NATIONAL DIABETES EDUCATION PROGRAM

Team Care

Comprehensive Lifetime Management for Diabetes

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The National Diabetes Education Program is a joint program of the National Institutes of Health and the Centers for Disease Control and Prevention.

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Executive Summary

This report was created to help organizational leaders in health care systems and purchasers of health care to implement multidisciplinary team care for people with diabetes in all clinical settings. The key function of a multidisciplinary team is to provide continuous, supportive, and aggressive care for people with diabetes throughout the course of their disease. Properly implemented diabetes team care is cost-effective and the preferred method of care delivery, particularly when services include health promotion and disease prevention in addition to intensive clinical management.

Diabetes is a serious, common, and costly disease that affects 16 million people or 6% of the U.S. population. About 90% of people with diabetes have type 2, which usually occurs in adults over 45 years old. The complications of diabetes (cardiovascular disease, blindness, kidney failure, nerve damage, and lower-extremity amputations) result in higher rates of disability; increases in use of health care services, lost days from work, and unemployment; and decreased quality of life. The total cost of diabetes in the United States in 1997 was $98.2 billion.

Despite its multi-system effects, diabetes is a controllable disease, and there is unequivocal evidence that its enormous human and economic toll can be significantly reduced by early and aggressive ongoing therapeutic intervention. The principal clinical features of type 2 diabetes—hyperglycemia, dyslipidemia, and hypertension—however, cannot be managed successfully with sporadic, reactive, or after-the-fact care. If diabetes care is to achieve the health benefits that modern science has made possible, it must be continuous, proactive, planned, patient centered, and population based.

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Executive Summary Continued

Although primary care physicians currently provide 80% to 95% of diabetes care in this country, they cannot do all that is required and often are discouraged that the current medical system does not function adequately for people with diabetes. Components of aggressive and comprehensive diabetes care that many physicians find difficult to provide because of various systems constraints include telephone management of glycemia, ongoing education and behavioral interventions, risk factor reduction, health promotion, and periodic examination for early signs of complications.

The challenge is to find a way to meet the needs of patients with diabetes by broadening the care delivery opportunities available to primary care providers (physicians, nurse practitioners, and physician assistants) and other health care professionals. Team care meets this challenge by integrating the skills of different health care professionals with those of the patient and family members into a comprehensive lifetime diabetes management program. Short- and long-term benefits of diabetes team care include improved glycemic control, increased patient follow-up, higher patient satisfaction, lower risk for the complications of diabetes, improved quality of life, and decreased health costs.

For team care to succeed, the following elements must be in place:

- Commitment of policy makers (e.g., purchasers of health care, medical directors, benefits managers, chief executive officers) to establish and sustain an infrastructure supportive of team care.
- Reimbursement for the services of core team members proportional to their expertise and time involved in diabetes team care.
- Regular communication among team members and documentation of provided care.

Forming a team requires a planning group to do the following:

- Ensure the commitment of leadership.
- Gain support from care providers.
- Identify team members.
- Identify the patient population.
- Stratify the patient population according to the intensity of services needed.
- Assess resources.
- Develop a system for coordinated, continuous, quality care.
- Evaluate outcomes and adjust services as necessary.

Team composition will vary according to patient need, patient load, organizational constraints, resources, clinical setting, and professional skills. In addition to the patient, who takes the central position, a "core" team usually includes a physician, nurse, and a dietitian, at least one of whom is a certified diabetes educator. Many other health professionals can be team members or collaborative consultants if needed. It is essential that a key individual coordinate the team effort.

It is easier to coordinate services, communicate effectively, evaluate patient outcomes and satisfaction, and monitor costs when all team members are employed by the same organization and payment for their services is from the same source. This structure is usually present in staff model health maintenance organizations or in large clinics. It is possible, however, for decentralized provider teams to work closely together and improve the quality and effectiveness of diabetes care in all other settings, such as group practices; rural, inner city, and small clinics; and other health maintenance organization systems.

The team can minimize patients' health risks by assessment, intervention, and surveillance to identify problems early and initiate prompt treatment.

Increased use of effective treatments to improve both glycemic control and cardiovascular risk profiles can prevent or delay progression to renal failure, blindness, nerve damage, lower-extremity amputation, and cardiovascular disease. When patients participate in treatment decisions, set personally selected behavioral goals, receive adequate education, and actively manage their disease, improved diabetes control is achieved. This in turn leads to improved patient satisfaction with care, better quality of life, improved health outcomes, and ultimately, lower health care costs.

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I. Introduction

"The key function of a multidisciplinary team is to provide continuous, comprehensive, and aggressive lifetime management for people with diabetes."

Kris Ernst

Diabetes is a serious, common, and costly disease that affects 16 million people or 6% of the U.S. population. Some 800,000 new cases are diagnosed annually. Diabetes was the seventh-leading cause of death in the United States in 1996, and age-adjusted diabetes death rates were higher in African Americans, Hispanic Americans, and American Indians, than in the general population.[1] Diabetes disproportionately affects these ethnic populations and the elderly. The complications of diabetes include cardiovascular disease, blindness, kidney failure, nerve damage, and lower-extremity amputations. These complications subsequently result in higher rates of disability; increases in use of health care services, lost days from work, and unemployment; and decreased quality of life.

The total cost of diabetes in the United States in 1997 was $98.2 billion, including $44.1 billion for diabetes-specific health care and $54.1 billion in indirect costs such as disability, time lost from work, and premature death.[1,2] Of the $44.1 billion, diabetes and acute glycemic care accounted for $7.7 billion, chronic complications of diabetes accounted for $11.8 billion (over $7 billion for cardiovascular disease alone), and $24.6 billion was due to the excess prevalence of other general medical conditions. Further, people with diabetes may account for 15% of total U.S. health care expenditures and 27% of all Medicare expenditures.[3] About 90% of people with diabetes have type 2, which more commonly occurs in adults over 45 years old who are obese and inactive, and have a family history of the disease.

Despite its multi-system effects, diabetes is a controllable disease, and there is unequivocal evidence that its enormous human and economic toll can be significantly reduced by early, aggressive, therapeutic intervention that is maintained throughout the patient's life. This report sets forth an analysis of the evidence that supports team care as an effective method for chronic disease management.

II. The need for a better system for delivery of diabetes care

Today's healthcare environment is affected by several significant factors, including greater numbers of aging and older individuals, the development of new technologies, advances in medical treatments, and the tremendous increase in scientific knowledge about health and illness. One result is that more people are living with diabetes and its complications.

In spite of the growing diabetes population and the high cost of this disease, the person with diabetes is often poorly served by our current health care system. Diabetes management is primarily symptom oriented and focused on acute illness. The principal clinical features of type 2 diabetes—hyperglycemia, dyslipidemia, and hypertension—however, must be managed with continuous, proactive, planned care. If diabetes care is to achieve the health benefits that modern science has made possible, it must be:

- Continuous, not episodic.
- Proactive, not reactive.
- Planned, not sporadic.
- Patient centered rather than provider centered.
- Population based, as well as individual based.

One system that incorporates these characteristics is a chronic disease model for diabetes and other chronic illnesses affecting people in the United States. There are numerous publications that support the rationale for a chronic disease model.[4–9]

Primary care physicians currently provide 80% to 95% of diabetes care in this country.[10] To date, most of the efforts to improve care for people with diabetes have assumed that primary care physicians can effect the necessary changes. Evidence-based guidelines have been developed to help physicians manage this multifaceted chronic illness in their office or clinic setting. Primary care physicians, however, cannot do all that is required for ongoing diabetes management and often are discouraged that the current medical system does not function adequately for people with diabetes. Components of aggressive and comprehensive diabetes care that many physicians find difficult to provide because of various systems constraints include telephone management of glycemia, ongoing education and behavioral interventions, risk factor reduction, health promotion, and periodic examination for early signs of complications.[9]

The challenge is to find a way to meet the needs of people with diabetes by broadening the delivery of care opportunities available to primary care providers (physicians, nurse practitioners, and physician's assistants). Primary care providers need to be part of an amplified care system. Team care meets this challenge by integrating the skills of primary care providers and different health care professionals with those of the patient and family members into a comprehensive lifetime diabetes management program.[9,11] Additionally, the clinical care team is augmented by the resources and support of community partners. Essential elements for team success in any system of health care are the following:

- Commitment from policy makers (e.g., purchasers of health care, medical directors, benefits managers, chief executive officers) to establish and sustain a supportive infrastructure.
- Reimbursement for the services of core team members proportional to their expertise and time involved in diabetes team care.
- Regular communication among team members and documentation of care provided.

> **"If diabetes care is to achieve the health benefits that modern science has made possible, it must be continuous, proactive, planned, patient-centered, and population-based."**
>
> ***Roland Hiss***

III. Recommended action steps

"For team care to succeed, the following essential elements must be in place:
- Commitment from policy makers to establish and sustain an infrastructure supportive of team care.
- Reimbursement for the services of core team members.
- Communication between team members and documentation of provided care."

Sandra Gillespie

A. For payors and purchasers of health care, and policy makers in health care systems

Individuals in leadership positions need to make the following decisions:

- How they want to provide continuous care for patients with diabetes.
- What the dimensions of that care will be.
- What reimbursement they are willing to provide or seek for that care.
- If team care is desired, how they will develop a supportive infrastructure.

B. For providers of health care

Health care providers need to make the following decisions:

- Whether they want to be part of a diabetes team.
- Who can help change the current practice or health care system to support team care.
- How team communication and documentation can be facilitated.

The sections that follow and information in the appendices address the development of an infrastructure that is essential to support effective team care.

IV. The team defined

A. The core team

The patient is the central team member, and thus patients need to know about their daily roles as care providers and decision-makers and how to work with their provider team. In addition to the patient, a "core" team usually includes three or four health care professionals with complementary skills who are committed to a common goal and approach.[12] An ideal core team includes a physician or other primary care provider, a nurse, and a dietitian, at least one of whom is a certified diabetes educator (CDE*). For the patient with type 2 diabetes, a physician specialist such as an endocrinologist may be a team member or a collaborative consultant. For the patient with type 1 diabetes, on the other hand, the physician specialist always should be a member of the core team. It is essential that a key individual such as a physician, other primary care provider, or a CDE coordinate the team effort.

The Diabetes Control and Complications Trial (DCCT), a large clinical trial of intensive versus standard therapy for people with type 1 diabetes, included team members from medicine, nursing, nutrition, education, and counseling.[13] The United Kingdom Prospective Diabetes Study (UKPDS), a large clinical trial of intensive versus standard therapy for people with type 2 diabetes, included teams of physicians, nurses, and dietitians.[14]

B. Other team members

Team composition will vary according to patient need, patient load, organizational constraints, resources, clinical setting, and professional skills.[15] For example, a podiatrist or a pharmacist may be an important core member of a team caring for older patients, while a psychologist or social worker may be required for a team providing child and adolescent care. Not every team member needs to be involved in every patient's care.

The pool of health care providers from which teams can be formed is shown in Figure 1 (page 25). The large number of provider groups included in the figure underscores the need for a flexible and creative plan to develop the most effective team to serve a specific patient population. The diagram shows the primary care provider coordinating a team that includes a diabetologist**, a nurse, and a dietitian, with a second tier of consultants and a third tier of community partners. Alternatively, the primary care provider could take a referral position, placing a CDE as the team leader/coordinator.

C. The centralized team

It is easier to coordinate services, communicate effectively, evaluate patient outcomes and satisfaction, and monitor cost-effectiveness when all team members are employed by the same organization and payment for their services is from the same source. This structure is usually present in staff model health maintenance organizations or large clinics. It is possible, however, for decentralized provider teams to work closely together to improve the quality and effectiveness of diabetes care in all other settings, such as group practices; rural, inner city, and small clinics; and other health maintenance organization systems.

* *A CDE is a health care provider who receives periodic certification from the National Certification Board for Diabetes Educators by taking a voluntary examination that indicates current knowledge in diabetes education.*

** *A diabetologist is a physician, usually an endocrinologist, specializing in diabetes care.*

"Team composition will vary according to patient need, patient load, organizational constraints, resources, clinical setting, and professional skills."

Patricia Kidd

V. Advantages of a multidisciplinary team

A multidisciplinary team brings together the particular skills and experience of several health professionals to contribute to a common purpose. Health care policy makers and payers have strong incentives to support any care improvements to lower blood glucose concentrations and reduce cardiovascular risk factors to help prevent or delay costly diabetes complications.[11,16] Coordinated multidisciplinary team care provides a high-quality, cost-effective method for achieving these goals and maintaining them over a long period of time.[17]

Examples of team management can be found in the scientific literature for diabetes[18–30] and other chronic diseases.[31–42] Short- and long-term benefits of diabetes team care include improved glycemic control, increased patient follow-up, higher patient satisfaction, lower risk for complications, improved quality of life, and decreased health costs.[43–47]

A. Short-term benefits

Short-term cost savings associated with team care can result from shorter length of hospital stay, reduced rate of hospital readmission, or reductions in disabilities and associated costs. For example, in one study the average length of stay for patients with a primary diagnosis of diabetes was 56% shorter for team-managed patients than for patients managed by an internist alone and 35% shorter than for patients seen only by an endocrinologist. The reduction in length of stay was largest when consultation was obtained early in the hospital stay.[22] Another study showed significant reductions in readmission rates for team-managed patients.[23] An outpatient team can deal with management issues or potential complications early, before they develop into serious problems that warrant a costly emergency room visit or hospital admission.

A study of patients who maintained an average hemoglobin A1c (HbA1c*) value of 7.5% reported improved quality of life on five scales, including symptom distress, general perceived health, and cognitive functioning. Compared with the control group, this group also had higher retained employment, greater productive capacity, and less absenteeism, resulting in significant short-term cost savings.[48]

B. Long-term benefits

Both the DCCT and the UKPDS improved health outcomes by providing intensive management that involved multidisciplinary care, frequent patient follow-up, counseling, and ongoing patient education.[28,29] Intensively treated patients achieved an HbA1c value of 7.2% in the DCCT and 7% in the UKPDS, compared with 8.9% and 7.9%, respectively, for conventionally treated patients. Although these trials did not study aspects of the team care they practiced, it is unlikely that their results could have been achieved without a multidisciplinary approach.[49–52]

The DCCT found that intensive treatment for patients with type 1 diabetes reduced the risk for microvascular complications for eye disease by 76%, kidney disease by 65%, and nerve damage by 64%. A follow-up study indicated that the reduction in risk for progressive eye and kidney disease persisted for at least 4 years after the DCCT ended, despite increasing blood glucose values.[53] The UKPDS showed that intensive treatment maintained over time for patients with type 2 diabetes reduced the risk for retinopathy by 21%, cataract extraction by 24%, microvascular endpoints by 25%, and albuminuria by 33%. Lowering blood pressure in a subset of UKPDS subjects to a mean of 144/82 mm Hg reduced the risk of strokes, diabetes-related deaths, heart failure, microvascular complications, and visual loss up to 56%.[54]

Although almost every patient can be expected to benefit from any increment in improved glycemic regulation, blood glucose control is more effective in preventing the initial development of microvascular complications than in preventing their progression once they have become established.[9,28] Early therapeutic intervention also is more cost-effective.[45] There is a marked correlation between glycemic control and the cost of medical care, with medical charges increasing significantly for every 1% increase in HbA1c above 7%.[55] In fact, the increase in medical charges accelerates as the HbA1c value increases. These findings underscore the need for early diagnosis and treatment of type 2 diabetes.

* *HbA1c is formed by glucose irreversibly combining with a component of hemoglobin in the bloodstream. Measuring the percent of HbA1c in the blood provides a reliable index of the average blood glucose during the previous 2 to 3 months. The test is now used routinely to monitor glycemic control in people with diabetes. Normal HbA1c values are 4 to 6%.*

"Properly implemented diabetes team care is cost-effective and the preferred method of care delivery, particularly when services include health promotion and disease prevention in addition to intensive clinical management."

Elizabeth Warren-Boulton

VI. Forming a team

A. Ensure the commitment of leadership

The first step requires an organization's key decision-makers to commit to the implementation of multidisciplinary team care and the necessary resources and infrastructure to enable the team to function. Once the commitment is made, a planning group needs to carry out the steps outlined in items B–H.

B. Gain support from care providers

- Select well-respected clinicians to serve as catalysts to generate interest and support among colleagues.
- Obtain the support of primary care providers and other potential team members.
- Involve core team members early in organizational and clinical decision-making to gain their active participation.
- Demonstrate team care on a small scale, if necessary, to increase provider comfort and adjustment to a new method of care, and to assess its feasibility, effectiveness, and impact.

C. Identify team members

- Meet with potential team members, policy makers, and business representatives such as clinic or office managers responsible for reimbursement.
- Clarify the roles of team members to resolve issues related to leadership and role overlap or redundancy in the care delivery process.[56]

D. Identify the patient population

- Initial assessment may be limited to general demographic characteristics and an estimate of the proportion of patients with type 1, type 2, and gestational diabetes.
- Further assessment could determine the presence of risk factors, number of patients with and without diabetes complications, severity of complications, the extent of comorbidities, use of health services, and delivery of preventive care.[57]

E. Stratify the patient population

- Once the diabetes patient population is known, the team may want to stratify the population into groups according to the intensity of services required. Patients at risk for diabetes complications may benefit from relatively low-cost preventive care focused on risk factor reduction and health promotion. See appendix 1, Stratifying Team Care According to Patient Population Needs.
- Identifying the patients with diabetes complications or other comorbidities over a previous 2-year period can help determine those who will require more extensive resources (see appendix 1).

F. Assess resources

- Identify strengths and weaknesses in available resources (such as support staff, education materials, equipment, supplies, home care services, support groups, follow-up services).
- Ensure that adequate space, equipment, and supplies are available.
- Acquire state-of-the-art management protocols and education materials to ensure the delivery of current, culturally sensitive, and consistent care.
- Assess community support and resources such as institutional funding and grants from community agencies, groups, or services.
- Determine available reimbursement for provider services (including education and nutrition), equipment, and supplies. Determine availability of grants or industry support for indigent programs.

G. Develop a system for coordinated, continuous, quality care

- Define the team philosophy, goals, and objectives.
- Develop a secure information system for patient identification, data collection, and ongoing assessment.
- Determine the structure and scope of the program or service. Teams can provide medical and clinical care; diabetes, lipid, and hypertension management; self-management education and nutrition therapy; psychosocial counseling; risk factor reduction; screening for complications; follow-up care; coordination of referrals to specialists; and access to supportive clinical and community resources. See appendix 2, Patient Flow Chart for Initial and Continuing Team Care for People with Diabetes.
- Base care on locally developed and consensus-based guidelines adapted from widely accepted standards or practice guidelines to meet local conditions.[58–61] See appendix 3, National Diabetes Education Program Guiding Principles for Diabetes Care; appendix 4, Diabetes Numbers At-a-Glance; and appendix 5, Diabetes Self-Management Education Curriculum.
- Develop a system that supports continuity of care through regular team meetings and ongoing documentation and communication of pertinent information among team members, ideally via a computerized information system.
- Structure a payment and/or a reimbursement system for provider services.
- Develop a system for monitoring the achievement of specific performance measures such as use of hemoglobin A1c.

H. Evaluate outcomes and adjust as necessary

- Plan for regular service assessment and clinical and economic evaluation of provider performance measures and patient outcomes. See appendix 6, Quality Improvement Indicators for Diabetes Care, and appendix 7, Maintaining a Successful Team.

VII. Access to diabetes care

"The team can minimize patients' health risks by assessment, intervention, and surveillance to identify problems early and initiate prompt treatment."

Judith Dempster

At the federal and state levels, persistent legislative advocacy efforts over the past decade have succeeded in improving insurance coverage for people with diabetes and increasing benefits for diabetes self-management education and supplies. To date, most states have passed legislation ensuring varying degrees of coverage for necessary diabetes equipment, supplies, and education for those persons whose insurance plans are regulated by state law.[62]

The Balanced Budget Act of 1997 created legislation to expand coverage of blood glucose monitors and test strips and to provide outpatient self-management training services for Medicare beneficiaries with diabetes.[63] The Health Care Financing Administration (the government agency that administers the Medicare program) has created preliminary regulations to establish eligibility criteria for Medicare beneficiaries and set quality standards that education programs must meet; it is determining which persons and entities are eligible for reimbursement for related services.[64]

Despite these advances, a serious insurance issue related to diabetes care remains unresolved. For the approximately 650,000 Americans with diabetes who do not have health insurance, access to care is uncertain.[65] In the elderly, African and Hispanic American, and American Indian populations where diabetes is both more prevalent and more serious, lack of access to care for those without health insurance compounds the problem.

Access challenges go beyond reimbursement for diabetes care. There are shortages of qualified diabetes care providers such as certified diabetes educators, dietitians and endocrinologists in some communities, especially rural and other isolated communities such as Indian reservations where diabetes is rampant. Given the higher burden of diabetes among minority populations, cultural, language, and intergenerational challenges can be additional barriers to access. Finally, reimbursement does not mean full utilization of benefits. Eligible persons need to be informed about their coverage benefits and how to access them.

VIII. Examples of effective team care

The examples in this section reflect team care functioning in a variety of settings and include some references to chronic diseases other than diabetes.

A. Team care in the managed care setting

A study of patients treated in seven managed care plans reported clinical and economic advantages from a comprehensive diabetes management program.[66] The diabetes program has a population-based approach that involves tracking the entire plan's population with diabetes and coordinating all aspects of their medical care. A multidisciplinary team works with plan physicians and their patients to provide comprehensive diabetes management. Patients are stratified into three levels based on the complexity of their disease, risk factors and co-morbidities, and quantity of needed resources. Case managers coordinate team services to meet patient health care needs. An electronic tracking system contains current patient and provider information. A data analysis (excluding proprietary costs) indicated that the program achieved adjusted gross economic savings of $50 per member with diabetes per month. Annual hospital admissions per 1,000 members with diabetes decreased by 18% and bed days fell by 21%.[66]

In Arizona, six competing capitated Medicare managed care plans collaborated with a peer review organization to improve outpatient diabetes team management for their members.[67] One year after baseline measures were taken, documented care was assessed for quality improvement. Indicators included mean HbA1c, proportion of HbA1c values <8%, use of an angiotensin converting enzyme (ACE) inhibitor for patients with hypertension or proteinuria, treatment for dyslipidemia, and screening tests for complications.

Comparative feedback of data to each plan in the above study stimulated changes in provider behavior and led to significant improvement in most of the indicators. For example, mean HbA1c values fell from 8.9% to 7.9%; the proportion of patients with HbA1c values <8% rose from 40% to 62%; the use of ACE inhibitors increased by 69%; and the treatment of dyslipidemia improved from 16% to 40%, but there was no significant improvement in lipid profiles.[67]

B. Stepped diabetes management

In stepped care, the team assesses patients' management concerns, skills, and resources, then sets education and treatment goals. Precise timelines are set for success with individual therapies. Different steps or levels of treatment are provided according to predetermined protocols until management goals are met and maintained. Combined evaluation data are generated for providers to compare changes in practice with baseline measures. This approach is estimated to be cost-effective after 6 to 7 years and to generate lifetime savings of approximately $27,000 per patient.[44]

C. Team care in large clinics

A large Veterans Affairs clinic for ambulatory care introduced a team program for lipid management that involved a clinical pharmacist, a nurse practitioner, a dietitian, and a clinical psychologist, all led by a registered nurse. The team met with a consultant cardiologist for 1 hour before each clinic to review laboratory test results and success in reaching treatment goals. The team then carried out a comprehensive treatment plan for up to 30 patients in a 4-hour clinic session. Significant cholesterol lowering results were achieved in comparison with traditional non-team care.[36]

D. Participation of primary care providers

Primary care physicians, nurse practitioners, and physician assistants can be active members of the core team and often will take on the team coordinator or leadership role. A survey of rural areas of the United States found that the supply of primary care physicians was insufficient to meet national averages for office visits for hypertension, asthma, and diabetes.[68] One-third of the nation's physician assistants work in primary care shortage areas, providing services comparable to those of a family physician.[69] Access to care in these areas could improve if other primary care providers were employed to offset shortages. Nurse practitioners have been shown to produce patient outcomes comparable to those for physicians in a primary care setting.[70]

E. Nurse management

Registered nurses are a cost-effective resource whose success in leading protocol-based care has been well documented.[43,71,72] With medical direction as needed, the nurse can make clinical management decisions about the treatment of diabetes, lipids, and hypertension; provide self-management education; and coordinate team services to meet the patient's health care needs. A computerized tracking and recall system has been shown to enhance the effectiveness of nurse-managed diabetes care.[42]

F. Nutrition intervention by registered dietitians

Medical nutrition therapy provided by registered dietitians has improved outcomes and saved money in the treatment of type 2 diabetes and hypercholesterolemia.[73,74] Nutrition intervention provided according to established nutrition practice guidelines is associated with improvements in glycemic control and health care cost reduction.[70] In an 8-week intervention program before the initiation of treatment with a cholesterol-lowering medication, dietitian visits were associated with a significant reduction in serum cholesterol and also with cost savings by obviating the need for lipid drugs in many of the participants.[74]

G. Participation of pharmacists

By taking nontraditional roles in family practice or medicine clinics in both urban and rural communities, pharmacists can improve chronic disease management.[32,35,75] In a small study, pharmacists working as members of primary care teams provided diabetes education, medication counseling, monitoring, and insulin initiation or adjustment in a Veterans Affairs medical center. Follow-up contact with the patient was either face-to-face or by telephone. Over a mean of 27 weeks, patients in the study experienced significant improvements in glycemic control.[75]

In a group of largely indigent patients with elevated cholesterol values, pharmacist involvement doubled the rate of achievement of National Cholesterol Education Program goals, resulting in a significant decline in total cholesterol values.[32] The pharmacist reviewed relevant laboratory data with the physician; recommended changes in medication, dosage, monitoring, and patient education; identified the least costly drug regimen; and encouraged patients to take their medications.

H. Involvement of community partners

Trained community health workers in collaboration with a hospital, clinic, or health-center-based team can improve diabetes care in disadvantaged communities and add a unique aspect to team care.[24,33,76] In one community, health workers established weekly or monthly contact with high-risk patients with diabetes who repeatedly had failed to improve under the office-based medical care system. Health workers used care plans developed in collaboration with the patient and a clinic-based team. Results included an increase in the amount and quality of medical care provided as well as improved body weight and blood glucose values.[24] A similar study improved health outcomes for inner city patients with hypertension through education and contact that increased adherence to therapy and appointment keeping.[33]

"When patients participate in treatment decisions, set behavioral goals, receive adequate education, and actively manage their diabetes, improved blood glucose control is achieved — leading, in turn, to improved patient satisfaction, quality of life, and health outcomes, and lower health care costs."

Martha Funnell

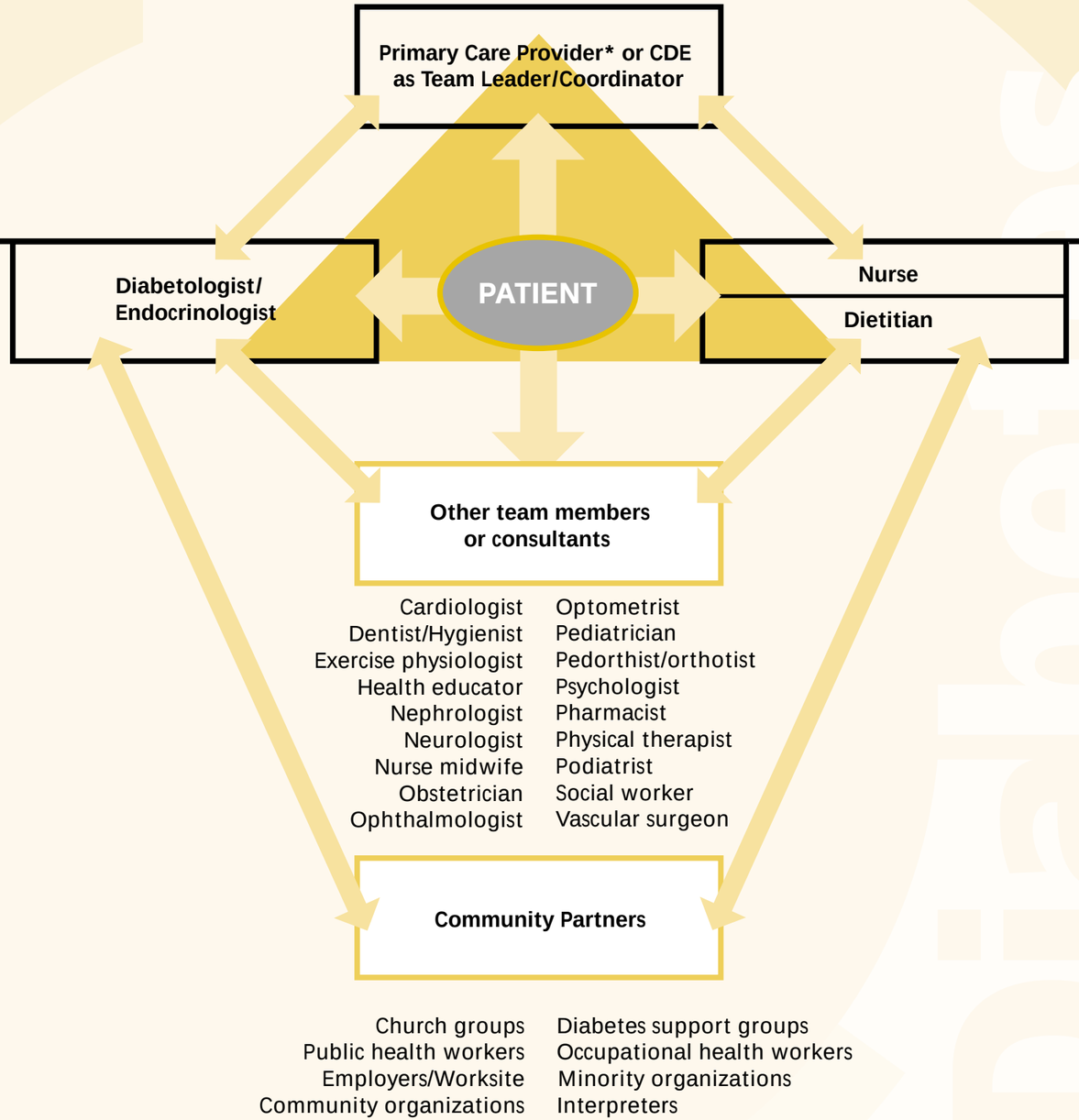
IX. Summary

"People live, work, play and worship in communities. Community team partners can enhance the success of diabetes self-management."

Faye L. Wong

The establishment of a multidisciplinary team for diabetes management based on scientifically grounded practice guidelines presents an outstanding opportunity for health care policy makers to improve the health of people with diabetes and ultimately reduce overall costs of diabetes care. An organization's leadership must be committed to providing comprehensive, lifetime management for its patients with diabetes, which is most effectively carried out through a team care approach. Team care needs to be continuous, proactive, planned, patient centered, and population based. It requires a collaborative, interactive, multi-skilled approach that maximizes the use of health professionals such as nurses, dietitians, and pharmacists as educators, care coordinators, and providers of services. Payment for team services is most readily accomplished when team members are employed by a single organization and their services are covered by a negotiated contract with insurance plans. When patients participate as decision-making partners in care, improved diabetes control is achieved. This improvement in turn leads to greater patient satisfaction with care, better quality of life, improved health outcomes, and lower health care costs.

Figure 1.
Diagram showing the patient and a typical 4-person "Core" provider team, other professionals who may be called upon as team members or consultants, and community partners.



Appendices

APPENDIX 1

Stratifying Team Care According to Patient Population Needs

Once the diabetes patient population is known, the team may want to stratify the population into groups according to the intensity of services required. Patients at risk for complications may require the lowest intensity of care and resources, while those with complications or comorbidities or those at break points in their disease management may require more intensive services.

A. Identify patients *at risk* for diabetes complications
Identifying patients at risk for diabetes complications can help the team to effectively stratify services. Clinical information needed to assess risk includes:

- HbA1c values
- Blood pressure control
- Lipid control
- Cardiovascular disease risk
- Eye disease risk
- Foot disease risk
- Evidence of microalbuminuria
- Smoking habits
- Alcohol use
- Family history of diabetes complications
- Duration of the disease.

A type 2 population largely free of diabetes complications will benefit from relatively low-cost preventive care focused on risk factor reduction and health promotion. After screening for complications, the team could offer group discussions about risk factor reduction and self-management issues such as nutrition, weight management, and ways to incorporate regular physical activity into lifestyles.

B. Identify patients with complications and other comorbidities
Identifying the patients who had diabetes complications or other comorbidities in a previous 2-year period can help determine those who will require more extensive resources, such as allocation of additional team members, more aggressive protocol management, or more frequent follow-up.[77,78] Analyses of administrative databases have demonstrated that a large fraction of health care dollars are allocated to a small proportion of the population with multiple comorbidities. For example, data from Mayo Clinic show that 20% of patients account for 70% of the medical costs associated with diabetes and 40% of patients account for 90% of the costs.[79] It is important to note, however, that patients with complications are an evolving group and that for practical planning purposes, periodic reassessment is essential.

C. Identify patients at "break points"
To predict other potential high resource users, identifying patients at "break points" in the course of their disease may be helpful. These points include:

- New onset of type 1 diabetes
- HbA1c consistently above 8%
- New onset of significant complications
- Frequent or uncontrolled hypoglycemia
- Pregnancy in a woman with diabetes
- Initiation of insulin therapy.[11]

Assessing reasons for consistently elevated HbA1c values in the patient population also may help team planning. The level of diabetes control can be affected by several factors:

- Limited provider availability and service reimbursement
- Outdated or ineffective management protocols
- Limited insurance coverage for patients
- Cognitive, psychological, and social barriers that limit patient participation in diabetes management.

APPENDIX 2

Patient Flow Chart for Initial and Continuing Team Care for People with Diabetes

1. Initial team visit
- Medical history and physical
- Laboratory evaluation
- Risk factor assessment
- Nutritional assessment
- Physical activity assessment
- Educational needs assessment
- Psychosocial assessment

2. Intervention
- Self-management education
- Collaborative goal setting for metabolic and self-care goals
- Plan for ongoing contact between the patient and appropriate team members
- Referral to specialists as necessary

3. Ongoing team care
- Assessment of progress toward goals and self-management
- Identification of barriers to self-care
- Problem solving, including adjustments in therapy and self-care goals

4. Annual planned team visit
- Annual visit for complications examination
- Reassessment of medical, nutritional, educational, and psychosocial needs
- Revisiting metabolic goals

APPENDIX 3

National Diabetes Education Program Guiding Principles for Diabetes Care[80]

Principle 1: Screening High-Risk People and Diagnosing Diabetes One-third of people with diabetes remain undiagnosed. Finding and treating diabetes early can improve health outcomes for people with diabetes. Therefore, routine screening and correct diagnosis are essential.

Principle 2: Ongoing Care People with diabetes should always receive high-quality care on an ongoing basis to ensure that they are taking good care of their diabetes and to make changes to their treatment plan when needed to achieve control of the disease.

Principle 3: Diabetes Education People with diabetes and their family members have the right to accurate information and education needed for diabetes self-care.

Principle 4: Treating Hyperglycemia Blood glucose values should be kept as near to normal values as is safely possible. The target range should be based on an overall assessment of the person's health.

Principle 5: Self-Monitoring of Blood Glucose Control and Hemoglobin A1c (HbA1c) Blood glucose levels and hemoglobin A1c values should be measured on a routine basis using current, reliable methods.

Principle 6: Preventing and Diagnosing Long-term Diabetes Problems Excellent diabetes care can greatly lower the chances of developing long-term diabetes problems.

Principle 7: Screening for and Treating Long-term Diabetes Problems People with diabetes should have regular exams to help find and treat long-term diabetes problems. All long-term diabetes problems have effective treatments.

To obtain a booklet that elaborates on these guiding principles for health care providers or for patients, call 1-800-438-5383 or visit the Web site at http://www.ndep.nih.gov.

APPENDIX 4

Diabetes Numbers At-a-Glance†

1. Criteria for Diagnosis of Diabetes

Fasting plasma glucose	≥ 126 mg/dl*
Random plasma glucose	≥ 200 mg/dl* with symptoms (polyuria, polydypsia, and unexplained weight loss)

**Repeat to confirm on subsequent day.*

2. Glycemic Control Goals for Type 1 or Type 2 Diabetes

Level of Control	*Hemoglobin A1c*
Normal	< 6 %
Goal	< 7 %
Take additional action	> 8 %

Self-monitored Blood Glucose

Whole blood values

Preprandial goal:	80 - 120 mg/dl
Bedtime goal:	100 - 140 mg/dl

Plasma values

Preprandial goal:	90 - 130 mg/dl
Bedtime goal:	110 - 150 mg/dl

3. Hypertension in Adults with Diabetes

	Systolic mmHg		*Diastolic mmHg*
Definition	≥140	and/or	≥90
Treatment goal	<130		<80

4. Category of Risk Based on Lipoprotein Levels in Adults

Risk	*LDL Cholesterol (mg/dl)*	*HDL Cholesterol (mg/dl)*	*Triglyceride (mg/dl)*
Higher	≥130	<35	≥400
Borderline	100-129	35-45	200-399
Lower	<100	>45	<200

5. Treatment Decisions Based on LDL Cholesterol Levels in Adult

	Medical Nutrition Therapy		*Drug Therapy*	
	Initiation Level	LDL Goal	Initiation Level	LDL Goal
With CHD, PVD, or CVD	>100	≤100	>100	≤100
Without CHD, PVD, and CVD	>100	≤100	≥130*	≤100

Data are given in mg/dl.
**For diabetic patients with multiple CHD risk factors, some authorities recommend drug therapy when LDL levels are between 100 and 130 mg/dl.*

6. Management Schedule

At every visit:

- Measure weight and blood pressure.
- Inspect feet (high risk feet).
- Review self-monitoring blood glucose record.
- Review/adjust medications.
- Recommend regular use of aspirin for CVD prevention.
- Review self-management skills, dietary needs, and physical activity.
- Counsel on smoking cessation and alcohol use.

Twice a year:

- Order hemoglobin A1c in patients meeting treatment goals with stable glycemia (quarterly if not).

Annually:

- Order fasting lipid profile, serum creatinine, and urinalysis for protein and microalbumin.
- Order dilated eye exam, dental exam, and influenza vaccine.
- Perform comprehensive foot exam.

Usually once:

- Order pneumococcal immunization..

Footnote. Explanation for the abbreviations used in item 5 are: LDL – low density lipoprotein cholesterol, CHD – coronary heart disease, PVD – peripheral vascular disease, CVD – cardiovascular disease.

†The numbers are based on American Diabetes Association Clinical Practice Recommendations. Diabetes Care 24 (Suppl. 1): S33-S43, 2001

APPENDIX 5

Diabetes Self-Management Education Curriculum

Diabetes Self-Management Education
Diabetes self-management education is an interactive, collaborative, ongoing process involving the person with diabetes and the educator. This four-step individualized process includes:

1. Assessment of specific education needs
2. Identification of specific diabetes self-management goals
3. Education intervention to help the individual achieve self-management goals
4. Evaluation of the attainment of self-management goals

Content areas for diabetes self-management education that a team should address as necessary are:

- The diabetes disease process and treatment options
- Incorporating appropriate nutrition management*
- Incorporating physical activity into lifestyle
- Using medications effectively
- Monitoring blood glucose and urine ketones and using the results to improve control
- Preventing, detecting, and treating acute complications
- Preventing (through risk reduction behavior), detecting, and treating chronic complications

  Goal setting to promote health and problem solving for daily living
- Integrating psychosocial adjustment into daily life
- Promoting preconception care, management during pregnancy, and gestational diabetes management

Based on American Diabetes Association National Standards for Diabetes Self-Management Education Programs.[15]

* *Medical nutrition therapy involves assessment of the nutritional status of the patient, including analysis of medical, social, and diet history, laboratory values, and anthropometric measurements. Based on assessment and goals mutually agreed upon by the patient and educator, the educator determines the nutrition prescription and education intervention. Ongoing follow-up and evaluation of clinical outcomes guide future interventions.*

APPENDIX 6

Quality Improvement Indicators for Diabetes Care

The increasing demand for quality care from managed care organizations and other health care systems is an important development. The Diabetes Quality Improvement Project (DQIP) is a national collaborative effort to improve diabetes care and the quality of life for people with diabetes. DQIP has developed a set of eight performance measures for diabetes care that cover hemoglobin A1c and lipid testing and assessment of the eyes, kidneys and feet.

Increasingly, the DQIP measures are being adopted by groups involved in national quality improvement efforts. Numerous public agencies (the Department of Defense, the Health Care Financing Administration, multiple state Medicaid programs, the Indian Health Service, and the Veterans Hospital Administration) and private groups (the American Diabetes Association Provider Recognition Program, and the National Committee for Quality Assurance, NCQA) are using some or all of the DQIP measures. Six of the eight DQIP measures have been incorporated into the NCQA's HEDIS* ® 2000 measures that are reported publicly for Medicare, Medicaid, and managed care plans that serve Medicare beneficiaries.

Policy makers can use these publicly available NCQA evaluations in selecting health care plans.[81] Facilities with teams that address NCQA criteria are likely to be in an advantageous position to negotiate a contract with managed care organizations.[34]

For a synopsis of current DQIP measures visit the Web site www.diabetes.org/dqip.asp.

* *Health Plan Employer Data and Information Set*

APPENDIX 7

Maintaining a Successful Team

Regardless of the team structure and purpose, several important elements need attention for ongoing, successful team care.

A. Promote patient satisfaction and self-management
Attention to patient concerns such as insurance coverage and billing, confidentiality, time spent waiting, accessibility of providers, and continuity of care can markedly influence patient satisfaction.[82]

Appendix 7 continued

Self-management education provides patients with the knowledge and skills to actively participate in their care, make informed decisions, set collaborative goals, carry out daily management, evaluate treatment outcomes, and communicate effectively with the provider team. Ongoing management requires reassessment and redefinition of collaborative goals, and supportive care to sustain achievement of goals over time.[14]

B. Promote a community support network The support of family, friends, and the entire community can help people with diabetes sustain self-management practices and a positive outlook over time. Encouraging communities to participate in routine physical activity and support the concept of healthy foods for all, creates an environment that can contribute to improved health outcomes and quality of life. Teams can help people with diabetes develop a community support network that includes support groups, the faith community, and needed services such as transportation.

C. Coordinate teamwork Teams need clear procedures to facilitate timely coordination of all required services. To ensure continuity of care and patient satisfaction, coordination efforts need periodic reassessment.

D. Communicate Team members need to communicate with each other and the patient. Team meetings, patient rounds, and journal clubs promote cohesion and a common approach to patient care. Setting targets for blood glucose and lipid values, hemoglobin A1c, blood pressure, body weight, and activity level provides a common ground for discussion of management strategies, collaborative goals, and evaluation of treatment outcomes. Consistent messages from all team members enhance patient understanding and increase effective self-management behaviors.[14]

Providers and patients need to develop and use a written plan for treatment goals, disease management, personal goals, and patient education and skill development. A multidisciplinary planning and documentation tool for the medical record can help team members to clarify responsibilities, coordinate care, and communicate the patient's progress in a timely way that benefits all health care providers the patient encounters.[56] Referring physicians can be apprised of patient progress through computer-generated reports, medical record notes, and personal and telephone contact.

E. Follow-up Ongoing patient follow-up and routine scheduled visits for preventive care are key to team success. A system to monitor and recall individuals for treatment and appointments, planned visits, and ongoing collaborative goal setting will facilitate the provision of these services. Follow-up care can be in the form of return face-to-face visits or interaction with other team members and community partners as well as telephone interviews and fax or e-mail correspondence. Arranging for patients to send self-monitored data and to receive phone counseling and ongoing therapeutic management by nurses and dietitians can reduce the need for multiple clinic or office visits and increase access to care for patients in medically underserved locations.[14,83,84] Essential preventive services include foot examinations, screening for microalbuminuria, and retinal eye examinations. Preventive dental care also is important. Sending patients reminders and questionnaires can encourage appointment keeping.

F. Use protocols and other practice tools Diabetes management tools are an integral part of a collaborative team approach and include standards of care, treatment guidelines, protocols and algorithms, flow sheets, standing orders, chart stickers, and other recording and reminder systems.[17,30]

G. Computerize information systems when feasible Secure computerized clinical information systems can identify patients with diabetes, centralize their data and laboratory values, suggest a change in medication dosage, and enable timely referrals to other providers or specialists. These systems also can automatically remind the team to conduct self-management education, provide preventive services, and schedule follow-up visits. Computerized information systems help monitor quality of care by pooling medical record audit findings and comparing them with baseline measures or values attained in other practice settings.

H. Evaluate Periodic process and outcome evaluations can be used to indicate ways to improve team function and patient care. Databases with analytic reports, pooled medical record audit findings, utilization data (such as hospital length-of-stay, emergency room visits, and total dollars spent) are important for evaluating the outcomes of team care, determining future progress, and indicating team success in meeting quality measures such as those in the Diabetes Quality Improvement Project.[34] Patient satisfaction and quality-of-life interviews or questionnaires for patients can provide valuable feedback to the team and may influence the scope and manner of care provided.

References

1. Centers for Disease Control and Prevention. National diabetes fact sheet: national estimates and general information on diabetes in the United States. Atlanta, GA: U.S. Department of Health and Human Services, CDC, 1997.
2. American Diabetes Association. Economic consequences of diabetes mellitus in the US in 1997. Diabetes Care 1998;21:296–309.
3. Rubin JR, Altman WM, Mendelson DN. Health care expenditures for people with diabetes mellitus, 1992. J Clin Endocrinol Metab 1994;78:809A–9F.
4. Glasgow RE, Wagner EH, Kaplan RM, Vinicor F, Smith L, Norman J. If diabetes is a public health problem, why not treat it as one? A population-based approach to chronic illness. Ann Behav Med 1999;21:159–70.
5. 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;1(1):12–22.
6. Von Korff M, Gruman J, Schaefer J, Curry SJ, Wagner EH. Collaborative management of chronic illness. Ann Intern Med 1997;127:1097–102.
7. Etzwiler DD. Chronic care: a need in search of a system. Diabetes Educ 1997;23:569–73.
8. Wagner EH, Austin BT, Von Korff M. Improving outcomes in chronic illness. Manag Care Q 1996;4(2):12–25.
9. Roman SH, Harris MI. Management of diabetes mellitus from a public health perspective. Endocrinol Metab Clin North Am 1997;26:443–74.
10. Hiss RG, Greenfield S. Forum three: changes in the US health care system that would facilitate improved care for non-insulin-dependent diabetes mellitus. Ann Intern Med 1996;124(part 2):180–6.
11. Quickel KE Jr. Managed care and diabetes, with special attention to the issue of who should provide care. Trans Am Clin Climatol Assoc 1996;108:184–95.
12. Ray MD. Shared borders: achieving the goals of interdisciplinary patient care. Am J Health Syst Pharm 1998;55:1369–74.
13. 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.
14. Personal communication. UKPDS Administrator, Diabetes Research Laboratories, Oxford University, Oxford, United Kingdom. March 9th, 2000.
15. Mensing C, Boucher J, Cypress M, et al. National standards for diabetes self-management education. Diabetes Care 2000;23:682–9.
16. Quickel KE. Diabetes in a managed care system. Ann Intern Med 1996;124(part 2):160–3.
17. Solberg LI, Reger LA, Pearson TL, Cherney LM, et al. Using continuous quality improvement to improve diabetes care in populations: the IDEAL model. Improving care for Diabetics through Empowerment Action collaboration and Leadership. Jt Comm J Qual Improv 1997;23:581–92.
18. Larsson J, Apelqvist J, Agardh CD, Stenstrom A. Decreasing incidence of major amputation in diabetic patients: a consequence of a multidisciplinary foot care team approach? Diabet Med 1995;12:770–6.
19. Dargis V, Pantelejeva O, Jonushaite A, Vileikyte L, Boulton AJ. Benefits of a multidisciplinary approach in the management of recurrent diabetic foot ulceration in Lithuania: a prospective study. Diabetes Care 1999;22:1428–31.
20. Courtney L, Gordon M, Romer L. A clinical path for adult diabetes. Diabetes Educ 1997;23:664–71.
21. Bailey BK, Cardwell MS. A team approach to managing preexisting diabetes complicated by pregnancy. Diabetes Educ 1996;22:111–5.

22. Levetan CS, Salas JR, Wilets IF, Zumoff B. Impact of endocrine and diabetes team consultation on hospital length of stay for patients with diabetes. Am J Med 1995;99:22–8.

23. Koproski J, Pretto Z, Poretsky L. Effects of an intervention by a diabetes team in hospitalized patients with diabetes. Diabetes Care 1997;20:1553–5.

24. Humphry J, Jameson LM, Beckham S. Overcoming social and cultural barriers to care for patients with diabetes. West J Med 1997;167:138–44.

25. Diabetes Integrated Care Evaluation Team. Integrated care for diabetes: clinical, psychosocial, and economic evaluation. Br Med J 1994;308:1208–12.

26. Bowyer NK. A primary care team approach to the prevention of ocular complications of diabetes: a program review. J Am Optom Assoc 1997;68:233–42.

27. Chicoye L, Roethel CR, Hatch MH, Wesolowski W. Diabetes care management: a managed care approach. West Med J 1998;97:32–4.

28. 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;329:977–86.

29. United Kingdom Prospective Diabetes Study Group. Intensive blood-glucose control with sulfonylureas or insulin compared with conventional treatment and risk of complications in patients with type 2 diabetes (UKPDS 33). Lancet 1998;352:837–53.

30. Litzelman DK, Slemenda CW, Langefeld CD, et al. Reduction of lower extremity clinical abnormalities in patients with non-insulin-dependent diabetes mellitus. A randomized controlled trial. Ann Intern Med 1993;119:36–41.

31. DeBusk RF. MULTIFIT: a new approach to risk factor modification. Cardiol Clin 1996;14:143–57.

32. Bogden PE, Koontz LM, Williamson P, Abbott RD. The physician and pharmacist team. An effective approach to cholesterol reduction. J Gen Intern Med 1997;12:158–64.

33. Hill MN, Becker DM. Roles of nurses and health workers in cardiovascular health promotion. Am J Med Sci 1995;310(suppl 1):S123–6.

34. Gerber J. Implementing quality assurance programs in multigroup practices for treating hypercholesterolemia in patients with coronary artery disease. Am J Cardiol 1997;80(8B):57H–61H.

35. Carter BL, Barnette DJ, Chrischilles E, Mazzotti GJ, Asali ZJ. Evaluation of hypertensive patients after care provided by community pharmacists in a rural setting. Pharmacotherapy 1997;17:1274–85.

36. Shaffer J, Wexler LF. Reducing low-density lipoprotein cholesterol levels in an ambulatory care system. Arch Intern Med 1995;155:2330–5.

37. Harris DE, Record NB, Gipson GW, Pearson TA. Lipid lowering in a multidisciplinary clinic compared with primary physician management. Am J Cardiol 1998;81:929–33.

38. Davis MK. A comprehensive weight-loss program for soldiers. Mil Med 1996;161:84–8.

39. Greineder DK, Loane KC, Parks P. Reduction in resource utilization by an asthma outreach program. Arch Pediatr Adolesc Med 1995;149:415–20.

40. Stout JW, White LC, Rogers LT, et al. The Asthma Outreach Project: a promising approach to comprehensive asthma management. J Asthma 1998;35:119–27.

41. Wilson SR, Scamagas P, Grado J, et al. The Fresno Asthma Project: a model intervention to control asthma in multiethnic, low-income, inner-city communities. Health Educ Behav 1998;25:79–98.

42. Betz CL, Raynor O, Turman J. Use of an interdisciplinary team for clinical instruction. Nurse Educ 1998;23:32–7.

43. Peters AL, Davidson MB. Application of a diabetes managed care program: the feasibility of using nurses and a computer system to provide effective care. Diabetes Care 1998;21:1037–43.

44. Ginsberg BH, Tan MH, Mazze R, Bergelson A. Staged diabetes management: computerizing a disease state management program. J Med Syst 1998;22:77–87.

45. Herman WH, Eastman RC. The effects of treatment on the direct costs of diabetes. Diabetes Care 1998;21 (suppl 3):C19–24.

46. Frykberg RG. Team approach toward lower extremity amputation prevention in diabetes. J Am Podiatr Med Assoc 1997;87:305–12.

47. Levin ME. Foot lesions in patients with diabetes mellitus. Endocrinol Metab Clin North Am 1996;25:447–62.

48. Testa MA, Simonson DC. Health economic benefits and quality of life during improved glycemic control in patients with type 2 diabetes mellitus. JAMA 1998;280:1490–6.

49. DCCT Research Group. The Diabetes Control and Complications Trial: the trial coordinator perspective. Diabetes Educ 1989;15:236–41.

50. DCCT Research Group. The role of the trial coordinator in the Diabetes Control and Complications Trial. Diabetes Educ 1993;19:509–12.

51. DCCT Research Group. The expanded role of the dietitian in the Diabetes Control and Complications Trial. J Am Diet Assoc 1993;93:758–67.

52. DCCT Research Group. Implementation of treatment protocols in the DCCT. Diabetes Care 1995;18:361–75.

53. The Diabetes Control and Complications Trial/Epidemiology of Diabetes Interventions and Complications Research Group. Retinopathy and nephropathy in patients with type 1 diabetes four years after a trial of intensive therapy. N Eng J Med 2000;342:381–9.

54. United Kingdom Prospective Diabetes Study Group. United Kingdom prospective diabetes study (UKPDS 13). Relative efficacy of randomly allocated diet, sulfonylurea, insulin or metformin in patients with newly diagnosed non-insulin dependent diabetes followed for three years. Br Med J 1995;310:83–8.

55. Gilmer TP, O'Connor PJ, Manning WG, Rush WA. The cost to health plans of poor glycemic control. Diabetes Care 1997;20:1847–62.

56. Hastings C. The changing multidisciplinary team. Nursing Econ 1997;15:105–8.

57. Engelgau MM, Geiss LS, Manninen DL, et al. Use of services by diabetes patients in managed care organizations. Development of a diabetes surveillance system. CDC Diabetes in Managed Care Work Group. Diabetes Care 1998;21:2062–8.

58. American Diabetes Association. Report of the task force on the delivery of diabetes self-management education and medical nutrition therapy. Diabetes Spectrum 1999;12:44–7.

59. American Diabetes Association. American Diabetes Association clinical practice recommendations 2000. Diabetes Care 2000; 23(suppl 1):S32–S60.

60. American Association of Diabetes Educators. The scope of practice for diabetes educators and the standards of practice for diabetes educators. 1999 member resource guide. Chicago, IL: American Association of Diabetes Educators, 1999.

61. International Diabetes Federation Consultative Section on Diabetes Education. International consensus standards of practice for diabetes education. London: Class Publishing, 1997.

62. American Diabetes Association. Legislative fact sheet: impact of diabetes legislative initiatives. Alexandria, VA: American Diabetes Association, 1999.

63. Balanced Budget Act of 1997, S 4105.

64. Department of Health and Human Services, Health Care Financing Administration. 42 CFR Parts 410, 414, 424, 476, and 498 (HCFA-3002-p). Medicare program: expanded coverage for outpatient diabetes self-management training services. Federal Register 1999;64:6827–52.

65. Harris MI, Cowie CC, Eastman R. Health-insurance coverage for adults with diabetes in the U.S. population. Diabetes Care 1994;17:585–91.

66. Rubin RJ, Dietrich KA, Hawk AD. Clinical and economic impact of implementing a comprehensive diabetes management program in managed care. J Clin Endocrin Metab 1998;83:2635–42.

67. Marshall CL, Bluestein M, Briere E, et al. Improving outpatient diabetes management through a collaboration of six competing, capitated Medicare managed care plans. Am J Med Qual 2000;15:65–71.

68. Knapp KK, Paavola FG, Maine LL, Sorofman B, Politzer RM. Availability of primary care providers and pharmacists in the United States. J Am Pharm Assoc (Wash) 1999;39:127–35.

69. Droza PF. Physician extenders increase healthcare access. Health Prog 1992;73(4):46–8.

70. Mundinger MO, Kane RL, Lenz ER, et al. Primary care outcomes in patients treated by nurse practitioners or physicians: a randomized trial. JAMA 2000;283:59–68.

71. Aubert RE, Herman WH, Waters J, et al. Nurse case management to improve glycemic control in diabetic patients in a health maintenance organization. A randomized, controlled trial. Ann Intern Med 1998;129:605–12.

72. Sikka R, Waters J, Moore W, Sutton DR, Herman WH, Aubert RE. Renal assessment practices and the effect of nurse case management of health maintenance organization patients with diabetes. Diabetes Care 1999;22:1–6.

73. Franz MJ, Splett PL, Monk A, et al. Cost-effectiveness of medical nutrition therapy provided by dietitians for persons with non-insulin-dependent diabetes mellitus. J Am Diet Assoc. 1995;95:1018–24.

74. Sikand G, Kashyap ML, Yang I. Medical nutrition therapy lowers serum cholesterol and saves medication costs in men with hypercholesterolemia. J Am Diet Assoc 1998;98:889–94.

75. Coast-Senior EA, Kroner BA, Kelly CL, Trilli LE. Management of patients with type 2 diabetes by pharmacists in primary care clinics. Ann Pharmacother 1998;32:636–41.

76. Corkery E, Palmer C, Foley ME, Schechter CB, Frisher L, Roman SH. Effect of a bicultural community health worker on completion of diabetes education in a Hispanic population. Diabetes Care 1997;20:254–7.

77. Newton KM, Wagner EH, Ramsey SD, et al. The use of automated data to identify complications and comorbidities of diabetes: a validation study. J Clin Epidemiol 1999;52:199–207.

78. Galvin LC, Baudendistel D. Case management: a team approach. Nurs Manage 1998;29:28–31.

79. Bloomgarden ZT. More on managed care. Diabetes Care 1997;20:227–31.

80. National Diabetes Education Program. Guiding principles for diabetes care for health care providers and people with diabetes. Bethesda, MD:NIDDK, 1998; NIH publication no.98–4343.

81. Davidson JA. The treatment of type 2 diabetes in Texas. Diabetes Care 1997;20:446–451.

82. Glasgow RE. A practical model of diabetes management and education. Diabetes Care 1995;18:117–26.

83. Piette JD, McPhee SJ, Weinberger M, Mah CA, Kraemer FB. Use of automated telephone disease management calls in an ethnically diverse sample of low-income patients with diabetes. Diabetes Care 1999;22:1302–9.

84. Wasson J, Gaudette C, Whaley F, Sauvigne A, Baribeau P, Welch HG. Telephone care as a substitute for routine clinic follow-up. JAMA 1992;267:1788–93.

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