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Guideline Summary NGC-8220

Guideline Title

Standards of medical care in diabetes. V. Diabetes care.

Bibliographic Source(s)

American Diabetes Association (ADA). Standards of medical care in diabetes. V. Diabetes care. Diabetes Care 2011 Jan;34(Suppl 1):S16-27.

Guideline Status

Note: This guideline has been updated. The National Guideline Clearinghouse (NGC) is working to update this summary.

Scope

Disease/Condition(s)

- Type 1 diabetes
- Type 2 diabetes
- Gestational diabetes

Guideline Category

Counseling

Evaluation

Management

Prevention

Treatment

Clinical Specialty

Cardiology

Endocrinology

Family Practice

Geriatrics

Internal Medicine

Nephrology

Neurology

Nursing

Nutrition

Obstetrics and Gynecology

Pediatrics

Preventive Medicine

Intended Users

Advanced Practice Nurses

Allied Health Personnel

Dietitians

Health Care Providers

Health Plans

Hospitals

Managed Care Organizations

Nurses

Patients

Pharmacists

Physician Assistants

Physicians

Public Health Departments

Guideline Objective(s)

- To provide evidence-based principles and recommendations for diabetes management
- To provide clinicians, patients, researchers, payers, and other interested individuals with the components of diabetes care, treatment goals, and tools to evaluate the quality of care

Target Population

- Adults and children with type 1 diabetes
- Adults and children with type 2 diabetes
- Pregnant women with diabetes
- Older adults with diabetes

Interventions and Practices Considered

1. Complete medical evaluation, including medical history, physical examination, appropriate laboratory evaluations, and referrals to specialists
2. Formulation of a management plan
3. Patient education regarding self-monitoring of blood glucose (SMBG)
4. Continuous glucose monitoring (CGM) in selected adults
5. Hemoglobin A1C testing
6. Developing or adjusting management plans to achieve glycemic goals
7. Pharmacologic management of type 1 and type 2 diabetes
8. Medical nutrition therapy (MNT)
9. Diabetes self-management education (DSME)
10. Physical activity program
11. Psychosocial assessment and care, including screening for psychosocial problems
12. Referral for diabetes management
13. Consideration of intercurrent illness
14. Bariatric surgery in patients with body mass index (BMI) >35 kg/m^2
15. Glucose for hypoglycemia and glucagon for patients at risk for severe hypoglycemia
16. Immunization, including influenza and pneumococcal vaccines

Major Outcomes Considered

- Blood glucose levels
- Hemoglobin A1C levels
- Glycemic control
- Hypoglycemia
- Hyperglycemia
- Blood pressure levels
- Rates of microvascular events (nephropathy, retinopathy)
- Rates of major adverse macrovascular events (myocardial infarction, stroke, cardiovascular death)
- Rates of neuropathic complications
- Quality of life
- Mortality rate
- Cost

Methodology

Methods Used to Collect/Select the Evidence

Searches of Electronic Databases

Description of Methods Used to Collect/Select the Evidence

Not stated

Number of Source Documents

Not stated

Methods Used to Assess the Quality and Strength of the Evidence

Weighting According to a Rating Scheme (Scheme Given)

Rating Scheme for the Strength of the Evidence

American Diabetes Association's Evidence Grading System for Clinical Practice Recommendations

A

Clear evidence from well-conducted, generalizable, randomized controlled trials that are adequately powered, including:

- Evidence from a well-conducted multicenter trial
- Evidence from a meta-analysis that incorporated quality ratings in the analysis

Compelling nonexperimental evidence (i.e., "all or none" rule developed by the Centre for Evidence-Based Medicine at Oxford)

Supportive evidence from well-conducted randomized controlled trials that are adequately powered, including:

- Evidence from a well-conducted trial at one or more institutions
- Evidence from a meta-analysis that incorporated quality ratings in the analysis

B

Supportive evidence from well-conducted cohort studies, including:

- Evidence from a well-conducted prospective cohort study or registry
- Evidence from a well-conducted meta-analysis of cohort studies

Supportive evidence from a well-conducted case-control study

C

Supportive evidence from poorly controlled or uncontrolled studies, including:

- Evidence from randomized clinical trials with one or more major or three or more minor methodological flaws that could invalidate the results
- Evidence from observational studies with high potential for bias (such as case series with comparison to historical controls)
- Evidence from case series or case reports

Conflicting evidence with the weight of evidence supporting the recommendation

E

Expert consensus or clinical experience

Methods Used to Analyze the Evidence

Review of Published Meta-Analyses

Systematic Review

Description of the Methods Used to Analyze the Evidence

Not stated

Methods Used to Formulate the Recommendations

Expert Consensus

Description of Methods Used to Formulate the Recommendations

Not stated

Rating Scheme for the Strength of the Recommendations

Recommendations have been assigned ratings of A, B, or C, depending on the quality of evidence (see "Rating Scheme for the Strength of the Evidence"). Expert opinion (E) is a separate category for recommendations in which there is as yet no evidence from clinical trials, in which clinical trials may be impractical, or in which there is conflicting evidence. Recommendations with an "A" rating are based on large, well-designed clinical trials or well-done meta-analyses. Generally, these recommendations have the best chance of improving outcomes when applied to the population to which they are appropriate. Recommendations with lower levels of evidence may be equally important but are not as well supported.

Cost Analysis

Published cost analyses were reviewed.

Method of Guideline Validation

Internal Peer Review

Description of Method of Guideline Validation

The recommendations were reviewed and approved by the Professional Practice Committee and, subsequently, by the Executive Committee of the Board of Directors.

Recommendations

Major Recommendations

Note: This guideline has been updated. The National Guideline Clearinghouse (NGC) is working to update this summary. The recommendations that follow are based on the previous version of the guideline.

The evidence grading system for clinical practice recommendations (A–C, E) is defined at the end of the "Major Recommendations" field.

Initial Evaluation

A complete medical evaluation should be performed to classify the diabetes, detect the presence of diabetes complications, review previous treatment and glycemic control in patients with established diabetes, assist in formulating a management plan, and provide a basis for continuing care. Laboratory tests appropriate to the evaluation of each patient's medical condition should be performed. A focus on the components of comprehensive care (see Table 8 in the original guideline document) will assist the health care team to ensure optimal management of the patient with diabetes.

Management

People with diabetes should receive medical care from a physician-coordinated team. Such teams may include, but are not limited to, physicians, nurse practitioners, physician's assistants, nurses, dietitians, pharmacists, and mental health professionals with expertise and a special interest in diabetes. It is essential in this collaborative and integrated team approach that individuals with diabetes assume an active role in their care.

The management plan should be formulated as a collaborative therapeutic alliance among the patient and family, the physician, and other members of the health care team. A variety of strategies and techniques should be used to provide adequate education and development of problem-solving skills in the various aspects of diabetes management. Implementation of the management plan requires that each aspect is understood and agreed on by the patient and the care providers and that the goals and treatment plan are reasonable. Any plan should recognize diabetes self-management education (DSME) and ongoing diabetes support as an integral component of care. In developing the plan, consideration should be given to the patient's age, school or work schedule and conditions, physical activity, eating patterns, social situation and cultural factors, and presence of complications of diabetes or other medical conditions.

Glycemic Control

Assessment of Glycemic Control

Glucose Monitoring

- Self-monitoring of blood glucose (SMBG) should be carried out three or more times daily for patients using multiple insulin injections or insulin pump therapy. (A)
- For patients using less frequent insulin injections, noninsulin therapies, or medical nutrition therapy (MNT) alone, SMBG may be useful as a guide to the success of therapy. (E)
- To achieve postprandial glucose targets, postprandial SMBG may be appropriate. (E)
- When prescribing SMBG, ensure that patients receive initial instruction in, and routine follow-up evaluation of, SMBG technique and their ability to use data to adjust therapy. (E)
- Continuous glucose monitoring (CGM) in conjunction with intensive insulin regimens can be a useful tool to lower A1C in selected adults (age ≥25 years) with type 1 diabetes. (A)
- Although the evidence for A1C lowering is less strong in children, teens, and younger adults, CGM may be helpful in these groups. Success correlates with adherence to ongoing use of the device. (C)
- CGM may be a supplemental tool to SMBG in those with hypoglycemia unawareness and/or frequent hypoglycemic episodes. (E)

Glycosylated Hemoglobin Test (A1C)

- Perform the A1C test at least two times a year in patients who are meeting treatment goals (and who have stable glycemic control). (E)
- Perform the A1C test quarterly in patients whose therapy has changed or who are not meeting glycemic goals. (E)
- Use of point-of-care testing for A1C allows for timely decisions on therapy changes, when needed. (E)

Glycemic Goals in Adults

- Lowering A1C to below or around 7% has been shown to reduce microvascular and neuropathic complications of diabetes and, if implemented soon after the diagnosis of diabetes, is associated with long-term reduction in macrovascular disease. Therefore, a reasonable A1C goal for many nonpregnant adults in general is <7%. (B)
- Because additional analyses from several randomized trials suggest a small but incremental benefit in

microvascular outcomes with A1C values closer to normal, providers might reasonably suggest more stringent A1C goals for selected individual patients, if this can be achieved without significant hypoglycemia or other adverse effects of treatment. Such patients might include those with short duration of diabetes, long life expectancy, and no significant cardiovascular disease (CVD). (B)

- Conversely, less stringent A1C goals may be appropriate for patients with a history of severe hypoglycemia, limited life expectancy, advanced microvascular or macrovascular complications, extensive comorbid conditions, and those with longstanding diabetes in whom the general goal is difficult to attain despite DSME, appropriate glucose monitoring, and effective doses of multiple glucose-lowering agents including insulin. (C)

Table. Summary of Glycemic Recommendations for Many Nonpregnant Adults with Diabetes

A1C	<7.0%
Preprandial capillary plasma glucose	70 to 130 mg/dL (3.9 to 7.2 mmol/L)
Peak postprandial capillary plasma glucose*	<180 mg/dL (<10.0 mmol/L)

• Goals should be individualized based on:
  • Duration of diabetes
  • Age/life expectancy
  • Comorbid conditions
  • Known CVD or advanced microvascular complications
  • Hypoglycemia unawareness
  • Individual patient considerations
• More or less stringent glycemic goals may be appropriate for individual patients
• Postprandial glucose may be targeted if A1C goals are not met despite reaching preprandial glucose goals.	

*Postprandial glucose measurements should be made 1 to 2 hours after the beginning of the meal, generally peak levels in patients with diabetes.

Glycemic Goals in GDM

Regarding goals for glycemic control for women with GDM, recommendations from the Fifth International Workshop-Conference on Gestational Diabetes are to target maternal capillary glucose concentrations of:

- Preprandial ≤95 mg/dL (5.3 mmol/L)

and either

- 1-h postmeal ≤140 mg/dL (7.8 mmol/L)

or

- 2-h postmeal ≤120 mg/dL (6.7 mmol/L)

For women with preexisting type 1 or type 2 diabetes who become pregnant, a recent consensus statement recommends the following as optimal glycemic goals, if they can be achieved without excessive hypoglycemia:

- Premeal, bedtime, and overnight glucose 60 to 99 mg/dL (3.3 to 5.4 mmol/L)
- Peak postprandial glucose 100 to 129 mg/dL (5.4 to 7.1 mmol/L)
- A1C <6.0%

Pharmacologic and Overall Approaches to Treatment

Therapy for Type 1 Diabetes

Recommended therapy for type 1 diabetes consists of the following components: 1) use of multiple dose insulin injections (3 to 4 injections per day of basal and prandial insulin) or continuous subcutaneous insulin infusion (CSII) therapy; 2) matching of prandial insulin to carbohydrate intake, premeal blood glucose, and anticipated activity; and 3) for many patients (especially if hypoglycemia is a problem), use of insulin analogs. There are excellent reviews available that guide the initiation and management of insulin therapy to achieve desired glycemic goals.

Because of the increased frequency of other autoimmune diseases in type 1 diabetes, screening for thyroid dysfunction, vitamin B12 deficiency, or celiac disease should be considered based on signs and symptoms. Periodic screening in the absence of symptoms has been recommended, but the effectiveness and optimal frequency are unclear.

Therapy for Type 2 Diabetes

The American Diabetes Association (ADA) and the European Association for the Study of Diabetes (EASD) published a consensus statement on the approach to management of hyperglycemia in individuals with type 2 diabetes. Highlights of this approach are: intervention at the time of diagnosis with metformin in combination with lifestyle changes (medical nutrition therapy [MNT] and exercise) and continuing timely augmentation of therapy with additional agents (including early initiation of insulin therapy) as a means of achieving and maintaining recommended levels of glycemic control (i.e., A1C <7% for most patients). As A1C targets are not achieved, treatment intensification is based on the addition of another agent from a *different* class. The overall objective is to achieve and maintain glycemic control and to change interventions when therapeutic goals are not being met.

Initiation of insulin at time of diagnosis is recommended for individuals presenting with weight loss or other severe hyperglycemic symptoms or signs.

Diabetes Self-management Education (DSME)

- People with diabetes should receive DSME according to national standards when their diabetes is diagnosed and as needed thereafter. (B)
- Effective self-management and quality of life are the key outcomes of DSME and should be measured and

monitored as part of care. (C)

- DSME should address psychosocial issues, since emotional well-being is associated with positive diabetes outcomes. (C)
- Because DSME can result in cost-savings and improved outcomes (B), DSME should be reimbursed by third-party payers. (E)

Medical Nutrition Therapy

General Recommendations

- Individuals who have prediabetes or diabetes should receive individualized MNT as needed to achieve treatment goals, preferably provided by a registered dietitian familiar with the components of diabetes MNT. (A)
- Because MNT can result in cost savings and improved outcomes (B), MNT should be adequately covered by insurance and other payers. (E)

Energy Balance, Overweight, and Obesity

- In overweight and obese insulin-resistant individuals, modest weight loss has been shown to reduce insulin resistance. Thus, weight loss is recommended for all overweight or obese individuals who have or are at risk for diabetes. (A)
- For weight loss, either low-carbohydrate, low-fat calorie-restricted, or Mediterranean diets may be effective in the short term (up to 2 years). (A)
- For patients on low-carbohydrate diets, monitor lipid profiles, renal function, and protein intake (in those with nephropathy), and adjust hypoglycemic therapy as needed. (E)
- Physical activity and behavior modification are important components of weight loss programs and are most helpful in maintenance of weight loss. (B)

Primary Prevention of Diabetes

- Among individuals at high risk for developing type 2 diabetes, structured programs emphasizing lifestyle changes that include moderate weight loss (7% body weight) and regular physical activity (150 min/week), with dietary strategies including reduced calories and reduced intake of dietary fat, can reduce the risk for developing diabetes and are therefore recommended. (A)
- Individuals at high risk for type 2 diabetes should be encouraged to achieve the U.S. Department of Agriculture (USDA) recommendation for dietary fiber (14 g fiber/1,000 kcal) and foods containing whole grains (one-half of grain intake). (B)

Management of Diabetes

Macronutrients in Diabetes Management

- The best mix of carbohydrate, protein, and fat may be adjusted to meet the metabolic goals and individual preferences of the person with diabetes. (E)
- Monitoring carbohydrate, whether by carbohydrate counting, choices, or experience-based estimation, remains a key strategy in achieving glycemic control. (A)
- For individuals with diabetes, the use of the glycemic index and glycemic load may provide a modest additional benefit for glycemic control over that observed when total carbohydrate is considered alone. (B)
- Saturated fat intake should be <7% of total calories. (A)
- Reducing intake of *trans* fat lowers low-density lipoprotein (LDL) cholesterol and increases high-density lipoprotein (HDL) cholesterol (A); therefore, intake of *trans* fat should be minimized (E).

Other Nutrition Recommendations

- If adults with diabetes choose to use alcohol, daily intake should be limited to a moderate amount (one drink per day or less for adult women and two drinks per day or less for adult men). (E)
- Routine supplementation with antioxidants, such as vitamins E and C and carotene, is not advised because of lack of evidence of efficacy and concern related to long-term safety. (A)
- Individualized meal planning should include optimization of food choices to meet recommended dietary allowances (RDAs)/dietary reference intakes (DRIs) for all micronutrients. (E)

Physical Activity

- People with diabetes should be advised to perform at least 150 min/week of moderate-intensity aerobic physical activity (50% to 70% of maximum heart rate). (A)
- In the absence of contraindications, people with type 2 diabetes should be encouraged to perform resistance exercise three times per week. (A)

Psychosocial Assessment and Care

- Assessment of psychological and social situation should be included as an ongoing part of the medical management of diabetes. (E)
- Psychosocial screening and follow-up should include, but is not limited to, attitudes about the illness, expectations for medical management and outcomes, affect/mood, general and diabetes-related quality of life, resources (financial, social, and emotional) and psychiatric history. (E)
- Screen for psychosocial problems such as depression and diabetes-related distress, anxiety, eating disorders, and cognitive impairment when self-management is poor. (C)

When Treatment Goals Are Not Met

For a variety of reasons, some people with diabetes and their health care providers do not achieve the desired goals of

treatment (see the table titled "Summary of glycemic recommendations for many nonpregnant adults with diabetes," above). Rethinking the treatment regimen may require assessment of barriers including income, health literacy, diabetes distress, depression, and competing demands, including those related to family responsibilities and dynamics. Other strategies may include culturally appropriate and enhanced DSME, co-management with a diabetes team, referral to a medical social worker for assistance with insurance coverage, or change in pharmacological therapy. Initiation of or increase in SMBG, utilization of CGM, frequent contact with the patient, or referral to a mental health professional or physician with special expertise in diabetes may be useful. Providing patients with an algorithm for self-titration of insulin doses based on SMBG results may be helpful for type 2 patients who take insulin.

Hypoglycemia

- Glucose (15 to 20 g) is the preferred treatment for the conscious individual with hypoglycemia, although any form of carbohydrate that contains glucose may be used. If SMBG 15 min after treatment shows continued hypoglycemia, the treatment should be repeated. Once SMBG glucose returns to normal, the individual should consume a meal or snack to prevent recurrence of hypoglycemia. (E)
- Glucagon should be prescribed for all individuals at significant risk of severe hypoglycemia, and caregivers or family members of these individuals should be instructed in its administration. Glucagon administration is not limited to health care professionals. (E)
- Individuals with hypoglycemia unawareness or one or more episodes of severe hypoglycemia should be advised to raise their glycemic targets to strictly avoid further hypoglycemia for at least several weeks in order to partially reverse hypoglycemia unawareness and reduce risk of future episodes. (B)

Intercurrent Illness

The stress of illness, trauma, and/or surgery frequently aggravates glycemic control and may precipitate diabetic ketoacidosis (DKA) or nonketotic hyperosmolar state, life-threatening conditions that require immediate medical care to prevent complications and death. Any condition leading to deterioration in glycemic control necessitates more frequent monitoring of blood glucose and (in ketosis-prone patients) urine or blood ketones. Marked hyperglycemia requires temporary adjustment of the treatment program and, if accompanied by ketosis, vomiting, or alteration in the level of consciousness, immediate interaction with the diabetes care team. The patient treated with noninsulin therapies or MNT alone may temporarily require insulin. Adequate fluid and caloric intake must be assured. Infection or dehydration is more likely to necessitate hospitalization of the person with diabetes than the person without diabetes.

The hospitalized patient should be treated by a physician with expertise in the management of diabetes. For further information on management of patients with hyperglycemia in the hospital, see the National Guideline Clearinghouse (NGC) summary of the ADA guideline, Standards of medical care in diabetes. VIII. Diabetes care in specific settings. For further information on management of DKA or nonketotic hyperosmolar state, refer to the ADA consensus statement on hyperglycemic crises.

Bariatric Surgery

- Bariatric surgery should be considered for adults with BMI >35 kg/m^2 and type 2 diabetes, especially if the diabetes or associated comorbidities are difficult to control with lifestyle and pharmacologic therapy. (B)
- Patients with type 2 diabetes who have undergone bariatric surgery need lifelong lifestyle support and medical monitoring. (E)
- Although small trials have shown glycemic benefit of bariatric surgery in patients with type 2 diabetes and BMI of 30 to 35 kg/m^2, there is currently insufficient evidence to generally recommend surgery in patients with BMI <35 kg/m^2 outside of a research protocol. (E)
- The long-term benefits, cost-effectiveness, and risks of bariatric surgery in individuals with type 2 diabetes should be studied in well-designed, randomized controlled trials with optimal medical and lifestyle therapy as the comparator. (E)

Immunization

- Annually provide an influenza vaccine to all diabetic patients at least 6 months of age. (C)
- Administer pneumococcal polysaccharide vaccine to all diabetic patients ≥2 years of age. A one-time revaccination is recommended for individuals >64 years of age previously immunized when they were <65 years of age if the vaccine was administered >5 years ago. Other indications for repeat vaccination include nephrotic syndrome, chronic renal disease, and other immunocompromised states, such as after transplantation. (C)

Definitions:

American Diabetes Association's Evidence Grading System for Clinical Practice Recommendations

A

Clear evidence from well-conducted, generalizable, randomized controlled trials that are adequately powered, including:

- Evidence from a well-conducted multicenter trial
- Evidence from a meta-analysis that incorporated quality ratings in the analysis

Compelling nonexperimental evidence (i.e., "all or none" rule developed by the Centre for Evidence-Based Medicine at Oxford)

Supportive evidence from well-conducted randomized controlled trials that are adequately powered, including:

- Evidence from a well-conducted trial at one or more institutions
- Evidence from a meta-analysis that incorporated quality ratings in the analysis

B

Supportive evidence from well-conducted cohort studies, including:

- Evidence from a well-conducted prospective cohort study or registry
- Evidence from a well-conducted meta-analysis of cohort studies

Supportive evidence from a well-conducted case-control study

C

Supportive evidence from poorly controlled or uncontrolled studies, including:

- Evidence from randomized clinical trials with one or more major or three or more minor methodological flaws that could invalidate the results
- Evidence from observational studies with high potential for bias (such as case series with comparison to historical controls)
- Evidence from case series or case reports

Conflicting evidence with the weight of evidence supporting the recommendation

E

Expert consensus or clinical experience

Clinical Algorithm(s)

None provided

Evidence Supporting the Recommendations

Type of Evidence Supporting the Recommendations

The type of supporting evidence is identified and graded for each recommendation (see the "Major Recommendations" field).

Benefits/Harms of Implementing the Guideline Recommendations

Potential Benefits

A focus on the components of comprehensive care will assist the health care team to ensure optimal management of the patient with diabetes.

Potential Harms

- Bariatric surgery is costly in the short term and has some risks. Rates of morbidity and mortality directly related to the surgery have been reduced considerably in recent years, with 30-day mortality rates now 0.28%, similar to those of laparoscopic cholecystectomy. Longer-term concerns include vitamin and mineral deficiencies, osteoporosis, and rare but often severe hypoglycemia from insulin hypersecretion.
- In individuals taking insulin and/or insulin secretagogues, physical activity can cause hypoglycemia if medication dose or carbohydrate consumption is not altered. When people with type 1 diabetes are deprived of insulin for 12 to 48 h and are ketotic, exercise can worsen hyperglycemia and ketosis.

Contraindications

Contraindications

Certain types of exercise may be contraindicated in diabetic patients with uncontrolled hypertension, severe autonomic neuropathy, severe peripheral neuropathy or history of foot lesions, and unstable proliferative retinopathy.

Qualifying Statements

Qualifying Statements

- Evidence is only one component of clinical decision-making. Clinicians care for patients, not populations; guidelines must always be interpreted with the needs of the individual patient in mind. Individual circumstances, such as comorbid and coexisting diseases, age, education, disability, and, above all, patient's values and preferences, must also be considered and may lead to different treatment targets and strategies. Also, conventional evidence hierarchies, such as the one adapted by the American Diabetes Association, may miss some nuances that are important in diabetes care. For example, while there is excellent evidence from clinical trials supporting the importance of achieving glycemic control, the optimal way to achieve this result is less clear. It is difficult to assess each component of such a complex intervention.
- While individual preferences, comorbidities, and other patient factors may require modification of goals, targets that are desirable for most patients with diabetes are provided. These standards are not intended to preclude clinical judgment or more extensive evaluation and management of the patient by other specialists as needed.

Implementation of the Guideline

Description of Implementation Strategy

While numerous interventions to improve adherence to the recommended standards have been implemented, a major

contributor to suboptimal care is a delivery system that too often is fragmented, lacks clinical information capabilities, often duplicates services, and is poorly designed for the delivery of chronic care. The Chronic Care Model (CCM) includes six core elements for the provision of optimal care of patients with chronic disease: 1) delivery system design (moving from a *reactive* to a *proactive* care delivery system, where planned visits are coordinated through a team-based approach; 2) self-management support; 3) decision support (basing care on consistent, effective care guidelines); 4) clinical information systems (using registries that can provide patient-specific and population-based support to the care team); 5) community resources and policies (identifying or developing resources to support healthy lifestyles); and 6) health systems (to create a quality-oriented culture). Alterations in reimbursement that reward the provision of quality care, as defined by the attainment of evidence-based quality measures, will also be required to achieve desired outcome goals. Redefinition of the roles of the clinic staff and promoting self-management on the part of the patient are fundamental to the successful implementation of the CCM. Collaborative, multidisciplinary teams are best suited to provide such care for people with chronic conditions like diabetes and to facilitate patients' performance of appropriate self-management.

A rapidly evolving literature suggests that there are three major strategies to successfully improve the quality of diabetes care delivered by a team of providers. National Diabetes Education Program (NDEP) maintains an online resource (www.betterdiabetescare.nih.gov) to help health care professionals design and implement more effective health care delivery systems for those with diabetes.

Three specific objectives are outlined below.

Objective 1

Provider and team behavior change: Facilitate timely and appropriate intensification of lifestyle and/or pharmaceutical therapy of patients who have not achieved beneficial levels of blood pressure, lipid, or glucose control.

- Clinical information systems including registries that can prospectively identify and track those requiring assessments and/or treatment modifications by the team.
- Electronic medical record-based clinical decision support at the point of care, both personalize and standardize care and can be used by multiple providers
- Use of checklists and/or flow sheets that mirror guidelines.
- Detailed treatment algorithms enabling multiple team members to "treat to target" and appropriately intensify therapy.
- Availability of care or disease management service by nurses, pharmacists, and other providers using detailed algorithms often catalyzing reduction in A1C, blood pressure, and low-density lipoprotein (LDL) cholesterol.

Objective 2

Patient behavior change: Implement a systematic approach to support patients' behavior change efforts as needed including 1) healthy lifestyle (physical activity, healthy eating, nonuse of tobacco, weight management, effective coping, medication taking and management); 2) prevention of diabetes complications (screening for eye, foot, and renal complications; immunizations); and 3) achievement of appropriate blood pressure, lipid, and glucose goals.

- Delivery of high-quality diabetes self-management education (DSME), which has been shown to improve patient self-management, satisfaction, and glucose control.
- Delivery of ongoing diabetes self-management support (DSMS) to ensure that gains achieved during DSME are sustained. National DSME standards call for an integrated approach that includes clinical content and skills, behavioral strategies (goal-setting, problem solving), and addressing emotional concerns in each needed curriculum content area. Provision of continuing education and support (DSMS) improves maintenance of gains regardless of the educational methodology.
- Provision of automated reminders via multiple communication channels to various subgroups of diabetic patients.

Objective 3

Change the system of care: Research on the comprehensive CCM suggests additional strategies to improve diabetes care, including the following:

- Basing care on consistent, evidence-based care guidelines
- Redefining and expanding the roles of the clinic staff
- Collaborative, multidisciplinary teams to provide high-quality care and support patients' appropriate self-management
- Audit and feedback of process and outcome data to providers to encourage population-based care improvement strategies
- Care management, one of the most effective diabetes quality improvement strategies to improve glycemic control
- Identifying and/or developing community resources and public policy that support healthy lifestyles
- Alterations in reimbursement that reward the provision of appropriate and high-quality care and accommodate the need to personalize care goals, providing additional incentives to improve diabetes care

The most successful practices have an institutional priority for quality of care, expanding the role of teams and staff, redesigning their delivery system, activating and educating their patients, and using electronic health record tools. Recent initiatives such as the Patient Centered Medical Home show promise in improving outcomes through coordinated primary care and offer new opportunities for team-based chronic disease care.

It is clear that optimal diabetes management requires an organized, systematic approach and involvement of a coordinated team of dedicated health care professionals working in an environment where patient-centered high-quality care is a priority.

Implementation Tools

Personal Digital Assistant (PDA) Downloads

Quick Reference Guides/Physician Guides

Slide Presentation

For information about availability, see the *Availability of Companion Documents* and *Patient Resources* fields below.

Institute of Medicine (IOM) National Healthcare Quality Report Categories

IOM Care Need

Living with Illness

Staying Healthy

IOM Domain

Effectiveness

Patient-centeredness

Identifying Information and Availability

Bibliographic Source(s)

American Diabetes Association (ADA). Standards of medical care in diabetes. V. Diabetes care. Diabetes Care 2011 Jan;34(Suppl 1):S16-27.

Adaptation

Not applicable: The guideline was not adapted from another source.

Date Released

1998 (revised 2011 Jan)

Guideline Developer(s)

American Diabetes Association - Professional Association

Source(s) of Funding

American Diabetes Association (ADA)

Guideline Committee

Professional Practice Committee

Composition of Group That Authored the Guideline

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Financial Disclosures/Conflicts of Interest

All members of the Professional Practice Committee are required to disclose potential conflicts of interest.

Conflict of interest disclosures for the 2010 Professional Practice Committee Members are available from the American Diabetes Association (ADA) Web site (see "Availability of Companion Documents" field).

Guideline Status

Note: This guideline has been updated. The National Guideline Clearinghouse (NGC) is working to update this summary.

Guideline Availability

Electronic copies of the updated guideline: Available from the American Diabetes Association (ADA) Web site  .

Print copies: Available from the American Diabetes Association, 1701 North Beauregard Street, Alexandria, VA 22311.

Availability of Companion Documents

The following are available:

- Introduction. Diabetes Care 34:S1-S2, 2011.

- Summary of revisions for the 2011 clinical practice recommendations. Diabetes Care 34:S3, 2011.
- Executive summary: standards of medical care in diabetes. Diabetes Care 34:S4-S10, 2011.
- Professional Practice Committee Members (includes conflict of interest disclosure). Diabetes Care 34:S97-S98, 2011.

Electronic copies: Available from the American Diabetes Association (ADA) Web site.

Print copies: Available from the American Diabetes Association, 1701 North Beauregard Street, Alexandria, VA 22311.

The following are also available:

- Diagnosis and classification of diabetes mellitus. Diabetes Care 2011 Jan; 34(Suppl 1):S62-S69. Electronic copies: Available from the ADA Web site.
- 2011 Standards of medical care in diabetes. Clinical practice recommendations. Slide set. American Diabetes Association; 2011 Jan. 130 p. Electronic copies: Available from the ADA Web site.
- 2011 Standards of medical care in diabetes. Clinical practice recommendations. Personal Digital Assistant (PDA). American Diabetes Association; 2011 Jan. Electronic copies: Available for download from the ADA Web site.

Patient Resources

None available

NGC Status

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