



## Guideline Summary NGC-8223

### Guideline Title

**Standards of medical care in diabetes. VIII. Diabetes care in specific settings.**

### Bibliographic Source(s)

American Diabetes Association (ADA). Standards of medical care in diabetes. VIII. Diabetes care in specific settings. Diabetes Care 2011 Jan;34(Suppl 1):S43-6.

### Guideline Status

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

## Scope

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### Disease/Condition(s)

- Type 1 diabetes mellitus
- Type 2 diabetes mellitus

### Guideline Category

Counseling  
Evaluation  
Management  
Treatment

### Clinical Specialty

Critical Care  
Endocrinology  
Family Practice  
Internal Medicine  
Nursing  
Nutrition  
Pediatrics

### Intended Users

Advanced Practice Nurses  
Allied Health Personnel  
Dietitians  
Health Care Providers  
Health Plans  
Hospitals  
Managed Care Organizations  
Nurses  
Patients  
Physician Assistants  
Physicians

### Guideline Objective(s)

- To provide recommendations for the management of diabetes in hospitalized patients
- 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

Hospitalized patients with diabetes

## Interventions and Practices Considered

1. Identification of diabetes in medical record
2. Blood glucose monitoring and documentation including nondiabetic patients who receive therapy associated with risk of hyperglycemia (e.g., high-dose glucocorticoids)
3. Setting blood glucose level goals
4. Insulin, as necessary, including intravenous administration, mealtime prandial insulin dosing, and correction doses or "supplemental" insulin
5. Developing a plan for the treatment of hypoglycemia
6. Obtaining A1C level
7. Medical nutrition therapy (MNT)
8. Diabetes education
9. Follow-up testing for hyperglycemic patients without a diagnosis of diabetes
10. Discharge planning

## Major Outcomes Considered

- Glycemic control
- Hypoglycemia
- Hyperglycemia
- Morbidity
- Mortality
- Safety and efficacy of treatments

## Methodology

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### 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

A formal cost analysis was not performed and published cost analyses were not 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.

#### **Diabetes Care in the Hospital**

- All patients with diabetes admitted to the hospital should have their diabetes clearly identified in the medical record. (E)
- All patients with diabetes should have an order for blood glucose monitoring, with results available to all members of the health care team. (E)
- Goals for blood glucose levels:
  - Critically ill patients: Insulin therapy should be initiated for treatment of persistent hyperglycemia starting at a threshold of no greater than 180 mg/dL (10 mmol/L). Once insulin therapy is started, a glucose range of 140 to 180 mg/dL (7.8 to 10 mmol/L) is recommended for the majority of critically ill patients. (A)
  - More stringent goals, such as 110 to 140 mg/dL (6.1 to 7.8 mmol/L) may be appropriate for selected patients, as long as this can be achieved without significant hypoglycemia. (C)
  - Critically ill patients require an intravenous insulin protocol that has demonstrated efficacy and safety in

achieving the desired glucose range without increasing risk for severe hypoglycemia. (E)

- **Non-critically ill patients:** There is no clear evidence for specific blood glucose goals. If treated with insulin, the premeal blood glucose target should generally be <140 mg/dL (7.8 mmol/L) with random blood glucose <180 mg/dL (10.0 mmol/L), provided these targets can be safely achieved. More stringent targets may be appropriate in stable patients with previous tight glycemic control. Less stringent targets may be appropriate in those with severe comorbidities. (E)
- **Scheduled subcutaneous insulin with basal, nutritional, and correction components is the preferred method for achieving and maintaining glucose control in non-critically ill patients.** (C) Using correction dose or "supplemental" insulin to correct premeal hyperglycemia in addition to scheduled prandial and basal insulin is recommended. (E)
- **Glucose monitoring should be initiated in any patient not known to be diabetic who receives therapy associated with high risk for hyperglycemia, including high-dose glucocorticoid therapy, initiation of enteral or parenteral nutrition, or other medications such as octreotide or immunosuppressive medications.** (B) If hyperglycemia is documented and persistent, treatment is necessary. Such patients should be treated to the same glycemic goals as patients with known diabetes. (E)
- **A hypoglycemia management protocol should be adopted and implemented by each hospital or hospital system.** A plan for treating hypoglycemia should be established for each patient. Episodes of hypoglycemia in the hospital should be documented in the medical record and tracked. (E)
- **All patients with diabetes admitted to the hospital should have an A1C obtained if the result of testing in the previous 2 to 3 months is not available.** (E)
- **Patients with hyperglycemia in the hospital who do not have a diagnosis of diabetes should have appropriate plans for follow-up testing and care documented at discharge.** (E)

### **Discharge Planning**

It is important to remember that diabetes discharge planning is not a separate entity, but part of an overall discharge plan. As such, discharge planning begins at admission to the hospital and is updated as projected patient needs change.

The optimal program will need to consider the type and severity of diabetes, the effects of the patient's illness on blood glucose levels, and the capacities and desires of the patient. Smooth transition to outpatient care should be ensured. The Agency for Healthcare Research and Quality (AHRQ) recommends that at a minimum, discharge plans include:

- **Medication reconciliation:** The patient's medications must be crosschecked to ensure that no chronic medications were stopped and to ensure the safety of new prescriptions. Whenever possible, prescriptions for new or changed medication should be filled and reviewed with the patient and family at or before discharge.
- **Structured discharge communication:** Information on medication changes, pending tests and studies, and follow-up needs must be accurately and promptly communicated to outpatient physicians, as soon as possible after discharge.

It is important that patients be provided with appropriate durable medical equipment, medication, supplies, and prescriptions at the time of discharge in order to avoid a potentially dangerous hiatus in care. These supplies/prescriptions should include:

- Insulin (vials or pens) (if needed)
- Syringes or pen needles (if needed)
- Oral medications (if needed)
- Blood glucose meter and strips
- Lancets and lancing device
- Urine ketone strips (type 1)
- Glucagon emergency kit (insulin-treated)
- Medical alert application/charm

### **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
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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:

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##### **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

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### 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

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### Potential Benefits

Appropriate diabetes care in hospitalized patients

### Potential Harms

- Hypoglycemia, especially in insulin-treated patients, is the leading limiting factor in the glycemic management of type 1 and type 2 diabetes.
- In a recent meta-analysis of 26 trials (N =13,567), the pooled relative risk (RR) of death with intensive insulin therapy was 0.93 as compared with conventional therapy (95% confidence interval [CI] 0.83–1.04).
- Prolonged therapy with sliding scale insulin (SSI) as the sole regimen is ineffective in the majority of patients, increases risk of both hypoglycemia and hyperglycemia, and has recently been shown to be associated with adverse outcomes in general surgery patients with type 2 diabetes. SSI is potentially dangerous in type 1 diabetes.

## Contraindications

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### Contraindications

Specific caution is required with metformin, due to the possibility that a contraindication may develop during the hospitalization, such as renal insufficiency, unstable hemodynamic status, or need for an imaging study that requires a radio-contrast dye.

## Qualifying Statements

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### 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, patients' 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

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### 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](http://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

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### IOM Care Need

Living with Illness

Staying Healthy

### IOM Domain

Effectiveness

Patient-centeredness

Safety

Timeliness

## Identifying Information and Availability

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### Bibliographic Source(s)

American Diabetes Association (ADA). Standards of medical care in diabetes. VIII. Diabetes care in specific settings. *Diabetes Care* 2011 Jan;34(Suppl 1):S43-6.

### 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

### 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

This summary was completed by ECRI on April 2, 2001. The information was verified by the guideline developer on August 24, 2001. This summary was updated by ECRI on April 21, 2003, May 26, 2004, July 1, 2005, and March 17, 2006 and April 26, 2007. This summary was updated by ECRI Institute on April 1, 2008. The updated information was verified by the guideline developer on May 15, 2008. This summary was updated by ECRI Institute on May 20, 2010. The information was verified by the guideline developer on May 25, 2010. This summary was updated by ECRI Institute on February 26, 2011.

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