VA/DOD CLINICAL PRACTICE GUIDELINE

Management of Diabetes Mellitus (DM)

KEY ELEMENTS OF THE DM GUIDELINE

PRIMARY PREVENTION

- Consider screening adults at risk for diabetes or prediabetes
- Encourage aerobic exercise and diet to achieve weight loss and prevent progression of prediabetes to diabetes

SECONDARY PREVENTION

- Achieve individualized HbA_1c target through diet, exercise, medication, and patient self-management diabetes education
- Reduce and control blood pressure to improve quality and length of life, and prevent micro- and macro-vascular complications
- Control cholesterol to reduce risk for cardiovascular disease

TERTIARY PREVENTION

- Screen periodically for kidney disease
- Screen for retinopathy every 12-24 months based on ophthalmic and clinical findings
- Screen for lower extremity complications and stratify risk

HEALTH PREVENTIVE MEASURES

- Consider aspirin therapy to reduce the risk of cardiovascular events
- Advise about tobacco use cessation
- Provide influenza vaccination in season
- Provide pneumonia vaccine, if indicated

PATIENT SELF-MANAGEMENT AND EDUCATION

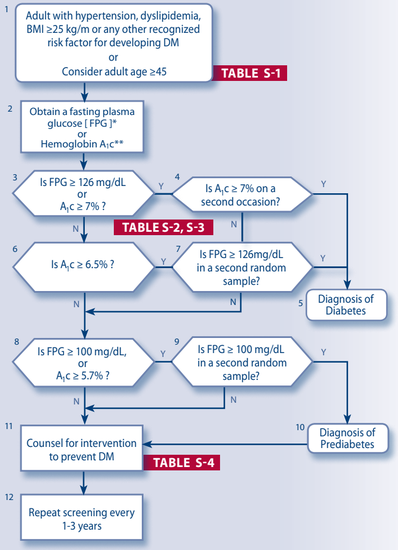
- Empower patients to make informed decisions about their self-care for diabetes

Access to full guideline:
http://www.healthquality.va.gov or,
https://www.qmo.amedd.army.mil

August 2010

VA/DoD Evidence-Based Practice

Module S: *Screening for Diabetes Mellitus*



Note:

* *Casual (i.e. any time of day without regard to time since the last meal) plasma glucose ≥ 200 mg/dl (on at least two occasions) in the patient with symptoms of hyperglycemia is sufficient to diagnose DM. Casual plasma glucose level ≥ 200mg/dl, but without symptoms, should be followed by measuring Fasting Plasma Glucose (FPG). Casual plasma glucose in the range 111-199 mg/dl should be followed up with FPG. FPG is the preferred test.*

** *A_1c should be measured using a clinical laboratory methodology (but NOT point of care) standardized to the National Glycohemoglobin Standardization Program (NGSP)*

TABLE S-1 Risk Factors for Type 2 diabetes

- Age ≥ 40 years
- Family history (First-degree relative with DM)
- High-risk population (e.g. African American, Hispanic, Native American, Asian American, and Pacific Islander)
- Prediabetes (i.e., history of impaired fasting glucose)*
- Hypertension (blood pressure ≥140/90 mmHg)*
- High-density lipoprotein cholesterol (HDL-C) level ≤40 mg/dL (0.90 mmol/L) and triglyceride (TG) level ≥250 mg/dL (2.82 mmol/L)*
- Vascular disease (coronary, cerebrovascular or peripheral)*
- Overweight or Obesity (body mass index [BMI] ≥ 25 kg/m2)*
- Abdominal obesity*
- Women with polycystic ovarian syndrome (PCOS)*
- History of gestational diabetes mellitus (GDM)
- History of delivering babies weighing >9 pounds
- Other clinical conditions associated with insulin resistance (e.g., acanthosis nigricans, non-alcoholic steatohepatitis (NASH))
- Schizophrenia
- Treated with certain atypical antipsychotics or antidepressants
- Habitual physical inactivity

** Associated with insulin resistance*

TABLE S-2 Diagnosis of Diabetes Mellitus

Status	*Fasting Plasma Glucose (FPG) [a], [b] or, Hemoglobin A_1c [c]*	*Casual Plasma Glucose [d]*
Diabetes Mellitus	FPG ≥126 mg/dL on two occasions *OR* HbA_1c is ≥ 6.5% and FPG ≥126 mg/dL *OR* HbA_1c ≥7% on two occasions	Casual plasma glucose ≥ 200 mg/dL plus symptoms of diabetes
Prediabetes	FPG ≥100 and <126 mg/dL on two occasions *OR* HbA1c ≥ 5.7% and FPG ≥100 and <126 mg/dL	—
Normal	FPG <100 mg/dL and HbA1c < 5.7%	—

[a] Fasting is defined as no caloric intake for at least 8 hours. [b] FPG is the preferred test for diagnosis, but either of the two listed is acceptable. In the absence of unequivocal hyperglycemia with acute metabolic decompensation, one of these two tests should be done on different days. [c] Using a clinical laboratory (not a Point of Care) methodology standardized to the National Glycohemoglobin Standardization Program (NGSP) [d] Casual means any time of day without regard to time since the last meal; classic symptoms include polyuria, polydipsia, and unexplained weight loss.

Oral glucose tolerance testing (OGTT) is no longer recommended in routine clinical practice because it is an imprecise test with poor reproducibility. The World Health Organization suggests continued use of the OGTT for patients with blood glucose values in the "uncertain range." Also, the OGTT does seem to better predict macrovascular complications.

TABLE S-3 Accuracy of using A_1c for Diagnosis of DM

The correlation between glucose-based tests of glycemic control (such as, fasting blood glucose and oral glucose tolerance) and A1c level is influenced by comorbid conditions as well as by age and race. In addition to these biological sources of non-glucose-dependent A1c variation, A1c values from any clinical laboratory have intrinsic variation among the available methods of measurement. A1c testing can be used to screen patients for prediabetes and diabetes. However, it should not be used for diagnosis unless the A1c level is ≥7% on 2 occasions. For A1c values <7%, fasting blood glucose measurements should be used to confirm a diagnosis of diabetes.

- Laboratories should use only HbA1c assay methods that are certified by the National Glycohemoglobin Standardization Program (NGSP) as traceable to the DCCT reference. The manufacturers of assays for HbA1c should also show traceability to the IFCC reference method
- Laboratories that measure HbA1c should participate in a proficiency-testing program, such as the CAP Glycohemoglobin Survey, that uses fresh blood samples with targets set by the NGSP Laboratory Network
- Laboratories should be aware of potential interferences, including hemoglobinopathies that may affect HbA1c test results depending on the method used. In selecting assay methods, laboratories should consider the potential for interferences in their particular patient population. In addition, disorders that affect erythrocyte turnover may cause spurious results regardless of the method used
- A1C measurements may be unreliable in the presence of hemolytic anemia, uremia, chronic kidney disease or pregnancy
- A1c is higher for a given level of glycemic control in older individuals and minority patients than in Caucasians, in addition to biological sources of error

TABLE S-4 Prevention of Diabetes

- Counsel about the risks of progression to diabetes and the rationale for implementing preventive strategies
- Individuals with risk factors for diabetes who are not diagnosed with prediabetes should also be counseled and educated about how to reduce risks
- Institute lifestyle modifications to prevent diabetes, including regular aerobic exercise and a calorie-restricted diet to promote and maintain weight loss
- Set an individualized goal to achieve and sustain weight loss of ≥ 5 percent of body weight for patients with risk factor for diabetes and a BMI ≥ 25
- When lifestyle modifications have been ineffective at preventing a sustained rise in glucose, offer pharmacologic therapy with a metformin or an alphaglucosidase inhibitor (e.g., acarbose) to delay progression from prediabetes to a diagnosis of diabetes

Module D: *Core Module*

TABLE D-1 Management of Patient with Diabetes

Review All the Following and Set Priorities

IF:		Go to:	
☑	Individualized HbA1c not at target	Glycemic Control	Module G
☑	SBP ≥ 140 or DBP ≥ 80 mmHg	Hypertension	VA/DoD HTN Guideline
☑	No lipids evaluation within one year? Elevated cholesterol or lipids?	Lipid Control	VA/DoD Lipid Guideline
☑	No kidney evaluation within one year? Microalbuminuria or elevated creatinine?	Kidney Disease	VA/DoD CKD Guideline
☑	No eye evaluation within two years? or Symptoms or high risk for visual loss? or History of retinopathy?	Eye Care	Module E
☑	No foot risk assessment within one year? or Risk factors present or active lesion?	Foot Care	Module F
☑	Need additional nutritional or lifestyle education?	Self-Management and Education	Module M
☑	• Consider aspirin therapy for patients with diabetes age ≥ 40 or evidence of cardiovascular disease risk factors • Administer influenza vaccine in season • Administer pneumonia vaccine, if indicated • If the patient is using tobacco, refer to the VA/DoD Clinical Practice Guideline for the Management of Tobacco Use		

TABLE D-2 Sequential Treatment of Type 2 Diabetes

1. Lifestyle modification, diet, and exercise
2. Monotherapy with oral agent or insulin
3. Combination (add a second oral agent)
4. Insulin with daytime oral agent
5. Insulin alone
6. Referral

TABLE D-3 Management of Patients with Diabetes

Blood Pressure

- BP target < 140/80 mm Hg
- Patients with SBP <140 mmHg and DBP 80 - 89 mmHg, may benefit from lowering DBP < 80 mm Hg if it can be achieved safely
- Patients with BP <140/80 mmHg who have clinical cardiovascular disease may benefit from ACEI even without a reduction in blood pressure

Dyslipidemia

	Baseline LDL-C [Mg/dL]	
	≥100	≥130
DM (with or without risk factors for CHD)	Diet and Exercise Consider drug therapy	Diet and Exercise Initiate drug therapy
LDL-C <130 mg/dL and HDL-C < 40 mg/dL	Consider gemfibrozil	
DM with triglycerdes (TG) 400-1000 mg/dL	Consider gemfibrozil if HDL-C < 40 mg/dL For high TG, use direct LDL-C measurement or non-HDL-C as lipid disorder to guide therapy	

Foot Care

- Every patient with diabetes must have an annual documented foot risk assessment
- Every high-risk patient should have a visual inspection of his/her feet at each routine primary care visit

Eye Care

- Persons who have had no retinopathy on all previous examinations should be screened for retinopathy at least every other year
- Persons who have ocular risk factors, are on insulin, or have had retinopathy detected on a previous examination should have a fundoscopic exam

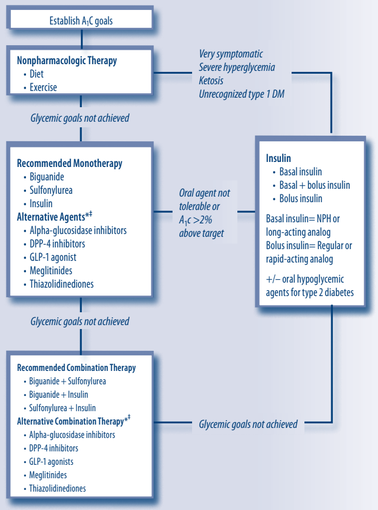
Kidney Disease

- Patients with DM should be screened periodically for the presence of kidney disease using urinalysis and estimation of the glomerular filtration rate (eGFR < 60 ml/min/1.73m2)
- Patients with diabetes who have a negative urine protein by dipstick should be tested for the presence of microalbuminuria
- Microalbuminuria defined as albumin-to-creatine ratio ≥30, confirmed on two out of three urine tests in patients with diabetes mellitus
- It is important to consider other causes of increased albumin excretion, especially in the case of type 1 diabetes present for < 5 years.
- A 24-hour urine collection for protein and creatinine is not needed for quantification of proteinuria

Abnormal Albumin Excretion (Random Urine)

Condition	*Normal*	*Microalbuminuria*	*Macroalbuminuria*
Alb/Cr ratio (mg/gr creatinine)	< 30	30-300	> 300

Module G: *Glycemic Control*



* *Listed alphabetically; not in order of preference*

‡ *If applicable, refer to VA www.pbm.va.gov or http://www.pbm.va.gov or DoD guidance/criteria for further recommendations on use of these agents*

TABLE G-1 Determination of Target HbA_1c Level [1] [2]

1. Determine glycemic control target range using risk stratification criteria
2. Adjust the target according to patient factors
3. Set the target range after discussion with the patient
4. Consider risk of hypoglycemia when recommending a target goal

Major Comorbidity [d] or Physiologic Age	Microvascular Complications		
	Absent or Mild [a]	Moderate [b]	Advanced [c]
Absent *>10 years of life expectancy*	<7%	<8%	8-9%*
Present [e] *5 to 10 years of life expectancy*	<8%	<8%	8-9%*
Marked [f] *<5 years of life expectancy*	8-9%*	8-9%*	8-9%*

* *Further reductions may be appropriate, balancing safety and tolerability of therapy.*

(a) Mild microvascular disease is defined by early background retinopathy, and/or microalbuminuria, and/ or mild neuropathy.

(b) Moderate microvascular disease is defined by pre-proliferative (without severe hemorrhage, intraretinal microvascular anomalies [IRMA], or venous bleeding) retinopathy or persistent, fixed proteinuria (macroalbuminuria) and/or demonstrable peripheral neuropathy (sensory loss).

(c) Advanced microvascular disease is defined by severe non-proliferative (with severe hemorrhage, IRMA, or venous bleeding), or proliferative retinopathy and/or renal insufficiency (serum creatinine level > 2.0 mg/dL), and/or insensate extremities or autonomic neuropathy (e.g., gastroparesis, impaired sweating, or orthostatic hypotension).

(d) Major comorbidity includes, but is not limited to, any or several of the following active conditions: significant cardiovascular disease, severe chronic kidney disease, severe chronic obstructive pulmonary disease, severe chronic liver disease, recent stroke, and life-threatening malignancy.

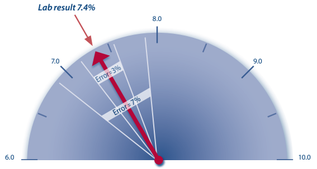
(e) Major comorbidity is present, but is not end-stage and management achievable.

(f) Major comorbidity is present and is either end-stage or management is significantly challenging.

(1) Based upon the DCCT referent standard. Clinicians need to evaluate the methodology used at their site.

(2) Reflects a "goal" over time. Intensification of therapy should be undertaken based upon individual clinical circumstances and treatment option.

TABLE G-2 Limitations of A1c Measurement Methodology



Recognize the limitations of A1c measurement methodology reconciling the differences between A1c readings and SMBG on a case-by-case basis. A value of A1c,reported by the lab as 7.4% could be anything between 6.9 and 7.9. The assay has an overall error acceptable for clinical use of 7%. If the overall error of the LAB assay is 3% the range is narrower (7.2 to 7.6)

TABLE G-3 Self-Monitoring Blood Glucose (SMBG)

1. SMBG is indicated for patients taking insulin
2. No evidence for routine SMBG in patients not on insulin
3. Patients must be instructed on procedures, importance of recording, and how to interpret results
4. SMBG can be used to adjust treatment
5. Frequency of testing based on type of treatment, hypoglycemia, goals of treatment
6. SMBG is not recommended for prediabetes

TABLE G-4 Indications for Considering Consultation or Referral

- Type 1 DM; especially with history of hospitalizations for metabolic complications and/or receiving intensive insulin therapy
- New-onset of insulin-requiring DM or marked insulin resistance
- Contraindications or intolerances to diabetes medications
- Recurrent episodes of incapacitating hypo- and/or hyperglycemia
- Poor recognition of hypoglycemia or history of severe hypoglycemic reactions (including coma, seizures, or frequent need for emergency resuscitation)
- Visual and/or renal impairment
- Psychosocial problems that complicate management (e.g., alcohol or substance abuse)
- A1c >9.0% considered for aggressive management on an expedited basis
- Not achieving glycemic control despite comprehensive treatment with complex regimen of combination pharmacotherapy including insulin
- Require evaluation or management beyond the level of expertise and resource level of the primary team

TABLE G-5 Comparison of Insulin Preparation

Insulin	*Onset (min)*	*Peak (min)*	*Duration (hr)*	*Mix Compatible*	*Appearance*
Rapid-Acting					
Aspart (Novolog®)	10-20	40-50	3-5 hr	NPH	Clear
Lispro (Humalog®)	15-30	30-90	3-5 hr	NPH	Clear
Gluisine (Apidra®)	15-30	30-90	3-4 hr	NPH (subcutaneous use only)	Clear
Short-Acting (prandial)					
Regular (Novolin R ®, Humulin R®)	30-60	2-5	5-8 hr	NPH	Clear
Regular U-500 (Humulin R U-500®)	30-45	2-4	6-10 hr	Do Not Mix	Clear
Intermediate-Acting (basal)					
NPH (Novolin N ®, Humulin N®)	60-90	4-12	10-24 hr	Rapid-acting or Regular,	Cloudy
Long-Acting (basal)					
Glargine (Lantus®)	60	N/A	20-24 hr	Do Not Mix	Clear
Detemir (Levemir®)	60-120	6-8	10-24 hr	Do Not Mix	Clear
Premixed Products (prandial + basal)					
NPH/Regular 70/30 (Novolin 70/30®)	30-60	2-12 (dual)	10-24	Do Not Mix	Cloudy
Insulin protamine aspart/aspart 70/30 (Novolog Mix®)	10-20	1-3 (dual)	10-16	Do Not Mix	Cloudy
Insulin protamine lispro 75/25 or 50/50 (Humalog®Mix 75/25 or Humalog Mix 50/50™)	15-30	1-6 (dual)	10-16	Do Not Mix	Cloudy

Module M: *Self-Management & Education*

TABLE M-1 Core Competencies (Self-Care Skills)

Core competency education should cover at least the following topics:

- Hyperglycemia
- Hypoglycemia (if applicable)
- Medication education (including insulin administration, if applicable)
- Self-monitoring of blood glucose
- Basic dietary principles
- Sick day management
- When to seek further treatment and/or medical advice

Acute Complications

Education regarding hyperglycemia and hypoglycemia (if applicable) should include:

- Definition
- Common symptoms
- Possible causes
- Action to take
- Actions to take, whom to call when the acute condition is not reversed

Medication Education

Education regarding diabetes medications should include (as appropriate):

- Names of medications
- Action & duration of medications
- Times & mode of administration
- Possible side effects
- Drug/food interactions

Self-Monitoring of Blood Glucose

Individualized education regarding self-monitoring of blood glucose should include:

- Indications and frequency of routine monitoring, including target glycemic range
- Indications for more frequent monitoring
- Preparation and use of monitoring devices, including puncture devices
- Recording and analysis of results
- Collaborating with providers in applying results
- Actions to take, whom to call when results are out of target range

Basic Diet Principles

General principles to be reviewed are:

- Eat at regular times—distribute CHO food intake throughout the day
- Define CHO, protein, and fat
- Describe which foods affect blood sugar the most (e.g., CHO)
- Emphasize the importance of eating a variety of foods, increasing fiber
- Use the Healthy Plate to control portion sizes

Physical Activity

- Getting 30 minutes physical activity on most days of the week

Special Circumstances

- Sick day management
- When to seek further medical assistance

The core competencies are not substitutes for comprehensive interdisciplinary diabetes self-management education (DSME) or medical nutrition therapy. If such a program is not available or if the patient is unwilling to attend or is newly diagnosed and awaiting enrollment in such a program, core competency (self-care skills) education should be given.

TABLE M-2 Assessing Patient's Knowledge and Adherence

Nutrition & Meal Planning	1	What times of the day do you eat your meals and snacks? What is the relationship of your meals to when you take your medication?
	2	When should you eat in relationship to the time you take insulin/medication?
	3	Which food affects your blood sugar the most—chicken breast, salad, or a potato?
Goal Setting	4	Do you remember your target goals (BP, LDL, blood sugar, A1c)?
	5	What are your target goals? (BP, LDL, blood sugar, HbA1c)?
Home Monitoring	6	When do you test your blood sugar?
	7	What are your blood sugar results and how do you use them to manage your diabetes?
Foot Care	8	How often do you look at your feet?
	9	When would you contact a health care provider if you have a foot problem?
	10	What are the symptoms of foot disease and when would you contact your provider?
Activity	11	What effect does activity have on your blood sugar?
Medication	12	What diabetes medicine do you take and how often?
	13	Do you take your diabetes medication when you are sick and unable to keep food down?
Acute Complications	14	Do you know what to do when your sugars are too low, too high, and when to call your provider?
Psychosocial	15	Are there any problems in your life that make it difficult for you to take care of your diabetes?
	16	Are you overwhelmed by your diabetes?
	17	Do you worry about developing complications of diabetes?
Preventive Screening	18	Do you know why you have to have periodic eye examinations?
	19	Have you scheduled your annual eye and foot examinations?
Treatment Adherence	20	Is there anything that has been recommended that you do for your diabetes that you think you will have difficulty with, or will be unable to do?
	21	What part of diabetes treatment do you have difficulty with?
Lifestyle	22	How do alcohol and cigarettes affect your diabetes?
	23	Do you want to get pregnant—either now or in the near future?
	24	If you are sexually active, what contraception methods are you using?
	25	Have there been any major changes in your life (family crisis, job loss)?