context of diabetes care.^{11,12} Peoples and colleagues have developed a schematic of the DSME/T outcomes continuum, delineating the process through which addressing change in the seven self-care behaviors promotes clinical improvement and improved health status.⁷³

Practice Question 3: What is the process for implementing diabetes self-management education and training?

Implementation of DSME/T involves five defined steps: (1) assessment; (2) goal setting; (3) planning; 4) implementation; and 5) evaluation/monitoring.^{11,12} These steps are described as follows (additional provider-level information is presented in Table 3):

Assessment

The first step in the DSME/T process is performing an assessment, which requires ongoing collection and interpretation of relevant data. The extent of the education assessment is dependent upon the skill level of the DSME/T provider (Table 3). The diabetes educator collects assessment data in a systematic and organized fashion from the patient and, as appropriate, from family members, members of the patient's social support network, existing medical records, and referring healthcare providers.

Goal Setting

Involvement of the person with diabetes is critical for achievement of goals. Effective goal setting for each of the AADE7™ Self-Care Behaviors is both self-directed by the patient and collaborative between the diabetes educator and the patient.^{131,132} One of the goals of DSME/T is to improve overall health status by empowering the person with diabetes to acquire the necessary self-management knowledge and skills, develop the confidence to perform appropriate self-care behaviors, and develop the problem solving and coping skills to overcome any barriers to self-care behaviors.¹²

Accordingly, theoretical approaches to behavior change, patient empowerment, and patient-centered communication are used to facilitate goal setting. Theoretical approaches include social cognitive theory, theory of reasoned action, transtheoretical model, and theory of planned behavior. Patient empowerment is a philosophical approach that speaks to the values and vision of the educator.¹³³ These theories and models assist patients in identifying behaviors they wish to address and then work with the diabetes educator to create a self-directed behavior change plan.

Planning

The diabetes educator develops the DSME/T plan to attain the mutually defined goals and outcomes.^{16,132} The plan integrates current diabetes care practices and established principles of teaching, learning, and behavior change. The plan is coordinated among the diabetes healthcare team members, the person with or at risk for diabetes, his or her family and other relevant support systems, and the referring provider.¹³⁴

Table 3. General Scope of Diabetes Educational/Clinical Care Activities

	Level 1 Non-Healthcare Professional	Level 2 Healthcare Professional Non-Diabetes Educator	Level 3 Non-Credentialed Diabetes Educator	Level 4 Credentialed Diabetes Educator*	Level 5 Advanced Level Diabetes Educator/Clinical Manager** (non-Rx with protocols or Rx)
Assessment	<ul style="list-style-type: none"> •Follow office or hospital protocol for patient intake •Verify basic literacy/numeracy •Provide support and basic information/guidance for accessing care 	<ul style="list-style-type: none"> •Follow office or hospital protocol for patient intake •Measure VS, anthropometrics •Verify basic literacy/numeracy •Provide support and basic information/guidance for accessing care •Assess family and community support system •Assess cultural barriers to self care or behavior change •Assess availability of healthy food choices and community resources for engagement in physical activity 	<ul style="list-style-type: none"> •Assess basic DM skills/knowledge of diabetes and literacy/numeracy •Assess for motivation and readiness to learn and make behavior changes •Assess attitude toward learning and preferred learning style •Assess impact of social, economic and cultural aspects/circumstances •Identify potential barriers to behavior change, including: cognitive and physical limitations, literacy, lack of support systems, negative cultural influences •Screen for acute and long-term complications 	<ul style="list-style-type: none"> •Assess basic DM skills/knowledge of diabetes and literacy/numeracy •Assess impact of social, economic and cultural aspects/circumstances •Assess for motivation and readiness to learn and make behavior changes •Assess attitude toward learning and preferred learning style •Identify potential barriers to behavior change, including: cognitive and physical limitations, literacy, lack of support systems, negative cultural influences •Perform clinical assessment, including relevant lab values •Perform physical assessment, including signs of malnutrition and anthropometrics •Assess for food/drug interactions •Assess for use of OTC 	<ul style="list-style-type: none"> •Assess basic DM skills/knowledge of diabetes and literacy/numeracy •Assess impact of social, economic and cultural aspects/circumstances •Assess for motivation and readiness to learn and make behavior changes •Assess attitude toward learning and preferred learning style •Identify potential barriers to behavior change, including: cognitive and physical limitations, literacy, lack of support systems, negative cultural influences •Perform clinical assessment, including relevant lab values •Perform physical assessment, including signs of malnutrition and anthropometrics •Assess for food/drug interactions •Assess for use of OTC medications and supplements

				<p>medications and supplements</p> <ul style="list-style-type: none"> •Assess for diabetes-specific and related medication use (i.e., insulin-to-carb ratios) •Assess for psychosocial adjustment, including coping strategies and eating disorders •Make discipline-specific diagnosis, as appropriate 	<ul style="list-style-type: none"> •Assess for diabetes-specific and related medication use (i.e., insulin-to-carb ratios) •Assess for psychosocial adjustment, including coping strategies and eating disorders •Make discipline-specific diagnosis and/or prescribe, as appropriate
Goal Setting	<ul style="list-style-type: none"> • May help set goals 	<ul style="list-style-type: none"> •Guides the patient to increase intake of vegetables and fruit •Guides the patient to increase leisure time physical activity •Identify community resources 	<ul style="list-style-type: none"> •Guide patient in setting individualized behavioral goals •Guide patient to prioritize goals based upon assessment and preference •Develop success metrics 	<ul style="list-style-type: none"> •Guide patient in setting individualized behavioral and clinical goals to address needs identified in all areas of the assessment •Guide patient to prioritize goals based upon assessment and preference •Develop success metrics •Use behavior change methodology (MI, cognitive therapy, etc.) to ensure and influence patient participation in the education process. 	<ul style="list-style-type: none"> •Guide patient in setting individualized behavioral and clinical goals to address needs identified in all areas of the assessment • Guide patient to prioritize goals based upon assessment and preference •Develop success metrics •Use behavior change methodology (MI, cognitive therapy, etc.) to ensure and influence patient participation in the education process.
Planning	<ul style="list-style-type: none"> •Follow prescriber's orders and diabetes educator's guidance 	<ul style="list-style-type: none"> •Follow prescriber's orders and CDE guidance for plan 	<ul style="list-style-type: none"> •Develop basic plan related to acquiring necessary DM skills based on needs identified in assessment 	<ul style="list-style-type: none"> •Develop an educational plan to address behavioral goals established in the goal setting process •Develop a learning plan to address gaps in knowledge •Plan strategies for addressing barriers identified •Refer to prescriber as 	<ul style="list-style-type: none"> •Develop a detailed intervention plan to address both clinical and behavioral goals established in the goal setting process •Develop a learning plan to address gaps in knowledge •Plan strategies for addressing barriers identified •Follow protocols and/or refer to specialist as

				needed	needed; prescribe as appropriate.
Implementation	<ul style="list-style-type: none"> •Offer guidance on accessing care and financial issues (reimbursement) •Refer to prescriber or CDE as needed 	<ul style="list-style-type: none"> •Suggest/support/assist with DM skill training; offer guidance on accessing care and financial issues (reimbursement) •Refer to prescriber or CDE as needed •Provide culturally appropriate basic health information •Organize community advocacy activities •Explain procedures •Assist with skill development 	<ul style="list-style-type: none"> •Suggest/support DM skill training; offer guidance on accessing care and financial issues (reimbursement) •Refer to prescriber or CDE as needed 	<ul style="list-style-type: none"> •Recommend & execute plan; ensure pt has the knowledge, skills and resources necessary to follow through on the plan •Identify and address barriers that become evident throughout the process 	<ul style="list-style-type: none"> •Recommend & execute plan; ensure pt has the knowledge, skills and resources necessary to follow through on the plan •Prescribe as appropriate •Identify and address barriers that become evident throughout the process
Evaluation/ Follow-Up	<ul style="list-style-type: none"> •Monitor adherence •Report assessment findings to prescriber and DE 	<ul style="list-style-type: none"> •Monitor adherence •Report assessment findings to prescriber and DE •Healthcare utilization •Refer for diabetes self-care education 	<ul style="list-style-type: none"> •Re-assess cognition of goals and plan •Monitor adherence •Refer to prescriber or CDE as needed 	<ul style="list-style-type: none"> •Re-assess cognition of goals and plan •Re-assess clinical and behavioral goal achievement at each visit •Re-assess and revise plan and goals •Re-assess cognition/re-evaluate knowledge and skills •Monitor adherence to plan •Refer to prescriber or others as needed 	<ul style="list-style-type: none"> •Re-assess cognition of goals and plan •Re-assess clinical and behavioral goal achievement at each visit •Re-assess and revise plan and goals •Re-assess cognition/re-evaluate knowledge and skills •Monitor adherence to plan •Follow protocols or prescribe •Refer to other specialists as appropriate

* It is recognized that some healthcare professionals who are Level 2 or 3 educators may undertake elements of DSME/T that are identified in Level 4, however, these practitioners lack nationally recognized certification in diabetes self-management education.

**Includes but not limited to, BC-ADM and Advanced Practice Nurse

NOTE: Level 4 and 5 practitioners may supervise those in the lower levels.

Implementation

The diabetes educator provides DSME/T according to the agreed upon plan. The educator guides implementation of the DSME/T plan and interfaces with the various care providers, patient and caregivers, as noted above.^{1,11,132}

Implementation also may be linked to other community and professional services/resources. It is important that patients fully understand and are able to perform the tasks defined in the plan.

Evaluation/Monitoring

For each patient, the diabetes educator evaluates the quality and outcomes of the self-care behaviors at baseline, and at regular intervals to determine the effectiveness of the DSME/T for the individual in the seven behavioral areas.^{12,15,16} The educator uses individual outcomes to guide the intervention for each patient with diabetes. Ongoing evaluation and monitoring of plan implementation is a critical component of behavior change.^{12,15} Providers will facilitate this process according to their appropriate level (Table 3).¹⁵

Practice Question 4: Who should deliver diabetes self-management education and training to persons with diabetes?

Diabetes education has historically been provided by nurses and dietitians.¹³⁶ However, the role of the diabetes educator has expanded to providers in other disciplines; this is especially true of pharmacists, who have demonstrated successful implementation of diabetes education programs in retail pharmacy settings.^{45,69,137} In addition, a number of other healthcare providers (e.g., physicians, exercise physiologists, mental health practitioners) actively provide DSME/T. Eye care specialists and podiatrists also contribute their expertise to education programs.²⁰

Although reports on the effectiveness of the various disciplines for education are mixed,^{46,48,51} registered nurses, registered dietitians, and registered pharmacists are generally viewed as the primary providers of DSME/T and curriculum development. However, a multi-disciplinary team may be strengthened by a multi-level tiered continuum approach that leverage labor, human capital, and education theories.¹³⁸⁻¹⁴² According to the US Bureau of Labor Statistics, “A wide variety of people with various educational backgrounds are necessary for the healthcare industry to function; including ... some in highly educated occupations who possess graduate level training or beyond.¹⁴³ In addition, others in the healthcare field may possess a more easily earned certificate. Usually all individuals working in healthcare have benefited from both classroom and clinical instruction.”¹⁴³ This model underlies the design of healthcare, social service and health education teams.¹⁴⁴⁻¹⁴⁶ Members of a team possess personal traits (e.g., creativity, wisdom, empathy) as well as knowledge and skills that are developed through academic and experiential learning.¹⁴⁷⁻¹⁵⁰ The modern healthcare team structure benefits from the interdependence of the team members and how they amplify one another.¹⁴⁹⁻¹⁵²

The multi-level DSME/T team builds upon concepts about the structure of teams in the workplace, the sociology of a specialty or profession, and alignment of authority and responsibility among the team members.¹⁴⁷⁻¹⁵⁴ This approach recognizes the key role of the higher level educator as well as the importance and contributions of lay health and community workers who are uniquely positioned to collaborate with diabetes educators and other healthcare providers to improve the quality of diabetes care in communities.¹⁵⁵ The multi-level team may be particularly relevant for emerging models of care coordination, such as the patient-centered medical home.¹⁵⁶

Practice Question 5: What are the unique roles and responsibilities of those who deliver diabetes self-management education and care?

As noted above, DSME/T is provided by healthcare professionals from many disciplines, involving practitioners with varying levels of experience/expertise in diabetes management, diabetes education, and clinical care.^{136-38,157-161} The composition of the team may vary to best meet the patients' needs, and while high quality patient care is associated with a tiered approach, it is essential that a key individual coordinate the team effort.¹⁶²⁻¹⁷³ Such care can be effectively overseen by a non-physician practitioner.¹⁷⁴

An integrated DSME/T team is patient-centered and goal-directed, with equal emphasis on education, counseling, and providing input for medical treatment. Being collaborative in nature, the interdisciplinary team shares common goals, a shared professional identity and fosters relationships among its members.¹⁷⁵⁻¹⁷⁷ The healthcare professional that is also a credentialed diabetes educator brings added benefits to such a team.^{178,179} The scope of work, however, for at least some of those working in a diabetes education team is regulated by state licensure requirements.

An example from a related service may be helpful -- social service teams include the multi-level team concept. Social service assistants are similar to Level 1 (and possibly Level 2) diabetes educators in that they:

Help social workers, healthcare workers, and other professionals provide services to people, usually work under the direction of workers from a variety of fields, such as nursing, psychiatry, psychology, or social work. The amount of responsibility and supervision they are given varies a great deal. Some have little direct supervision... Others work under close direction... Social and human service assistants provide services to clients to help them improve their quality of life. They assess clients' needs, investigate their eligibility for benefits and services ...and help them obtain them. They also arrange for transportation, if necessary, and provide emotional support.¹⁸⁰

Given the diversity of DSME/T providers and skill levels, it is necessary to delineate levels of practice for the delivery of DSME/T (Table 3). These guidelines propose five distinct levels of care that are differentiated by educational preparation, credentialing, professional practice regulations, and the clinical practice environment, as follows:

Level 1, non-healthcare professional; *Level 2*, healthcare professional non-diabetes educator; *Level 3*, non-credentialed diabetes educator; *Level 4*, credentialed diabetes educator; and *Level 5*, advanced level diabetes educator/clinical manager (Table 3).

Level 1: Non-Healthcare Professional

Level 1 includes community healthcare workers and other non-professional healthcare providers who have little expertise in diabetes education and/or management, but provide and/or support healthcare services to individuals with diabetes. This level includes, but is not limited to: health promoters, health educators, and community health workers.^{155,181} A key focus of Level 1 individuals, particularly community health workers, is practical problem solving, advocacy, and assistance with obtaining access to care, services, medications, etc.¹⁸² Performance of activities at this level of care should be under the direction of a qualified diabetes healthcare professional who has training and expertise in areas relative to the direct care and ongoing support services specified in Table 3.^{17,183,-184} Non-diabetes educators can be expected to perform the following:

- *Assessment:* Measure vital signs and anthropometrics, assess literacy, and follow protocols for patient intake. Assessment may include family and social support systems. Provide support, general information, and guidance regarding accessing care, available diabetes education offerings, and financial assistance.
- *Goal Setting:* May help patients by providing basic information and assisting in setting basic goals for healthy eating and physical activity.
- *Planning.* Follow the prescriber's orders and diabetes educator's guidance for planning.
- *Implementation:* Refer/support diabetes management skill training, and offer guidance on accessing care and financial resources. Level 1 DSME/T providers may lead support groups or organize a community physical activity (e.g., walking group). Level 1 providers refer to the prescriber or diabetes educator as needed.
- *Monitoring/Evaluation:* Monitor progress toward the plan and report findings to the prescriber and diabetes educator.

Level 2: Healthcare Professional Non-Diabetes Educator

This level includes professional healthcare providers who have little expertise in diabetes education and/or management, but provide and/or support healthcare services to individuals with diabetes. This level includes, but is not limited to: medical assistants (MAs), licensed practical nurses (LPNs), registered nurses (RNs), nutritionists, dietetic technicians registered (DTR), registered pharmacists (RPh), and others.¹⁸⁵⁻¹⁸⁷ As with Level 1 providers, a key focus of individuals at this level is practical problem solving, advocacy, and assistance with obtaining access to care, services, medications, and so forth.¹⁸² Performance of activities at this level of care assumes that the individual

is a healthcare professional working under the direction of a qualified diabetes healthcare professional and has training and expertise in areas relative to the medical care and support services specified in Table 3.¹⁸⁵ The amount and type of professional education is the main distinction between Level 1 and Level 2 non-diabetes educators. (Table 3) The Level 2 healthcare professional non-diabetes educator can be expected to perform the following tasks with, perhaps, greater insight into the overall health status of the patient than can the Level 1 educator:

- *Assessment:* Measure vital signs and anthropometrics, assess literacy, and follow protocols for patient intake. Assessment may include family and social support systems. Provide support and general information and guidance regarding accessing care (i.e., available diabetes education offerings) and financial assistance.
- *Goal Setting:* Level 2 providers assist patients by providing basic information, assisting in setting basic goals for healthy eating and physical activity, and by identifying community resources.
- *Planning:* Follow the prescriber's orders and diabetes educator's guidance for planning.
- *Implementation:* Refer/support/assist diabetes management skill training. For example, Level 2 providers might offer guidance on accessing care, identify financial resources, and provide culturally appropriate basic health information. Level 2 providers may lead support groups or organize community physical activity (e.g., walking group). They may refer to prescriber or diabetes educator as needed.
- *Monitoring/Evaluation:* Monitor progress toward the plan and report findings to the prescriber and diabetes educator.

It is recognized that some healthcare professionals who are Level 2 educators may undertake elements of DSME/T that are identified in Level 4, however, these practitioners lack nationally recognized certification in diabetes self-management education.

Level 3: Non-Credentialed Diabetes Educator

Diabetes educators are healthcare professionals who have achieved a core body of knowledge and skills in the biological and social sciences, communication, counseling, and education and who have experience in the care of people with diabetes.¹⁸² Level 3 includes individuals who meet the AADE definition of "diabetes educator" but are not credentialed as a certified diabetes educator (CDE®) or board certification in advanced management (BC-ADM). AADE defines diabetes educators as follows: "Diabetes educators are healthcare professionals who focus on helping people with and at risk for diabetes and related conditions achieve behavior change goals which, in turn, lead to better clinical outcomes and improved health status."¹⁸² Diabetes educators apply in-depth knowledge and skills in the biological and social sciences, communication, counseling, and education to provide self-management education and training.^{17,182, 187,188, 189}

This level includes, but is not limited to: registered nurses, registered dietitians, registered pharmacists, licensed mental health professionals, and exercise physiologists. Regardless of discipline, the diabetes educator must be prepared to assist persons with diabetes in attaining the knowledge and skills to effectively manage their diabetes. Diabetes educators must possess a body of knowledge that spans across disciplines to provide comprehensive DSME/T.^{11,15} For example, RDs who are also diabetes educators may provide instruction for insulin injection, insulin dosing, and medication side effects, in addition to nutrition counseling. Moreover, RDs can also provide MNT as a separate service; use of both DSME/T and MNT may be more efficacious for some patients than for those who receive just one of these interventions.⁷⁸ Other examples include exercise physiologists who function in the diabetes educator role may help patients develop a meal plan, and pharmacists may provide counseling and instruction about foot care in addition to instruction on proper use of medications.¹⁸⁹⁻¹⁹¹ (See Table 3)

It is the position of AADE that all diabetes educators should work toward receiving formal certification. Diabetes educators, as well as those with the CDE® credential¹⁸⁹ or the advanced BC-ADM (board certification in advanced diabetes management) credential,¹⁹⁰ are chiefly concerned with and actively engaged in the process of DSME/T, as follows:

- *Assessment:* Conduct a thorough, individualized self-management assessment of the person with or at risk for diabetes.
- *Goal Setting:* Guide the patient in setting and prioritizing individualized behavioral goals based on assessment and preference. This process also includes developing success metrics for the specific behavior(s) to be addressed.
- *Planning:* Collaboratively develop basic plans for persons with diabetes to acquire necessary diabetes self-management skills based on the needs identified in the assessment.
- *Implementation:* Provide diabetes self-care skill training. Offer guidance on accessing care and financial issues (reimbursement) and refer to prescriber or CDE® or BC-ADM as needed.
- *Monitoring/Evaluation:* Re-assess understanding of and progress toward the patient's goals and plan, and refer to the prescriber or CDE® as needed.

It is recognized that some healthcare professionals who are Level 3 educators may undertake elements of DSME/T that are identified in Level 4, however, these practitioners lack nationally recognized certification in diabetes self-management education.

Level 4: Credentialed Diabetes Educator

In addition to fulfilling the requirements of a diabetes educator, certified diabetes educators meet the academic, professional, and experiential requirements set forth by the National Certification Board for Diabetes Educators

(NCBDE).¹⁸⁹ As part of the application process, a diabetes educator must document that he or she meets all the criteria for certification. An accepted applicant must demonstrate competency in the required body of knowledge and skills by means of a written examination. Certification is valid for a period of 5 years and is maintained either through repeat examination or through documented participation in relevant continuing education activities every 5 years. As specified in Table 3, Level 4 providers can be expected to perform the following:

- *Assessment:* Use the assessment performed by Level 1, 2, or 3 providers. Perform assessments of physical health, medications, and psychosocial issues and identify areas for education and clinical interventions.
- *Goal Setting:* Guide persons with diabetes in setting individualized behavioral and clinical goals to address the needs identified in all areas of the assessment, develop success metrics, and use behavior change methodology to facilitate patient participation in the education process.
- *Planning:* Develop an education plan to address behavioral goals established during the goal setting process, develop a learning plan to address gaps in knowledge, collaborate with patients to plan strategies for addressing barriers identified, and refer to the prescriber as needed.
- *Implementation:* Recommend and execute plans, ensuring that the patient has the knowledge, skills, and resources necessary to follow through on the plan. Identify and address barriers that become evident throughout the process.
- *Monitoring/Evaluation:* At each visit, monitor progress of the plan and re-assess the patient's understanding of goals and plan, knowledge and skills, and clinical and behavioral goal achievement. Providers, in collaboration with the patient, revise the plan and goals as needed. They refer to the prescriber as needed.

Level 5: Advanced Level Diabetes Educator/Clinical Manager

Practitioners with the BC-ADM credential and other providers at this level incorporate skills and strategies of DSME/T into more comprehensive clinical management of people with diabetes.¹⁹⁰ Level 5 practice is characterized by autonomous assessment, problem identification, planning, implementation, and evaluation of diabetes care. Providers at this level function either with protocols or have prescriptive authority. To meet Level 5 criteria, these individuals must possess skill in performing complete and/or focused assessments, recognizing and prioritizing complex data, and providing therapeutic problem solving, counseling, and regimen adjustments for persons with diabetes.¹⁷ As specified in Table 3, Level 5 roles and responsibilities include:

- *Assessment:* Use the assessment performed by Level 1, 2, 3, and 4 providers. Perform more complex assessments of physical health, medications, and psychosocial issues and make a diagnosis for education and clinical interventions.

- *Goal Setting:* Guide patients in setting individualized behavioral and clinical goals to address the needs identified in all areas of the assessment, develop success metrics, and use behavior change methodology to facilitate and influence patient participation in the education process.
- *Planning:* Develop an education plan to address both behavioral and clinical goals established during the goal setting process, develop a learning plan to address gaps in knowledge, and collaborate with patients to plan strategies for addressing barriers identified.
- *Implementation:* Recommend and execute plans, ensuring that the patient has the knowledge, skills, and resources necessary to follow through on the plan. Identify and address barriers that become evident throughout the process.
- *Monitoring/Evaluation:* At each visit, monitor progress of the plan and re-assess the patient's understanding of goals and plan, knowledge and skills, and clinical and behavioral goal achievement. Providers involve the patient in revising the plan and goals as needed. Follow protocols as prescribed, make treatment changes and refer to other specialists as needed.

Other Diabetes Education Professionals

Most, but not all, diabetes educators are engaged in the practice of DSME/T.¹⁹² Those who do not, can make important contributions to healthcare in the areas such as healthcare management, academia, public health, research, informatics, or sports medicine. The levels discussed above may not directly apply to such diabetes educators.

Cost of Implementing the Guidelines

Studies on the economic impact associated with the implementation of guidelines have generally confirmed that standardizing practice results in cost savings.^{137,138} AADE estimates that the economic implications of implementing these guidelines will be minimal and the benefits in improved patient outcomes are likely to be notable. However, the actual costs (and savings) of guidelines implementation for the practice of diabetes education have not been addressed and will remain unclear until specific analyses of guidelines adoption have been undertaken.

Addressing Potential Barriers to Implementation of these Guidelines

AADE recognizes that implementation of the recommendations included in these guidelines may be affected by barriers to the delivery of DSME/T at the patient, practitioner, organizational, or societal level. These barriers may include:

- Lack of public awareness regarding the severity of diabetes and the importance of DSME/T.
- Inadequate and/or lack of reimbursement and coverage limitations relevant to DSME/T.

- Inadequate and/or lack of staffing and resource allocation within clinical and community settings.
- Practice constraints regarding licensure and inconsistencies from state to state.
- Institutional resistance to change (e.g., need to adjust staffing, workflow, role delineation, budgets).

A recent claims data analysis supports the use of diabetes education and training as a cost-effective component of quality care for all persons with diabetes.³⁹ Although it is beyond the scope of this document to address the financial and organizational barriers identified, AADE is actively working with local, state, and federal policy makers to resolve these issues and expand access to DSME/T for all persons with diabetes. Further, AADE has developed education resources and tools to assist DSME/T providers in integrating the AADE7™ framework into their practices. These resources and tools are available on the AADE website (www.diabeteseducator.org/ProfessionalResources).

Looking to the Future

These guidelines address the current practice climate of DSME/T, while the theory underlying self-management continues to evolve. It is likely the education and professional preparation of diabetes educators will continue to adapt to accommodate the emerging theories, be outcomes driven, and address the roles and competencies for each level of educator.

The literature reflects increasing focus on prevention of diabetes and contains recent reports on models of delivery that are being built on telephonic/electronic communication.^{130,137,193,194}

In the future, some education interventions are likely to be provided via the Internet and other electronic means of delivery. To remain current, AADE will review these guidelines every three years and revise as needed.

Summary

Diabetes is a serious disease that is reaching epidemic proportions and affects an estimated 24 million Americans.²³ Poorly controlled diabetes leads to a number of severe complications and death.²⁴ The annual direct and indirect costs associated with diabetes and its complications are considerable.²⁸

Self-management of diabetes can significantly decrease the development and/or progression of diabetic complications, and it has been found to be cost-effective in primary practice settings.^{23,29, 39} Because diabetes is predominately a self-managed disease, effective self-management requires patients to understand and use multiple technologies, medications, complex treatment strategies, and problem-solving skills.^{23,29,34} The diabetes educator is in a unique position to address patients', and healthcare system needs.

Although DSME/T is recognized as a crucial component in diabetes care, many patients never receive formal training.^{24,35,36} AADE recognizes the need to make DSME/T available to all persons with diabetes. DSME/T providers must be competent to deliver quality services within the context of their practice levels.¹⁷ AADE further advocates the use of a defined process and education strategies that facilitate positive self-care behaviors.

These guidelines serve to clarify the roles and responsibilities of DSME/T providers. AADE encourages all DSME/T providers to incorporate these guidelines into their practices in order to expand access to high-quality diabetes education and thereby improve the quality of diabetes care.

Authors

Chris Parkin, MS
Debbie Hinnen, ARNP, BC-ADM, CDE, FAAN
Virginia Valentine, CNS, BC-ADM, CDE
Donna Rice, MBA, BSN, RN, CDE
Marian L. Batts-Turner, MSN, RN, CDE
Linda Haas, PHC, RN, CDE
Carolé Mensing, RN, MA, CDE
Terry Lumber, RN, CNS, CDE, BC-ADM
Karen Fitzner, PhD
Barbara Stetson, PhD
Karen McKnight, RD, LD
Kris Ernst, BSN, RN, CDE
Terry Compton, MS, APRN, RN, CDE
Joe Nelson, MA, LP
Jane Jeffrie Seley, MPH, MSN, GNP, CDE, BC-ADM
Nancy Letassy, RPH
Dawn Sherr, RD, CDE

Acknowledgements

AADE wishes to acknowledge the members of AADE Research Committee, who graded the evidence used in the development of these guidelines, as follows:

Catherine Barnes, PhD, RN
Suzanne Austin Boren, PhD, MHA
Carol J. Homko, PhD, RN, CDE
Daniel J. Kent, PharmD, CDE
Julienne Kirk, PharmD
Laurie Ruggiero, PhD
Barbara Stetson, PhD
Daniel R. Touchette, PharmD, MA

AADE also recognizes the following PPC members who offered guidance to the finalization of the guidelines.

Tamara Hammons, PharmD, CDE
Barbara Kocurek, PharmD, BCPS, CDE
Karen Pope, MSN, RN, CDE
Martha P. Quintana, RN, BSN, CDE
Patricia Lierman, RD, LD, MS, MED, BC-ADM, CDE
Lois Moss-Barnwell, MS, RD, LDN, CDE

AADE also wishes to acknowledge the individuals who served as reviewers for these guidelines, as follows:

Tammy L. Brown, MPH, RD, BC-ADM, CDE, Captain USPHS, Indian Health Services Division of Diabetes Treatment and Prevention
Kristina Ernst, BSN, RN, CDE, Public Health Advisor, Division of Diabetes Translation
Martha M. Funnell, MS, RN, CDE, Michigan Diabetes Research and Training Center, Juvenile Diabetes Research Foundation Center for the Study of the Complications in Diabetes
Kate Lorig, DrPH, RN, Patient Education Research Center, Department of Medicine, Stanford University
Vincenza Snow, MD, FACP, Clinical Programs and Quality Care, American College of Physicians
Pam Michael, MBA, RD, Nutrition Services Coverage, American Dietetic Association

References

***The evidence rating that has been assigned to each citation is shown at the end of the citation.*

1. American Association of Diabetes Educators. AADE7 Self-Care Behaviors. *Diabetes Educ.* 2008;34:445-449. (4)
2. Leonard J Jr, Liburd L, Spencer T, Airhihenbuwa CO. Understanding the environmental issues in diabetes self-management education research: a reexamination of 8 studies in community-based settings. In: Leonard J Jr, Laine C, eds. Supplement: Diabetes Translation and Public Health: 25 Years of CDC Research and Programs. *Ann Int Med.* 2004. 140(1): 964-971. (3)
3. Mensing C, Boucher J, Cypress M, et al. National standards for diabetes self-management education. *Diabetes Care.* 2007;30:S96-S103. (4)
4. American Diabetes Association. Summary of Revisions for the 2008 Clinical Practice Recommendations. *Diabetes Care.* 2008;31:S3-S4. (4)
5. American Diabetes Association. Summary of Revisions for the 2007 Clinical Practice Recommendations. *Diabetes Care.* 2007;30:S3. (4)
6. American Diabetes Association. Clinical Practice Recommendations 2005. *Diabetes Care.* 2005;28:S1-79.(4)
7. U.S. Department of Health and Human Services. Healthy People 2000 Final Review. Hyattsville, MD: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention; 2001. (4)
8. Anderson RM, Funnell MM. Patient empowerment: reflections on the challenge of fostering the adoption of a new paradigm. *Patient Educ Couns.* 2005;57:153-157. (4)
9. Funnell MM, Anderson RM. Changing office practice and health care systems to facilitate diabetes self-management. *Curr Diab Rep.* 2003;3:127-133. (4)
10. Anderson RM, Funnell MM, Butler PM, Arnold MS, Fitzgerald JT, Feste CC. Patient empowerment. Results of a randomized controlled trial. *Diabetes Care.* 1995;18:943-949. (1)

11. Martin C, Daly A, McWhorter LS, Shwide-Slavin C, Kushion W. The scope of practice, standards of practice, and standards of professional performance for diabetes educators. *Diabetes Educ.* 2005;31:487-488, 490, 492. (4)
12. Mulcahy K, Maryniuk M, Peeples M, et al. Diabetes self-management education core outcomes measures. *Diabetes Educ.* 2003;29:768-764, 787-788. (4)
13. Rubin RR, Peyrot M, Siminerio LM. Health care and patient-reported outcomes: results of the cross-national Diabetes Attitudes, Wishes, and Needs (DAWN) study. *Diabetes Care.* 2006;29:1249-1255. (2)
14. Furler J, Walker C, Blackberry I, et al. The emotional context of self-management in chronic illness: a qualitative study of the role of health professional support in the self-management of type 2 diabetes. *BMC Health Serv Res.* 2008;8:214. (3)
15. American Association of Diabetes Educators. The Scope of Practice, Standards of Practice, and Standards of Professional Performance for Diabetes Educators. 2008.
http://www.diabeteseducator.org/export/sites/aade/_resources/pdf/The_Scope_of_Practice_07_14_08_Updated.pdf. Accessed March 23, 2009. (4)
16. Funnell MM, Brown TL, Childs BP, Haas LB, et al. National standards for diabetes self-management education. *Diabetes Care.* 2008;31:S97-104. (4)
17. Burke S, ed. Competencies for Diabetes Educators. American Association of Diabetes Educators.2009.
http://www.diabeteseducator.org/export/sites/aade/_resources/pdf/competencies.pdf. (4)
18. American Association of Diabetes Educators. Guidelines for developing AADE position statements. 2008.
http://www.diabeteseducator.org/export/sites/aade/_resources/doc/GUIDELINES_FOR_POSITION_STATEMENTS.doc. Accessed March 23, 2009 (n/a)
19. Shane-McWhorter L, Armor B, Johnson JT, Letassy N, Reichert SL, Sisson EM, Sommers JB, Triplett HC, Vivian EM. Pharmacist Scope of Practice, Standards of Practice, and Standards of Professional Performance for Diabetes Educators. *The Diabetes Educator*, November/December 2009; vol. 35, 3 suppl: pp. 69S-84S. (4)
20. American Association of Diabetes Educators. National Standards, Essential Elements and Interpretive Guidance.
http://www.diabeteseducator.org/export/sites/aade/_resources/pdf/National_Standards_and_Interpretive_Guidance_5.27.2009.pdf (4)

21. Appraisal of guidelines research and evaluation. Introduction. 2001.
<http://www.agreecollaboration.org/intro>. Accessed March 23, 2009. (n/a)
22. Lohr K, Field M. A provisional instrument for assessing clinical practice guidelines. In: Field M, Lohr K, eds. Guidelines for Clinical Practice. From Development to Use. Washington, DC: National Academy Press; 1992. (n/a)
23. Centers for Disease Control and Prevention. National diabetes fact sheet: general information and national estimates on diabetes in the United States, 2007. Atlanta, GA: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention; 2008. (1)
24. Diabetes Control and Complications Trial (DCCT) Research Group. The effect of intensive treatment of diabetes on the development and progression of long-term complications in insulin-dependent diabetes mellitus. *N Engl J Med*. 1993;329:977-986. (1)
25. Huxley R, Barzi F, Woodward M. Excess risk of fatal coronary heart disease associated with diabetes in men and women: meta-analysis of 37 prospective cohort studies. *BMJ*. 2006;332:73-78. (2)
26. Haffner SM, Lehto S, Ronnema T, Pyorala K, Laakso M. Mortality from coronary heart disease in subjects with type 2 diabetes and in nondiabetic subjects with and without prior myocardial infarction. *N Engl J Med*. 1998;339:229-234. (2)
27. Niskanen L, Turpeinen A, Penttila I, Uusitupa MI. Hyperglycemia and compositional lipoprotein abnormalities as predictors of cardiovascular mortality in type 2 diabetes: a 15-year follow-up from the time of diagnosis. *Diabetes Care*. 1998;21:1861-1869. (2)
28. Direct and Indirect Costs of Diabetes in the United States. American Diabetes Association.
<http://www.diabetes.org/diabetes-statistics/cost-of-diabetes-in-us.jsp>. Accessed January 9, 2009. (1)
29. UK Prospective Diabetes Study (UKPDS) Group. Intensive blood-glucose control with sulphonylureas or insulin compared with conventional treatment and risk of complications in patients with type 2 diabetes (UKPDS 33). *Lancet*. 1998;352:837-853. (1)
30. Holman RR, Paul SK, Bethel MA, Matthews DR, Neil HA. 10-Year follow-up of intensive glucose control in type 2 diabetes. *N Engl J Med*; 2008;359:1577-1589. (1)
31. Gaede P, Lund-Andersen H, Parving HH, Pedersen O. Effect of a multifactorial intervention on mortality in type 2 diabetes. *N Engl J Med*. 2008;358:580-591. (2)

32. Gaede P, Valentine WJ, Palmer AJ, et al. Cost-effectiveness of Intensified versus conventional multifactorial intervention in type 2 diabetes: results and projections from the steno-2 study. *Diabetes Care*. 2008;31:1510-1515. (2)
33. Juvenile Diabetes Research Foundation Continuous Glucose Monitoring Study Group. Continuous glucose monitoring and intensive treatment of type 1 diabetes. *N Engl J Med*. 2008;359:1464-1476. (1)
34. National Heart Lung and Blood Institute. Questions and Answers Action to Control Cardiovascular Risk in Diabetes (ACCORD) Study. March 15, 2010.
http://www.nhlbi.nih.gov/health/prof/heart/other/accord/q_a.htm. (4)
35. The Look AHEAD Research Group. Long-term Effects of a Lifestyle Intervention. on Weight and Cardiovascular Risk Factors in Individuals With Type 2 Diabetes Mellitus Four-Year Results of the Look AHEAD Trial. *Arch Intern Med*. 2010;170(17):1566-1575. (1)
36. U.S. Department of Health and Human Services. National Ambulatory Medical Care Survey; 2004. (1)
37. Norris SL, Engelgau MM, Narayan KM. Effectiveness of self-management training in type 2 diabetes: a systematic review of randomized controlled trials. *Diabetes Care*. 2001;24:561-587. (1)
38. Coonrod BA, Betschart J, Harris MI. Frequency and determinants of diabetes patient education among adults in the U.S. population. *Diabetes Care*. 1994;17:852-858. (3)
39. Duncan, Birkmeyer. Value of the diabetes educator: Solucia Consulting Interim Report for AADE. Sept. 2008. *Diabetes Educ* 2009 35: 752 (2)
40. S Boren S ,Fitzner KA, Panhalkar PS, Specker JE. Costs and Benefits Associated With Diabetes Education: A Review of the Literature. *Diabetes Educ* 2009; 35; 72 (3)
41. Duke SA, Colagiuri S, Colagiuri R. Individual patient education for people with type 2 diabetes mellitus. *Cochrane Database Syst Rev*. 2009 Jan 21;(1):CD005268.(2)
42. Simkin-Silverman LR, Gleason KA, King WC, et al. Predictors of weight control advice in primary care practices: patient health and psychosocial characteristics. *Prev Med*. 2005;40:71-82. (2)
43. Shah BR, Hux JE, Laupacis A, Zinman B, van WC. Clinical inertia in response to inadequate glycemic control: do specialists differ from primary care physicians? *Diabetes Care*. 2005;28:600-606. (2)
44. AACE Diabetes Mellitus Clinical Practice Guidelines Task Force. American Association of Clinical Endocrinologists Medical Guidelines for Clinical Practice for the Management of Diabetes Mellitus. *Endocr Pract*. 2007;13:3-68. (4)

45. Deakin T, McShane CE, Cade JE, Williams RDRR. Group based training for self-management strategies in people with type 2 diabetes mellitus. *Cochrane Database of Systematic Reviews* 2005, Issue 2. Art. No.: CD003417. DOI: 10.1002/14651858.CD003417.pub2. (1)
46. Warsi A, Wang PS, LaValley MP, Avorn J, Solomon DH. Self-management education programs in chronic disease: a systematic review and methodological critique of the literature. *Arch Intern Med*. 2004;164:1641-1649. (1)
47. Keers JC, Groen H, Sluiter WJ, Bouma J, Links TP. Cost and benefits of a multidisciplinary intensive diabetes education programme. *J Eval Clin Pract*. 2005;11:293-303. (2)
48. Gary TL, Genkinger JM, Guallar E, Peyrot M, Brancati FL. Meta-analysis of randomized educational and behavioral interventions in type 2 diabetes. *Diabetes Educ*. 2003;29:488-501. (1)
49. Wolf AM, Conaway MR, Crowther JQ, et al. Translating lifestyle intervention to practice in obese patients with type 2 diabetes: improving Control with Activity and Nutrition (ICAN) study. *Diabetes Care*. 2004;27:1570-1576. (1)
50. Wolf AM, Siadaty M, Yaeger B, et al. Effects of lifestyle intervention on health care costs: improving control with activity and nutrition (ICAN). *J Am Diet Assoc*. 2007;107:1365-1373. (2)
51. Norris SL, Lau J, Smith SJ, Schmid CH, Engelgau MM. Self-management education for adults with type 2 diabetes: a meta-analysis of the effect on glycemic control. *Diabetes Care*. 2002;25:1159-1171. (1)
52. Ellis SE, Speroff T, Dittus RS, Brown A, Pichert JW, Elasy TA. Diabetes patient education: a meta-analysis and meta-regression. *Patient Educ Couns*. 2004;52:97-105. (1)
53. Schwedes U, Siebolds M, Mertes G. Meal-related structured self-monitoring of blood glucose: effect on diabetes control in non-insulin-treated type 2 diabetic patients. *Diabetes Care*. 2002;25:1928-1932. (1)
54. Renders CM, Valk GD, Griffin SJ, Wagner EH, Eijk Van JT, Assendelft WJ. Interventions to improve the management of diabetes in primary care, outpatient, and community settings: a systematic review. *Diabetes Care*. 2001;24:1821-1833. (2)
55. Piatt GA, Orchard TJ, Emerson S, et al. Translating the chronic care model into the community: results from a randomized controlled trial of a multifaceted diabetes care intervention. *Diabetes Care*. 2006;29:811-817. (1)
56. T Skinner TC, Carey ME, Craddock S, Dalyb H, Davies MJ, Dohertye Y, Heller S, Khunti K, Oliver L,, on behalf of the DESMOND Collaborative. Diabetes education and self-management for ongoing and newly diagnosed (DESMOND): Process modeling of pilot study. <http://www.desmond-project.org.uk/>. (1)

57. National Institute of Diabetes and Digestive and Kidney Diseases. Metabolic control matters. Nationwide translation of the diabetes control and complications trial: analysis and recommendations. Bethesda, MD, US Dept HHS, 1994; NIH publication no. 94-3773. (1)
58. Whittemore R. Strategies to facilitate lifestyle change associated with diabetes mellitus. *J Nurs Scholarship*. 2000;32:225-232. (2)
59. Lorig KR, Ritter PL, Laurent DD, Plant K. Internet-based chronic disease self-management: a randomized trial. *Med Care*. 2006;44:964-971. (1)
60. National Institute for Clinical Excellence (NICE). Guidance on the Use of Patient Education Models for Diabetes. 2003. <http://www.nice.org.uk/nicemedia/pdf/60Patienteducationmodelsfullguidance.pdf>. (4)
61. Norris SL, Engelgau MM, Narayan KMV: Effectiveness of self-management training in type 2 diabetes: a systematic review of randomized controlled trials. *Diabetes Care*. 2001;24:561–587. (1)
62. Norris SL, Nichols PJ, Caspersen CJ, et al. The effectiveness of disease and case management for people with diabetes: a systematic review. *Am J Prev Med*. 2002;22:15-38. (1)
63. Brown SA, Garcia AA, Kouzekanani K, Hanis CL. Culturally competent diabetes self-management education for Mexican Americans: the Starr County border health initiative. *Diabetes Care*. 2002;25:259-268. (1)
64. Cranor CW, Bunting BA, Christensen DB. The Asheville Project: long-term clinical and economic outcomes of a community pharmacy diabetes care program. *J Am Pharm Assoc*. 2003; 43(2):173-184. (2)
55. Klonoff DC, Schwartz DM. An economic analysis of interventions for diabetes. *Diabetes Care*. 2000;23:390-404. (2)
66. Gilmer TP, Roze S, Valentine WJ, et al. Cost-effectiveness of diabetes case management for low-income populations. *Health Serv Res*. 2007;42:1943-1959. (3)
67. Trento M, Passera P, Borgo E, Tomalino M, et al. A 3-year prospective randomized controlled clinical trial of group care in type 1 diabetes. *Nutr Metab Cardiovasc Dis*. 2005;15:293-301. (2)
68. Loveman E, Frampton GK, Clegg AJ. The clinical effectiveness of diabetes education models for Type 2 diabetes: a systematic review. *Health Technol Assess*. 2008;12:1-136. (2)
69. Ragucci KR, Fermo JD, Wessell AM, Chumney EC. Effectiveness of pharmacist-administered diabetes mellitus education and management services. *Pharmacotherapy*. 2005;25:1809-1816. (3)

70. 71. Funnell MM, Anderson RM. Patient empowerment: a look back, a look ahead. *Diabetes Educ.* 2003;29:454-462. (4)
72. Glasgow RE, Hiss RG, Anderson RM, et al. Report of the health care delivery work group: behavioral research related to the establishment of a chronic disease model for diabetes care. *Diabetes Care.* 2001;24:124-130. (4)
73. Peebles M, Tomky D, Mulcahy K, Peyrot M, Siminerio L. Evolution of the American Association of Diabetes Educators' diabetes education outcomes project. *Diabetes Educ.* 2007;33:794-817. (4)
74. American Association of Diabetes Educators. AADE7™ Self-Care Behaviors (Definitions). <http://www.diabeteseducator.org/ProfessionalResources/AADE7/index.html> (4)
75. Bantle JP, Wylie-Rosett J, Albright AL, et al. Nutrition recommendations and interventions for diabetes: a position statement of the American Diabetes Association. *Diabetes Care.* 2008;31:S61-S78. (4)
76. Povey R, Clark-Carter D. Diabetes and Healthy Eating - A Systematic Review of the Literature *The Diabetes Educator.* 2007;33(6):931-959. (1)
77. Wing RR, Goldstein MG, Acton KJ, et al. Behavioral science research in diabetes: lifestyle changes related to obesity, eating behavior, and physical activity. *Diabetes Care.* 2001;24:117-123. (4)
78. Daly A, Michael P, Johnson EQ, Harrington C, Patick S, Bender T. Diabetes White Paper: Defining the Delivery of Nutrition Services in Medicare Medical Nutrition Therapy vs. Medicare Diabetes Self-Management Training Programs. *J Am Diet Assoc.* 2009;109:528-539. (4)
79. Albright A, Chapter 35 Reducing Risks pg 777, 781 Mensing C, ed. The Art and Science of Diabetes Self-Management Education. A Desk Reference for Healthcare Professionals. Chicago, IL: American Association of Diabetes Educators; 2007. (4)
80. Boule NG, Haddad E, Kenny GP, Wells GA, Sigal RJ. Effects of exercise on glycemic control and body mass in type 2 diabetes mellitus: a meta-analysis of controlled clinical trials. *JAMA.* 2001;286:1218-1227. (2)
81. Harris MD. Psychosocial aspects of diabetes with an emphasis on depression. *Curr Diab Rep.* 2003;3:49-55. (4)
82. Anderson RJ, Freedland KE, Clouse RE, Lustman PJ. The prevalence of comorbid depression in adults with diabetes: a meta-analysis. *Diabetes Care.* 2001;24:1069-1078. (2)

83. Lawlor DA, Hopker SW. The effectiveness of exercise as an intervention in the management of depression: systematic review and meta-regression analysis of randomised controlled trials. *BMJ*. 2001;322:763-767. (1)
84. Klein S, Sheard NF, Pi-Sunyer X, et al. Weight management through lifestyle modification for the prevention and management of type 2 diabetes: rationale and strategies: a statement of the American Diabetes Association, the North American Association for the Study of Obesity, and the American Society for Clinical Nutrition. *Diabetes Care*. 2004;27:2067-2073. (4)
85. Albright A, Franz M, Hornsby G, et al. American College of Sports Medicine position stand. Exercise and type 2 diabetes. *Med Sci Sports Exerc*. 2000;32:1345-1360. (4)
86. Wasserman DH, Zinman B. Exercise in individuals with IDDM. *Diabetes Care*. 1994;17:924-937. (4)
87. Pedersen BK, Saltin B. Evidence for prescribing exercise as therapy in chronic disease. *Scand J Med Sci Sports*. 2006;16:3-63. (1)
88. Lehmann R, Kaplan V, Bingisser R, Bloch KE, Spinaz GA. Impact of physical activity on cardiovascular risk factors in IDDM. *Diabetes Care*. 1997;20:1603-1611. (2)
89. Laaksonen DE, Atalay M, Niskanen LK, et al. Aerobic exercise and the lipid profile in type 1 diabetic men: a randomized controlled trial. *Med Sci Sports Exerc*. 2000;32:1541-1548. (2)
90. Fuchsjager-Mayrl G, Pleiner J, Wiesinger GF, et al. Exercise training improves vascular endothelial function in patients with type 1 diabetes. *Diabetes Care*. 2002;25:1795-1801. (3)
91. Kavookjian J, Elswick BM, Whetsel T. Interventions for being active among individuals with diabetes: a systematic review of the literature. *The Diabetes Educ*. 2007;33(6):962-988. (2)
92. Boren S, Gunlock TL, Schaefer J, Albright A. Reducing risks in diabetes self-management. *Diabetes Educ*. 2007;33:1053-1077. (2)
93. McAndrew L, Schneider SH, Burns E, Leventhal H. Does Patient Blood Glucose Monitoring Improve Diabetes Control? A Systematic Review of the Literature. *Diabetes Educ*., 2007;33(6):991-1010. (2)
94. American Diabetes Association. Standards of medical care in diabetes. *Diabetes Care*. 2009;32:S13-S61. (4)
95. The American Association of Clinical Endocrinologists Medical Guidelines for the Management of Diabetes Mellitus: the AACE system of intensive diabetes self-management. *Endocr Pract*. 2000;6:43-84. (4)

96. Goldberg JD, Franklin B, Lasser D, et al. Gestational diabetes: impact of home glucose monitoring on neonatal birth weight. *Am J Obstet Gynecol.* 1986;154:546-550. (2)
97. Jensen DM, Damm P, Moelsted-Pedersen L, et al. Outcomes in type 1 diabetic pregnancies: a nationwide, population-based study. *Diabetes Care.* 2004;27:2819-2823. (2)
98. Jovanovic LG. Using meal-based self-monitoring of blood glucose as a tool to improve outcomes in pregnancy complicated by diabetes. *Endocr Pract.* 2008;14:239-247. (4)
99. Ylinen K, Aula P, Stenman UH, Kesaniemi-Kuokkanen T, Teramo K. Risk of minor and major fetal malformations in diabetics with high hemoglobin A1c values in early pregnancy. *BMJ.* 1984;289:345-346. (3)
100. Barnett AH, Krentz AJ, Strojek K, et al. The efficacy of self-monitoring of blood glucose in the management of patients with type 2 diabetes treated with a gliclazide modified release-based regimen. A multicentre, randomized, parallel-group, 6-month evaluation (DINAMIC 1 study). *Diabetes Obes Metab.* 2008;10:1239-1247. (1)
101. Farmer A, Wade A, Goyder E, et al. Impact of self monitoring of blood glucose in the management of patients with non-insulin treated diabetes: open parallel group randomised trial. *BMJ.* 2007;335:132. (1)
102. Martin S, Schneider B, Heinemann L, et al. Self-monitoring of blood glucose in type 2 diabetes and long-term outcome: an epidemiological cohort study. *Diabetologia.* 2006;49:271-278. (2)
103. Murata GH, Shah JH, Hoffman RM, et al. Intensified blood glucose monitoring improves glycemic control in stable, insulin-treated veterans with type 2 diabetes: the Diabetes Outcomes in Veterans Study (DOVES). *Diabetes Care.* 2003;26:1759-1763. (1)
104. Austin MM, Haas L, Johnson T, et al. Self-monitoring of blood glucose: benefits and utilization. *Diabetes Educ.* 2006;32:835-837. (4)
105. Turner RC, Cull CA, Frighi V, Holman RR. Glycemic control with diet, sulfonylurea, metformin, or insulin in patients with type 2 diabetes mellitus: progressive requirement for multiple therapies (UKPDS 49). UK Prospective Diabetes Study (UKPDS) Group. *JAMA.* 1999;281:2005-2012. (1)
106. Pladevall M, Williams LK, Potts LA, Divine G, Xi H, Lafata JE. Clinical outcomes and adherence to medications measured by claims data in patients with diabetes. *Diabetes Care.* 2004;27:2800-2805. (3)
107. Krapek K, King K, Warren SS, et al. Medication adherence and associated hemoglobin A1C in type 2 diabetes. *Ann Pharmacother.* 2004;28:1357-1362. (2)

108. Ho PM, Rumsfeld JS, Masoudi FA, et al. Effect of medication nonadherence on hospitalization and mortality among patients with diabetes mellitus. *Arch Intern Med.* 2006;166:1836-1841. (2)
109. Odegard PS, Capoccia K. Medication taking and diabetes: a systematic review of the literature. *Diabetes Educ.* 2007;33:1014-1029. (2)
110. Meece J. Dispelling myths and removing barriers about insulin in type 2 diabetes. *Diabetes Educ.* 2006;32:9S-18S. (4)
111. Hill-Briggs F, Gemmell L. Problem solving in diabetes self-management and control: a systematic review of the literature. *Diabetes Educ.* 2007;33:1032-1050. (2)
112. Tomky D. Problem solving. A commentary. *Diabetes Educ.* 2007;33:1051-1052. (4)
113. Stetson B, Boren S, Leventhal H, Schlundt D, Glasgow R, Fisher EB, Iannotti R, Randal D, Kent D, Lumber T, Nelson J, Ruggiero L, Barnes C, Fitzner K. Embracing the evidence on problem solving in diabetes self-management education and support. *SelfCare.* 2010;1(3):83-99. (4)
114. Glasgow RE, Toobert DJ, Barrera M, Stryker LA. Assessment of problem solving: a key to successful diabetes self-management. *J Behav Med.* 2004;27:477-490. (3)
115. Glasgow RE, Toobert DJ, Hampson SE, Brown JE, Lewinsohn PM, Donnelly J. Improving self-care among older patients with type II diabetes: the "Sixty Something..." Study. *Patient Educ Couns.* 1992;19:61-74. (2)
116. Grey M, Boland EA, Davidson M, Yu C, Sullivan-Bolyai S, Tamborlane WV. Short-term effects of coping skills training as adjunct to intensive therapy in adolescents. *Diabetes Care.* 1998;21:902-908. (2)
117. Kent D, Haas L, Randal D, Lin E, Thorpe CT, Boren SA, Fisher J, Heins J, Lustman P, Nelson J, Ruggiero L, Wysocki T, Fitzner K, Sherr D, Martin AL. Healthy coping: issues and implications in diabetes education and care. *Popul Health Manag.* 2010 Oct;13(5):227-33. (4)
118. Grey M, Boland EA, Davidson M, Li J, Tamborlane WV. Coping skills training for youth with diabetes mellitus has long-lasting effects on metabolic control and quality of life. *J Pediatr.* 2000;137:107-113. (2)
119. Fisher EB, Thorpe CT, Devellis BM, Devellis RF. Healthy coping, negative emotions, and diabetes management: a systematic review and appraisal. *Diabetes Educ.* 2007;33:1080-1103. (2)
120. Lustman PJ, Griffith LS, Freedland KE, Kissel SS, Clouse RE. Cognitive behavior therapy for depression in type 2 diabetes mellitus. A randomized, controlled trial. *Ann Intern Med.* 1998;129:613-621. (2)

121. Didjurgeit U, Kruse J, Schmitz N, Stuckenschneider P, Sawicki PT. A time-limited, problem-orientated psychotherapeutic intervention in Type 1 diabetic patients with complications: a randomized controlled trial. *Diabet Med.* 2002;19:814-821. (2)
122. Karlsen B, Idsoe T, Dirdal I, Rokne HB, Bru E. Effects of a group-based counseling programme on diabetes-related stress, coping, psychological well-being and metabolic control in adults with type 1 or type 2 diabetes. *Patient Educ Couns.* 2004;53:299-308. (3)
123. Winkley K, Ismail K, Landau S, Eisler I. Psychological interventions to improve glycaemic control in patients with type 1 diabetes: systematic review and meta-analysis of randomised controlled trials. *BMJ.* 2006;333:65. (1)
124. Surwit RS, van Tilburg MA, Zucker N, et al. Stress management improves long-term glycemic control in type 2 diabetes. *Diabetes Care.* 2002;25:30-34. (2)
125. de Sonnaville JJ, Snoek FJ, Colly LP, Deville W, Wijkel D, Heine RJ. Well-being and symptoms in relation to insulin therapy in type 2 diabetes. *Diabetes Care.* 1998;21:919-924. (2)
126. Ellis DA, Frey MA, Naar-King S, Templin T, Cunningham PB, Cakan N. The effects of multisystemic therapy on diabetes stress among adolescents with chronically poorly controlled type 1 diabetes: findings from a randomized, controlled trial. *Pediatrics.* 2005;116:e826-e832. (2)
127. Ellis DA, Frey MA, Naar-King S, Templin T, Cunningham P, Cakan N. Use of multisystemic therapy to improve regimen adherence among adolescents with type 1 diabetes in chronic poor metabolic control: a randomized controlled trial. *Diabetes Care.* 2005;28:1604-1610. (2)
128. Boren SA, Gunlock TL, Schaefer J, Albright A. Reducing risks in diabetes self-management: a systematic review of the literature. *Diabetes Educ.* 2007;33:1053-1077. (2)
129. Boren SA. AADE7™ Self-Care Behaviors: systematic reviews. *Diabetes Educ.* 2007;33:866, 871. (n/a)
130. Saydah SH, Fradkin J, Cowie CC. Poor control of risk factors for vascular disease among adults with previously diagnosed diabetes. *JAMA.* 2004;291:335-342. (1)
131. Funnell MM, Brown TL, Childs BP, et al. National standards for diabetes self management education. *Diabetes Care.* 2008;31:S97-S104. (4)
132. AADE position statement: AADE7™ Self-Care Behaviors. *Diabetes Educ.* 2008;34:449. (4)

133. Anderson B, Funnell MM, Tang TS. Self-management of health. In: Mensing C, ed. *The Art and Science of Diabetes Self-Management Education: A Desk Reference for Healthcare Professionals*. Chicago, IL: American Association of Diabetes Educators; 2006:43-58. (4)
134. Standard 4. The Scope of Practice, Standards of Practice, and Standards of Professional Performance for Diabetes Educators. American Association of Diabetes Educators. 2008.
http://www.diabeteseducator.org/export/sites/aade/resources/pdf/The_Scope_of_Practice_07_14_08_Updated.pdf. Accessed January 7, 2009. (4)
135. Peeples M, Mulcahy K, Tomky D, Weaver T. The conceptual framework of the National Diabetes Education Outcomes System (NDEOS). *Diabetes Educ*. 2001;27:547-562.(4)
136. Davis ED. Role of the diabetes nurse educator in improving patient education. *Diabetes Educ*. 1990;16:36-38. (4)
137. Elliott RA, Barber N, Clifford S, Horne R, Hartley E. The cost effectiveness of a telephone-based pharmacy advisory service to improve adherence to newly prescribed medicines. *Pharm World Sci*. 2008;30:17-23. (2)
138. Zimelman LK. A team approach-consideration in developing diabetes care teams. *Diabetes Educ*. 1988;14(2):113-116. (4)
139. Becker G. Human Capital. <http://www.econlib.org/library/Enc/HumanCapital.html>
140. Ang, S. & Van Dyne, L. 2008. Conceptualization of cultural intelligence: Definition, distinctiveness, and nomological network. In S. Ang, & L. Van Dyne,(Eds.). *Handbook on cultural intelligence: Theory, measurement and applications* (pp. 3–15). (4)
141. Earley, P.C. & Ang, S. 2003. *Cultural intelligence: Individual interactions across cultures*. Palo Alto, Calif: Stanford University Press. (4)
142. Sanders MR, Turner KM, Mardie-Dadds C. The development and dissemination for the Triple P-Positive parenting program: a multilevel, evidence-based system of parenting and family support. *Prev Sci*. 2002;3(3):173-89. (4)
143. The US Bureau of Labor Statistics. <http://www.bls.gov/oco/cg/cgs035.htm#nature>. (1)
144. The US Bureau of Labor Statistics. Dietitians and Nutritionists. <http://www.bls.gov/oco/ocos077.htm> (1)
145. US Bureau of Labor Statistics: Social Service. <http://www.bls.gov/oco/ocos059.htm> (1)

146. US Bureau of labor Statistics Health Educator.. www.bls.gov/oco/ocos063.htm (1)
147. Smith A. An Inquiry into the Nature and Causes of the Wealth of Nations. London: Methuen and Co., Ltd., ed. Edwin Cannan, 1904. Fifth edition. (4)
148. Karwowski W. Division of labor refers to the way work is organized. International encyclopedia of ergonomics and human factors, Volume 3.
http://books.google.com/books?id=KeoMi5Y8Q_gC&pg=PA1484&lpg=PA1484&dq=construction+team+division+of+labor&source=bl&ots=pyss6MsH_c&sig=k7csojwNbcnHYBIdCRuXIIhRBk&hl=en&ei=Nf3OTMXVCoO0lQe2lMjnCA&sa=X&oi=book_result&ct=result&resnum=6&ved=0CCsQ6AEwBQ#v=onepage&q=construction%20team%20division%20of%20labor&f=false (3)
149. Van Maanen, J. and S. Barley (1984). "Occupational Communities: Culture and control in organizations." *Research in Organizational Behavior*, 6: 287-365. (3)
150. Hall, Richard and Pamela S. Tolbert. 2004. *Organizations: Structure, Process and Outcomes* (8th edition). Englewood Cliffs: Prentice Hall. (4)
151. Bureau of Labor Statistics. *Career Guide to Industries, 2010-11 Edition*
<http://www.bls.gov/oco/cg/cgs003.htm>. (1)
152. Rothman RL, So SA, Shin J, Malone RM, Bryant B, Dewalt DA, Pignone MP, Dittus RS.. Labor characteristics and program costs of a successful diabetes disease management program. *Am J Manag Care* 2006 May;12(5):277-83. (2)
153. Tobe SW, Lum-Kwong MM, Perkins N, Von Sychowski S, Sebaldt RJ, Kiss A. Heart and Stroke Foundation of Ontario (HSFO) high blood pressure strategy's hypertension management initiative study protocol. *BMC Health Serv Res*. 2008 Dec 10;8:251. (3)
154. Martin OJ, Wu WC, Taveira TH, Eaton CB, Sharma SC. Multidisciplinary Group Behavioral and Pharmacologic Intervention for Cardiac Risk Reduction in Diabetes: A Pilot Study. *Diabetes Educ*. 2007 Jan-Feb;33(1):118-27. (3)
155. American Association of Diabetes Educators. *Diabetes community health workers*. *Diabetes Educ*. 2003;29:818- 824. (4)
156. Health Policy Brief. Patient –Centered medical homes. A new way to deliver primary care may be more affordable and improve quality. But how widely adopted will the model be? *Health Affairs*. September 14, 2010. www.healthaffairs.org. (4)

157. Trento M, Basile M, Borgo E, Grassi G, Scuntero P, Trinetta A, Cavallo F, Porta M. A randomised controlled clinical trial of nurse-, dietitian- and pedagogist-led Group Care for the management of Type 2 diabetes. *J Endocrinol Invest.* 2008 Nov;31(11):1038-42. (1)
158. McLean DL, McAlister FA, Johnson JA, King KM, Makowsky MJ, Jones CA, Tsuyuki RT; SCRIP-HTN Investigators. A randomized trial of the effect of community pharmacist and nurse care on improving blood pressure management in patients with diabetes mellitus: study of cardiovascular risk intervention by pharmacists-hypertension (SCRIP-HTN). *Arch Intern Med.* 2008 Nov 24;168(21):2355-61. (1)
159. Lyon RB, Vinci DM. Nutrition management of insulin-dependent diabetes mellitus in adults: review by the diabetes care and education dietetic practice group. *J Am Diet Assoc.* 1993 Mar;93(3):309-14. (4)
160. McCulloch DK, Price MJ, Hindmarsh M, Wagner EH. A population-based approach to diabetes management in a primary care setting: early results and lessons learned. *Eff Clin Pract.* 1998 Aug-Sep;1(1):12-22. (3)
161. Wilson C, Brown T, Acton K, Gilliland S. Effects of clinical nutrition education and educator discipline on glycemic control outcomes in the Indian health service. *Diabetes Care.* 2003 Sep;26(9):2500-4. (3)
162. Morgan M, Dunbar J, Reddy P, Coates M, Leahy R. The TrueBlue study: is practice nurse-led collaborative care effective in the management of depression for patients with heart disease or diabetes? *BMC Fam Pract.* 2009 Jun 23;10:46. (3)
163. Hiss RG, Armbruster BA, Gillard ML, McClure LA. Nurse care manager collaboration with community-based physicians providing diabetes care: a randomized controlled trial. *Diabetes Educ.* 2007 May-Jun;33(3):493-502. (1)
164. National Diabetes Education Program (NDEP) TeamCare- Comprehensive Lifetime management for diabetes. <http://www.ndep.nih.gov/media/TeamCare.pdf>. (2)
165. Zimelman, L. Considerations in Developing Diabetes Care Teams *Diabetes Educ.* April 1988 vol. 14 no. 2 113-116. (4)
166. Rubin RR, Peyrot M, Siminerio LM. Health care and patient-reported outcomes: results of the cross-national Diabetes Attitudes, Wishes and Needs (DAWN) study. *Diabetes Care.* 2006 Jun;29(6):1249-55. (3)
167. Berry D, Urban A, Grey M. Management of type 2 diabetes in youth (part 2). *J Pediatr Health Care.* 2006 Mar-Apr;20(2):88-97. (3)

168. Cueto-Manzano AM, Cortés-Sanabria L, Martínez-Ramírez HR. Role of the primary care physician in diagnosis and treatment of early renal damage. *Ethn Dis*. 2009 Spring;19(1 Suppl 1):S1-68-72. (4)
169. Flynn DS, Jennings J, Moghabghab R, Nancekivell T, Tsang C, Cleland M, Shipman-Vokner K. Raising the bar of care for older people in Ontario emergency departments. *Int J Older People Nurs*. 2010 Sep;5(3):219-26. (3)
170. Janson SL, Cooke M, McGrath KW, Kroon LA, Robinson S, Baron RB. Improving chronic care of type 2 diabetes using teams of interprofessional learners. *Acad Med*. 2009 Nov;84(11):1540-8. (3)
171. Gary TL, Batts-Turner M, Yeh HC, Hill-Briggs F, Bone LR, Wang NY, Levine DM, Powe NR, Saudek CD, Hill MN, McGuire M, Brancati FL. The effects of a nurse case manager and a community health worker team on diabetic control, emergency department visits, and hospitalizations among urban African Americans with type 2 diabetes mellitus: a randomized controlled trial. *Arch Intern Med*. 2009 Oct 26;169(19):1788-94. (1)
172. Watts SA, Gee J, O'Day ME, Schaub K, Lawrence R, Aron D, Kirsh S. Nurse practitioner-led multidisciplinary teams to improve chronic illness care: the unique strengths of nurse practitioners applied to shared medical appointments/group visits. *J Am Acad Nurse Pract*. 2009 Mar;21(3):167-72. (3)
173. Shojania KG, Ranji SR, McDonald KM, Grimshaw JM, Sundaram V, Rushakoff RJ, Owens DK. Effects of quality improvement strategies for type 2 diabetes on glycemic control: a meta-regression analysis. *JAMA*. 2006 Jul 26;296(4):427-40. (1)
174. Davidson MB, Blanco-Castellanos M, Duran P. Integrating nurse-directed diabetes management into a primary care practice. *The American Journal of Managed Care*. Published online September 21, 2010. (3)
175. Bayless M, Martin C. The team approach to intensive diabetes management. *Diabetes Spectrum*. 1998;11(1):33-37. (4)
176. Funnell MM. Integrated approaches to the management of NIDDM patients. *Diabetes Spectrum*. 1993; 9:55-59. (3)
177. Anderson RM. The team approach to diabetes: an idea whose time has come. *Occupational Health Nurs*. 1982;30(13-14):66. (3)
178. Zrebiec J. A national study of The Diabetes Educator: report on a practice analysis conducted by the National Certification Board for Diabetes Educators. *Diabetes Educ*. 2009 Jul-Aug;35(4):657-63. Epub 2009 May 15. (2)

179. Daly A, Kulkarni K, Boucher J. The new credential: advanced diabetes management. *J Am Diet Assoc.* 2001 Aug;101(8):940-3. (4)
180. Social Service. US Bureau of Labor Statistics: <http://www.bls.gov/oco/ocos059.htm>. (1)
181. Loring K, Gonzalez VM. Community-based diabetes self-management education: definition and case study. *Diabetes Spectrum.* 2000;3:234-238. (4)
182. African-American Hairstylists Enlisted as Lay Health Promoters in Eight Michigan Cities. <http://www.rwjf.org/reports/grr/042800.htm> (4)
183. Norris S, Chowdhury F, Van Le K, Horsley T, Brownstein J, Zhang X, et al. Effectiveness of community health workers in the care of persons with diabetes. *Diabetic Medicine.* 2006;23(5):544-56. (1)
184. Cherrington A, Ayala GX, Amick H, Allison J, Corbie-Smith B, Scarinci I. Implementing the Community Health Worker Model Within Diabetes Management Challenges and Lessons Learned From Programs Across the United States. *Diabetes Educ.* 2008;34(5): 824-833 (3).
185. Ruggiero L, Moadsiri A, Butler P, Oros SM, Berbaum ML, Whitman S, Cintron D. Supporting Diabetes Self-Care in Underserved Populations: A Randomized Pilot Study Using Medical Assistant Coaches. *Diabetes Educ.*, January/February 2010; vol. 36, 1: pp. 127-131. (1)
186. Langford AT, Sawyer DR, Gioimo S, Brownson CA, O'Toole ML. Patient-Centered Goal Setting as a Tool to Improve Diabetes Self-Management. *Diabetes Educ.* 2007;33(Suppl 6):139S-144S. (3)
187. Barlow S, Crean J, Heizler A, Mulcahy K, Springer J. Diabetes Educators: Assessment of Evolving Practice. *Diabetes Educ.*, May/June 2005; vol. 31, 3: pp. 359-372. (4)
188. Butcher MK, Gilman J, Fitch Meszaros J, Bjorsness D, Madison M, McDowall JM, Oser CS, Johnson EA, Harwell TS, Helgeson SD, Gohdes D. Improving Access to Quality Diabetes Education in a Rural State: The Montana Quality Diabetes Education Initiative. *Diabetes Educ.ator.*, 2006; 32(6): 963-967. (2)
- 189.1. National Certification Board for Diabetes Educators. Information about certification as a certified diabetes educator. National Certification Board for Diabetes Educators; 2008. (4)
190. Valentine V, Kulkarni K, Hinnen D. Evolving Roles: From Diabetes Educators to Advanced Diabetes Managers. *Diabetes Spectrum.* 2003; 16(1): 27-31 (4)
- E187. Mille D, Roy T, Carrère MO, et al. Economic impact of harmonizing medical practices: compliance with clinical practice guidelines in the follow-up of breast cancer in a French Comprehensive Cancer Center. *J Clin Oncol.* 2000;18:1718-724. (2)

188. Nathwani D, Rubinstein E, Barlow G, Davey P. Do guidelines for community-acquired pneumonia improve the cost-effectiveness of hospital care? *Clin Infect Dis*. 2001;32:728-741. (3)
189. Graham C. Exercise and Aging: Implications for Persons With Diabetes. *Diabetes Educ*. 1991; 17(3):189-195. (4)
190. Hayes C, Herbert M, Marrero, D, Martin ML, Muchnick S. American Association of Diabetes Educators. Diabetes and Exercise *Diabetes Educator* 2008; 34(1):37-40. (4)
191. McArdle WD, Katch FI, Katch VL. Exercise physiology: energy, nutrition, and human... Exercise physiology concepts and metabolic equations.. *Diabetes: your complete exercise guide*. *Diabetes Educ*. 1994; 20(4):323-362. (4)
192. Martin AL, Lumber T, Compton T, Ernst T, Haas L, Regan-Klich J, Letassy N, McKnight KA, Nelson JB, Seley JJ, Toth JA, Mensing C. Insights and Trends in Diabetes Education: Results of the 2008 AADE National Diabetes Education Practice Survey. *Diabetes Educ*. 2008; 34(6): 970-986. (3)
193. King EB, Gregory RP, Schlundt DG. The effect of problem-solving training on the counseling skills of telephonic nurse care managers. *J Nurses Staff Dev*. 2007;23:229-237. (2)
194. Handley MA, Shumway M, Schillinger D. Cost-effectiveness of automated telephone self-management support with nurse care management among patients with diabetes. *Ann Fam Med*. 2008;6:512-518. (2)

Appendix A

Table 1. Criteria for Rating

EVIDENCE RATING:

Level-of-Evidence Category	Study Design or Information Type
1	<ul style="list-style-type: none"> • Randomized controlled trial with rigorous methodology • Multicenter trial with rigorous methodology • Large meta-analysis with quality ratings • Quasi-experimental study with control group
2	<ul style="list-style-type: none"> • Randomized controlled trial • Prospective cohort study • Meta-analyses of cohort study • Case-control study
3	<ul style="list-style-type: none"> • Methodologically flawed randomized controlled trial • Nonrandomized controlled trial • Observational study • Case series or case report
4	<ul style="list-style-type: none"> • Expert consensus • Expert opinion based on experience • Theory-driven conclusion • Unproven claim • Experience-based information

Table 2. Criteria for Recommendations

RECOMMENDATION GRADING:

Grade	Description
A	<ul style="list-style-type: none"> • Homogeneous evidence from multiple well-designed randomized controlled trials with sufficient statistical power • Homogeneous evidence from multiple well-designed cohort controlled trials with sufficient statistical power ≥ 1 conclusive level-of-evidence category 1 publications demonstrating risk/benefit
B	<ul style="list-style-type: none"> • Evidence from at least one large well-designed clinical trial, cohort or case-controlled analytic study, or meta-analysis • No conclusive level-of-evidence category 1 publication; ≥ 1 conclusive level-of-evidence; category 2 publications demonstrating risk/benefit
C	<ul style="list-style-type: none"> • Evidence based on clinical experience, descriptive studies, or expert consensus opinion • No conclusive level-of-evidence category 1 or 2 publication; ≥ 1 conclusive level-of-evidence category 3 publications demonstrating risk/benefit • No conclusive risk at all and no conclusive benefit demonstrated by evidence

D	<ul style="list-style-type: none">• Not graded• Expert opinion in lieu of conclusive level-of-evidence category 1, 2, or 3 publication demonstrating risk/benefit• No conclusive level-of-evidence category 1, 2, or 3 publication demonstrating risk/benefit
---	---