

**Strategies for Reducing  
Morbidity and Mortality from Diabetes  
Through Health-Care System Interventions  
and Diabetes Self-Management Education  
in Community Settings**

**A Report on Recommendations of the Task  
Force on Community Preventive Services**

**U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES**  
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# Strategies for Reducing Morbidity and Mortality from Diabetes Through Health-Care System Interventions and Diabetes Self-Management Education in Community Settings

## A Report on Recommendations of the Task Force on Community Preventive Services

### Summary

*Reducing morbidity and mortality and improving quality of life for persons with diabetes is an ongoing challenge for health-care providers and organizations and public health practitioners. Interventions are available that focus on persons with diabetes, health-care systems, families, and public policies. The Task Force on Community Preventive Services (the Task Force) has conducted systematic reviews of seven population-oriented interventions that can be implemented by health-care organizations and communities. Two of these interventions focus on health-care systems (disease and case management), and five focus on persons with diabetes (diabetes self-management education delivered in community settings). On the basis of these reviews, the Task Force has made recommendations regarding use of these seven interventions. The Task Force strongly recommends disease and case management in health-care systems for persons with diabetes. Diabetes self-management education is recommended in community gathering places (e.g., community centers or faith institutions) for adults and in the home for children and adolescents with type 1 diabetes. Evidence was insufficient to recommend diabetes self-management education interventions in other settings (i.e., schools, work sites, and recreational camps) or in the home for adults with type 2 diabetes. This report provides additional information regarding these recommendations, briefly describes how the reviews were conducted, provides sources of full reviews of interventions and information to assist in applying the interventions locally, and describes additional diabetes-related work in progress.*

## BACKGROUND

Diabetes mellitus (diabetes) is a prevalent, costly condition associated with substantial morbidity and mortality. In 1997, approximately 15.7 million persons in the United States (5.9% of the total population) had diabetes (1); of these persons, an estimated 5.4 million persons have diabetes, but it is undiagnosed. Diabetes prevalence is increasing; 789,000 new cases are diagnosed annually (1). Diabetes prevalence increases with age, varying from 0.16% among persons aged <20 years to 18.4% among those aged ≥65 years (1). Prevalence is also higher among minority populations. For persons aged ≥20 years, diabetes prevalence is 7.8% among non-Hispanic whites, 10.8% among non-

Hispanic blacks, 10.6% among Mexican Americans, and 9.0% among American Indians and Alaska Natives (1).

In 1996, diabetes was the seventh leading cause of death in the United States (1). Death rates are twice as high among middle-aged persons (i.e., persons aged 45–60 years) with diabetes than among those without diabetes. Mortality from diabetes is related primarily to heart disease. Adults with diabetes have heart disease death rates approximately 2–4 times higher than adults without diabetes (1). Other complications also lead to increased morbidity and mortality rates. Risk for stroke is 2–4 times higher among persons with diabetes (1). Diabetes is the leading cause of new cases of blindness among adults aged 20–74 years (1) and the leading cause of end-stage renal disease, accounting for approximately 40% of new cases (1). Approximately 60%–70% of persons with diabetes have neuropathy, and >50% of lower limb amputations in the United States occur among persons with diabetes (1). Pregnancy-related deaths occur twice as often among women with diabetes than among those without (1). Diabetes-related costs to U.S. health-care systems are substantial. In 1997, total direct and indirect costs were estimated at \$98 billion (2).

Diabetes management is complex and difficult from the patient's perspective as well as the provider's, and evidence exists that levels of care are suboptimal (3,4). Lifestyle behaviors (e.g., diet and physical activity) are difficult to change, and healthy behaviors are difficult to maintain for long periods (5). Daily medication regimens, insulin injection, and blood glucose monitoring are complex and uncomfortable. Moreover, substantial time and money is needed to manage diabetes. For successful management, persons with diabetes need adequate patient education and social support. Providers encounter high usage rates and resource consumption by persons with diabetes, and collaborating with patients to achieve behavior change can be frustrating for providers. Providers need support from health-care systems to educate, monitor, and manage patients with diabetes, and coordination is needed among patients, providers, health-care delivery systems, and communities.

Reducing morbidity and mortality and improving quality of life for persons with diabetes is a critical public health objective. As part of the Healthy People 2010 initiative (6), goals have been set to prevent diabetes, increase early diagnosis, increase screening rates for diabetes complications, and decrease morbidity and mortality (Table 1).

This review focuses on population-oriented strategies that can be implemented by communities and health-care systems to improve the care of persons with diabetes. By implementing interventions reported to be effective, policy makers and health-care and public health providers can help their communities achieve health goals while using community resources efficiently. This report and other related publications provide guidance from the Task Force on Community Preventive Services (the Task Force) for decision makers in state and local health departments, managed care organizations, purchasers of health care, persons responsible for funding public health programs, and others who have an interest in or responsibility for improving the health and well-being of persons with diabetes.

Primary prevention is the ideal way to minimize morbidity and mortality from diabetes. For type 2 diabetes, prevention most often consists of weight control and adequate physical activity (7,8). These two topics will be addressed in other reviews in the *Guide to Community Preventive Services: Systematic Reviews and Evidence-Based Recommendations* (the *Community Guide*).



**TABLE 1. Selected objectives for reducing the disease and economic burden of diabetes and improving the quality of life for persons who have or are at risk for diabetes**

Targeted condition among persons with diabetes, unless otherwise noted	Percentage of total U.S. population	
	Baseline	Healthy People 2010 objective
Proportion who receive formal diabetes education	40% (1998)*	Increase to 60%
Diabetes death rate among the general population	75/100,000/yr (1997)*	Decrease to 45/100,000/yr
Diabetes-related deaths	8.8/1,000/yr (1997)*	Decrease to 7.8/1,000/yr
Deaths from cardiovascular disease	343/100,000/yr (1997)*	Decrease to 309/100,000/yr
Rate of lower extremity amputations	11/1,000/yr (1996)	Decrease to 5/1,000/yr
Proportion of adults who have glycosylated hemoglobin measured $\geq 1$ times/year	24% (1998)*	Increase to 50%
Proportion of adults who have annual eye exam	56% (1998)*	Increase to 75%
Proportion of adults who have $\geq 1$ annual foot exams	55% (1998)*	Increase to 75%
Proportion of adults who take aspirin $\geq 15$ times/month	20% (1988–1994)	Increase to 30%
Proportion of adults who perform self-blood glucose monitoring $\geq 1$ times/day	42% (1998)*	Increase to 60%

\* Estimates are age-adjusted to the year 2000 standard population.

**Source:** U.S. Department of Health and Human Services. Healthy People 2010. 2<sup>nd</sup> ed. With understanding and improving health and objectives for improving health. 2 vols. Washington, DC: US Government Printing Office, November 2000.

## INTRODUCTION

The independent, nonfederal Task Force is developing the *Community Guide* with the support of the U.S. Department of Health and Human Services (DHHS) and in collaboration with public and private partners. CDC and other federal agencies provide staff support to the Task Force for development of the *Community Guide*. However, the recommendations presented in this report were developed by the Task Force and are not necessarily the recommendations of CDC or DHHS.

This report is the fourth that has been completed for the *Community Guide*, a resource that will include multiple systematic reviews focusing on specific diseases, disabilities, and injuries and ways to promote healthy behaviors and environments. Previous published reports include vaccine-preventable diseases (9–13), tobacco use prevention and control (14, 15), and motor vehicle occupant injury (16). This report provides an overview of the process used by the Task Force to select and review evidence. It also summarizes the recommendations of the Task Force regarding two health-care system interventions that focus on diabetes and five interventions to increase diabetes self-management education in community settings. In 2002, a full report will be published in the *American Journal of Preventive Medicine* that will include the recommendations; supporting evidence (i.e., summaries of the body of evidence and discussions of applicability, additional benefits, potential harms, and existing implementation barriers); costs, cost-benefits, and cost-effectiveness (when available); and remaining research questions.

In addition to the seven interventions reviewed in this report, reviews are under way for five additional health-care system interventions as well as for interventions involving family education and public policy. These will be included in future publications. This review did not examine evidence of the effectiveness of clinical care interventions focused on the individual patient. Recommendations regarding clinical care can be obtained from the American Diabetes Association (17). The U.S. Preventive Services Task Force has made recommendations regarding screening (18).

## METHODS

The *Community Guide's* methods for conducting systematic reviews and linking evidence to recommendations have been described elsewhere ( 19 ). In brief, for each *Community Guide* topic, a systematic review development team representing diverse disciplines, backgrounds, and work settings conducts reviews by

- developing an approach to organize, group, and select interventions for review;
- systematically searching for and retrieving evidence;
- assessing the quality of and summarizing the strength of the body of evidence of effectiveness;
- summarizing supporting evidence; and
- identifying and summarizing research gaps.

For the systematic review of diabetes interventions, the team initially focused on two priority areas: health-care system interventions for optimizing care for persons with diabetes and diabetes self-management education interventions in community settings. These areas were selected by consultants\* representing diverse experience. They generated a comprehensive list of strategies and created a priority list of interventions for review based on the a) importance of interventions in decreasing morbidity and mortality and in improving quality of life for persons with diabetes; b) potential cost-effectiveness of the intervention; c) lack of clarity regarding the effectiveness of an intervention; and d) feasibility of implementing the interventions in routine public health practice.

New models of health-care delivery have emerged in the last decade in response to the failure of traditional models to meet the needs of persons with diabetes and in response to societal changes that include changing demographics, new technology, a shift in the focus of patient care toward quality of life and other patient-oriented outcomes, a demand for minimization of medical errors and iatrogenic injury, and limited health-care resources. Two new models of care delivery, disease and case management, are reviewed in this report. Disease management is defined in the clinical setting as an

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organized, proactive, multicomponent approach to health-care delivery, involving all members of a population having a specific disease (or a subset of that population with specific risk factors). Care is focused on, and integrated across, the spectrum of the disease and its complications, prevention of comorbid conditions, and relevant aspects of the delivery system. Goals include improving short- and long-term health or economic outcomes or both among persons with the disease. Effectiveness of multicomponent disease-management interventions, and not that of each component, was examined in this review. Case management is a set of activities whereby the needs of patients at risk for excessive resource usage, suboptimal outcomes, or suboptimal coordination of services are identified and addressed through improved planning, coordination, and provision of care (20). Case management involves assigning authority to one professional (i.e., the case manager) who is not the provider of direct health care and who oversees and is responsible for all case management activities. Case management can exist as a single-component intervention, be combined with other clinical care interventions (e.g., practice guidelines or patient reminders), or be part of a disease management intervention.

Diabetes self-management education is the process of teaching persons to manage their disease (21). Five related interventions were examined in this review. Community settings are key potential sites for diabetes self-management education interventions. Traditional clinical settings might not be ideal for educating persons with diabetes, but the home can be a good setting for self-management education for multiple reasons: teaching lifestyle changes, including diet, is better facilitated in the home, and teaching self-monitoring of blood glucose is aided by addressing concerns in the environment where the procedure is being performed. Cultural concerns can be addressed in the home as well. Home training might be easier for persons with disabilities or with other difficulties in attending clinic settings. Diabetes self-management education interventions in the home include home visits by a health-care professional or lay health-care worker and computer-assisted instruction or electronic connection to the clinic for advice and feedback (e.g., downloading results of self-monitoring of blood glucose). Community settings include community centers, libraries, private (nonclinical) facilities, and faith institutions. These settings might be more convenient and comfortable than clinic settings for diabetes self-management education.

To be included in the reviews of effectiveness, studies had to a) be primary investigations of interventions selected for evaluation; b) be published in English; c) be conducted in established market economies;\* d) provide information regarding  $\geq 1$  outcomes of interest that were preselected by the team; and e) meet minimum quality standards (22). All types of comparative study designs (i.e., randomized controlled trials, preintervention versus postintervention designs, times series, and cohort studies) were included in the reviews (19).

For each intervention reviewed, the team developed an analytic framework indicating possible causal links between the intervention and predefined outcomes of interest that are linked to improved health outcomes. The Task Force concluded that the link is

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\*Established market economies as defined by the World Bank are Andorra, Australia, Austria, Belgium, Bermuda, Canada, Channel Islands, Denmark, Faeroe Islands, Finland, France, Former Federal Republic of Germany, Germany, Gibraltar, Greece, Greenland, Holy See, Iceland, Ireland, Isle of Man, Italy, Japan, Liechtenstein, Luxembourg, Monaco, the Netherlands, New Zealand, Norway, Portugal, San Marino, Spain, St. Pierre and Miquelon, Sweden, Switzerland, the United Kingdom, and the United States.

sufficiently strong between the behavioral and short-term health outcomes and long-term effects on morbidity, mortality, and quality of life. Therefore, intervention evaluations in this review focused on evidence of effectiveness of interventions in improving patient and provider behaviors, as well as short- and long-term patient health outcomes, as discussed in the following:

- **Patient Behaviors.** Self-monitoring of blood glucose (SMBG) is recommended by the American Diabetes Association for all persons with type 1 diabetes and for patients with insulin-treated type 2 diabetes (23). SMBG has been associated with improved health outcomes for persons with type 1 diabetes (24). Clinical trials in which SMBG was a critical component (e.g., the Diabetes Control and Complications Trial [25] and others [26,27]) have demonstrated that tight glycemic control improves microvascular outcomes among persons with type 1 and type 2 diabetes. Reduction of calorie and fat intake are associated with weight control and improved glycemic control (28–31). Aspirin use offers the same cardiovascular protection for persons with and without diabetes (32) and is recommended for all persons with diabetes who are aged  $\geq 30$  years and who have no contraindications (33). Physical activity is associated with improved glycemic control among persons with diabetes (34). Finally, smoking contributes to morbidity and mortality from micro- and macrovascular complications associated with diabetes (35).
- **Provider Behaviors.** Provider monitoring of glycosylated hemoglobin (GHb), lipids, foot lesions, and neuropathy has been associated with improved outcomes because these physiologic measures are related to health outcomes (22,25,36–40) and effective treatments and prevention strategies are available (22,23,32,41,42). GHb (including hemoglobin A1c) describes a series of hemoglobin components formed from hemoglobin and glucose. The level of GHb in blood reflects glucose levels during the previous 120 days, which is the life span of red blood cells (23). Annual screening for retinopathy and nephropathy, followed by appropriate management for persons identified with abnormalities (43,44), are associated with improved health outcomes among persons with diabetes.
- **Short-Term Health Outcomes.** Short-term outcomes of glycemic control (25,36), blood pressure (37,45), lipid levels (38,42), proteinuria and renal function (46), weight (31), and the presence of foot lesions (39) are all associated with long-term health outcomes among persons with diabetes.

Each study that met the inclusion criteria was evaluated by using a standardized abstraction form (19), and each was assessed for study design suitability and threats to internal validity (19). On the basis of the number of threats to validity, studies were characterized as having good, fair, or limited quality of execution (19), and only studies with good or fair execution were included in the review. A summary effect measure (i.e., the difference between the changes observed in the intervention and comparison groups, if the study design used a comparison group) was calculated for outcomes of interest. Interquartile ranges were determined as an index of variability when  $\geq 7$  studies were available in the body of evidence. Pooled estimates of effect were calculated if a sufficient number of studies with comparable outcomes existed and if exploratory data analysis revealed diverse results in the body of literature or confidence intervals overlapped zero. Point estimates of effect were calculated with both fixed and random effects mod-

els by using the inverse of the variance of the net change in GHb as the study weight. Computation of the between-study variance for the random effects model was obtained by using a recommended formula (47) and using estimates of within-group correlation ( $\rho$ ) of 0.25, 0.5, and 0.75. The pooled estimates presented are from random effects models, with  $\rho$  equaling 0.75 and 95% confidence intervals.

Evidence of effectiveness is characterized as strong, sufficient, or insufficient on the basis of the number of available studies, the suitability of study designs for evaluating effectiveness, the quality of execution of the studies, the consistency of the results, and the effect size (19). The *Community Guide* uses systematic reviews to evaluate the evidence of intervention effectiveness, and the Task Force makes recommendations on the basis of the review findings (19). The strength of each recommendation is based on the strength of the evidence of effectiveness (e.g., an intervention is strongly recommended when strong evidence of effectiveness exists, and an intervention is recommended when sufficient evidence exists) (19). Other types of evidence also can affect recommendations. For example, evidence of harms resulting from an intervention might lead to a recommendation that the intervention not be used if adverse effects outweigh improved outcomes. Although the option exists, the Task Force has yet to use economic information to modify recommendations.

A finding of insufficient evidence of effectiveness should not be interpreted as evidence of ineffectiveness. Identification of interventions for which evidence of effectiveness is insufficient is critical for identifying areas of uncertainty and research agendas. In contrast, adequate evidence of ineffectiveness would lead to a recommendation that the intervention not be used.

## RESULTS

By using computerized databases, reviews of reference lists from included studies, and consultation with diabetes specialists, the review team identified 105 studies that met the inclusion criteria for the seven interventions that the Task Force evaluated for this report. Of those 105 studies, 35 were excluded on the basis of limitations in their execution and were not considered further. The remaining 70 studies were included in the review,\* and the Task Force recommendations presented in this report are based on those studies.

On the basis of the evidence of effectiveness, the Task Force either strongly recommends or recommends four of the seven strategies evaluated (Table 2): disease management and case management in health-care systems, diabetes self-management education in the home for children and adolescents with type 1 diabetes, and self-management education in community gathering places for adults with diabetes. The Task Force found insufficient evidence on which to make a recommendation for or against diabetes education for school personnel or self-management education at work sites and in recreational camps. Results are presented for the preselected outcomes where data are available. For certain outcomes (e.g., aspirin use, physical activity, cardiac events, and mortality), no data were available in studies that met inclusion criteria. Summary tables of the reviews of economic evidence are available at <<http://www.thecommunityguide.org>> (accessed July 16, 2001).

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\*Additional information regarding qualifying studies is available at <<http://www.thecommunityguide.org>> (accessed July 16, 2001).



**TABLE 2. Recommendations from the Task Force on Community Preventive Services (the Task Force) regarding use of selected health-care system and self-management training interventions for persons with diabetes**

Interventions (Number of qualifying studies)	Task Force recommendation for use	Intervention description	Results
<b>Health-care system interventions</b>			
Disease management (n = 25)	Strongly recommended	<p>Disease management in clinical settings is an organized, proactive, multicomponent approach to health-care delivery, involving persons with diabetes. Care is focused on and integrated across the spectrum of the disease and its complications, the prevention of comorbid conditions, and the relevant aspects of the delivery system.</p> <p>Median follow-up for studies examining GHb:* 18 months.</p>	<p>Disease management improved provider monitoring of GHb (15 studies; median effect: 15.6%; interquartile range: from 4% to 39%) and lipid levels (9 studies; median effect: 24%; interquartile range: from 21% to 26%); screening for retinopathy (15 studies; median effect: 9%; interquartile range: from 3% to 20%); foot lesions or peripheral neuropathy (9 studies; median effect: 26.5%; interquartile range: from 10.9% to 54%); and urine protein (7 studies; median effect: 9.7%; interquartile range: from 0% to 44%).</p> <p>Disease management improved GHb (19 studies; median effect: -0.5%; interquartile range: from -1.35% to -0.1%).</p> <p>Inconsistent effects were noted on weight and body mass index (7 studies), blood pressure (6 studies), lipid levels (4 studies), and quality of life (1 study).</p>

\* GHb: Glycosylated hemoglobin.

† **Source:** Smith JC, Greer NL for the Technology Assessment Committee. Case management for chronic illness, the frail elderly, and acute myocardial infarction. Bloomington, MN: Institute for Clinical Systems Integration, 1998. Technology Assessment Report (TA #44).

§ Net change (post-pre) between intervention and comparison group, if any.

¶ HbA1c: Hemoglobin A1c.

\*\* A determination that evidence is insufficient should not be regarded as evidence of ineffectiveness. A determination of insufficient evidence assists in identifying a) areas of uncertainty regarding effectiveness of an intervention and b) specific research needs. In contrast, evidence of ineffectiveness leads to a recommendation that the intervention not be used.

**TABLE 2. (Continued) Recommendations from the Task Force on Community Preventive Services (the Task Force) regarding use of selected health-care system and self-management training interventions for persons with diabetes**

Interventions (Number of qualifying studies)	Task Force recommendation for use	Intervention description	Results
Case management (n = 15)	Strongly recommended	<p>Case management is a set of activities whereby the needs of patients at risk for excessive resource usage, suboptimal outcomes, or suboptimal coordination of services are identified and addressed through improved planning, coordination, and provision of care.<sup>†</sup> Case management involves assigning authority to one professional (i.e., a case manager) who is not the direct health-care provider but who oversees and is responsible for all case-management activities. Case management can exist as a single-component intervention, be combined with other clinical care interventions (e.g., practice guidelines or patient reminders), or be part of a disease-management intervention.</p> <p>Median follow-up for studies examining GHb: 12.5 months.</p>	<p>Frequency of provider monitoring of GHb improved when case management was part of a disease-management intervention (5 studies; median absolute effect: 33%;<sup>§</sup> range: from -7% to 60%). GHb improved when case management was part of a disease-management intervention (11 studies; median change in HbA1c:<sup>¶</sup> -0.5%; interquartile range: from -0.65% to -0.46%). GHb also improved when case management was implemented without disease management (3 studies; median: -0.4%; interquartile range: from -0.6% to -0.16%).</p> <p>Evidence was insufficient to determine the effect of case management on a) screening frequency for urine protein, retinopathy, foot lesions, and peripheral neuropathy; b) testing of lipid levels; and c) physiologic outcomes of lipid levels, body mass index, and blood pressure.</p>

\* GHb: Glycosylated hemoglobin.

<sup>†</sup> **Source:** Smith JC, Greer NL for the Technology Assessment Committee. Case management for chronic illness, the frail elderly, and acute myocardial infarction. Bloomington, MN: Institute for Clinical Systems Integration, 1998. Technology Assessment Report (TA #44).

<sup>§</sup> Net change (post-pre) between intervention and comparison group, if any.

<sup>¶</sup> HbA1c: Hemoglobin A1c.

\*\* A determination that evidence is insufficient should not be regarded as evidence of ineffectiveness. A determination of insufficient evidence assists in identifying a) areas of uncertainty regarding effectiveness of an intervention and b) specific research needs. In contrast, evidence of ineffectiveness leads to a recommendation that the intervention not be used.

**TABLE 2. (Continued) Recommendations from the Task Force on Community Preventive Services (the Task Force) regarding use of selected health-care system and self-management training interventions for persons with diabetes**

Interventions (Number of qualifying studies)	Task Force recommendation for use	Intervention description	Results
<b>Diabetes self-management education (DSME)</b>			
Community gathering places (n = 8)	Recommended for adults with type 2 diabetes	Persons aged >18 years with diabetes were educated in settings outside the home, clinic, school, or work site. These settings included community centers, libraries, private (nonclinical) facilities, and faith institutions.  Median follow-up for GHb: 6 months.	Glycemic control improved in 7 studies with a pooled effect size for GHb of -1.9% (95% confidence interval; from -2.4% to -1.4%).  Blood pressure improved in 2 studies. Variable effects were noted on physical activity, weight, and lipids.
Home (n = 10)	Recommended for children and adolescents with type 1 diabetes  Insufficient evidence** for persons with type 2 diabetes	Interventions encompassed self-management training delivered primarily in the home (i.e., home visits, computer-assisted instruction, and electronic communication with health-care professionals).  Median follow-up for glycemic control in type 1 diabetics: 12 months.  Median follow-up for type 2 diabetics: 12 months.	Type 1 diabetes: Improvement was noted in glycemic control in 3 of 4 studies. The pooled effect size for GHb was -1.1% (95% confidence interval; from -1.6 to -0.6). No effect was noted on weight (1 study).  Type 2 diabetes: Insufficient evidence existed to assess the effectiveness of DSME in the home for persons with type 2 diabetes because of a limited number of qualifying studies that examined relevant health outcomes. Improvement was noted in glycemic control (2 studies; mean effect size: -0.5%). Improvements were also noted in foot appearance (1 study) and body weight (2 studies).

\* GHb: Glycosylated hemoglobin.

† **Source:** Smith JC, Greer NL for the Technology Assessment Committee. Case management for chronic illness, the frail elderly, and acute myocardial infarction. Bloomington, MN: Institute for Clinical Systems Integration, 1998. Technology Assessment Report (TA #44).

§ Net change (post-pre) between intervention and comparison group, if any.

¶ HbA1c: Hemoglobin A1c.

\*\* A determination that evidence is insufficient should not be regarded as evidence of ineffectiveness. A determination of insufficient evidence assists in identifying a) areas of uncertainty regarding effectiveness of an intervention and b) specific research needs. In contrast, evidence of ineffectiveness leads to a recommendation that the intervention not be used.



**TABLE 2. (Continued) Recommendations from the Task Force on Community Preventive Services (the Task Force) regarding use of selected health-care system and self-management training interventions for persons with diabetes**

Interventions (Number of qualifying studies)	Task Force recommendation for use	Intervention description	Results
Work site (n = 1)	Insufficient evidence**	Diabetes self-management training was delivered at the work site, or coworkers were educated regarding diabetes.  Follow-up: 3 months.	Insufficient evidence existed to assess the effectiveness of DSME at the work site because only 1 qualifying study was identified. That study demonstrated variable effects on knowledge and a substantial decrease in GHb; limitations also existed in its design.
Recreational camps (n = 10)	Insufficient evidence**	Diabetes self-management training was delivered at recreational camps.  Median follow-up: 4–6 days	Insufficient evidence existed to assess the effectiveness of DSME at recreational camps because of an insufficient number of qualifying studies addressing relevant health outcomes. Effects on glycemic control were mixed (3 studies).
Schools (n = 1)	Insufficient evidence**	School staff were educated regarding diabetes with the goal of improving the health and well-being of children with diabetes.  Education focused on the teacher or other school staff, but outcomes could be measured either for staff or students with diabetes.  Follow-up: 6–8 weeks.	Insufficient evidence existed to assess the effectiveness of education of school personnel because a) only 1 qualifying study was available, and it demonstrated variable effects on knowledge; b) its design had limitations; and c) no information was available regarding outcomes other than knowledge.

\* GHb: Glycosylated hemoglobin.

† **Source:** Smith JC, Greer NL for the Technology Assessment Committee. Case management for chronic illness, the frail elderly, and acute myocardial infarction. Bloomington, MN: Institute for Clinical Systems Integration, 1998. Technology Assessment Report (TA #44).

§ Net change (post–pre) between intervention and comparison group, if any.

¶ HbA1c: Hemoglobin A1c.

\*\* A determination that evidence is insufficient should not be regarded as evidence of ineffectiveness. A determination of insufficient evidence assists in identifying a) areas of uncertainty regarding effectiveness of an intervention and b) specific research needs. In contrast, evidence of ineffectiveness leads to a recommendation that the intervention not be used.

## USING THESE RECOMMENDATIONS IN COMMUNITIES AND HEALTH-CARE SYSTEMS

Given the substantial public health burden of diabetes, improving care for persons with diabetes should be relevant in the majority of communities and health-care systems. In selecting and implementing interventions, communities and health-care systems should strive to develop a comprehensive strategy to promote healthy lifestyles (e.g., increased physical activity, improved nutrition, and reduced tobacco use) and to help persons with diabetes and their health-care providers and systems to improve glycemic control, decrease diabetes complications and mortality, and improve quality of life.

Choosing interventions that have been shown to work and that are well-matched to local needs and capabilities and then implementing those interventions are vital steps toward improving outcomes for persons with diabetes. In setting priorities for selecting interventions to meet local objectives, recommendations and other evidence provided in the *Community Guide* should be considered in combination with local information (e.g., resource availability, administrative structures, and the economic, social, and regulatory environments of organizations and practitioners). Information regarding applicability can be used to assess intervention usefulness for each setting or population. Though currently sparse, economic information (to be provided in the full report in 2002) might be useful in identifying resource requirements for interventions and interventions that meet public health goals more efficiently than other available options. If local goals and resources permit, strongly recommended and recommended interventions should be initiated or increased.

Communities and health-care systems should first assess the prevalence of diabetes and associated complications in the community or organization and the level of care and education provided to persons with diabetes. Care levels can be compared with guidelines and treatment goals that are based on scientific opinions from health organizations (e.g., the American Diabetes Association) (17). Community approaches can then be developed to address health disparities and improve care and quality of life.

The Task Force strongly recommends disease and case management to improve system-level (e.g., provider monitoring) and patient (e.g., glycemic control) outcomes. Resources and infrastructure required to implement these interventions can be substantial. Letting organizations implement components of disease management might be more feasible. Identification of the population and practice guidelines could be implemented initially, then followed by other strategies (e.g., case management). Strategies need not be sophisticated. For example, initial identification of the population could be achieved through verbal communication with providers and patients, and the information systems for monitoring could be paper records or electronic spreadsheets.

The Task Force recommends diabetes self-management education in the home for children and adolescents with diabetes and in community gathering places for adults. Interventions in these settings are not intended to replace clinic-based ones, but rather to complement them when community settings are more feasible or desirable for the patient. Communication and collaboration between educators and health-care providers are essential. Insufficient evidence exists on which to base recommendations for or against diabetes self-management education at recreational camps and work sites and educating school personnel regarding diabetes.

In summary, health-care system and diabetes self-management education interventions exist that are effective in improving health outcomes. Community- and health-care system-based efforts are needed to deliver optimal care for persons with diabetes and to achieve Healthy People 2010 goals.

The systematic reviews that led to the recommendations discussed in this report should be useful to researchers and scientific organizations in identifying directions for future research. The reader is reminded that the Task Force decision not to make recommendations regarding certain interventions does not imply that the interventions were ineffective. Rather, that decision reflects the fact that an insufficient number of high-quality studies existed upon which to base a recommendation. These areas need further research.

## **ADDITIONAL INFORMATION REGARDING THE *COMMUNITY GUIDE***

Additional *Community Guide* systematic reviews of oral health, sexual behavior, physical activity, cancer, and the sociocultural environment are being developed, and the results of each review will be published as it is completed. A compilation of the reviews will be published in book form. Additional information regarding the Task Force and the *Community Guide* is available at <<http://www.thecommunityguide.org>> (accessed July 16, 2001).

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