

NEIGHBORHOOD HEALTH PLAN OF RHODE ISLAND	
Section: Clinical Practice Guideline	Subject: Guidelines for Diabetes Care
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RATIONALE

Diabetes has reached epidemic proportions. Nearly 24 million children and adults in the United States live with diabetes. In 2006, an estimated 63,000 Rhode Island adults aged 18 years or older had diagnosed diabetes. If current trends continue, one in three children born today will face a future with diabetes. These statistics, coupled with the personal struggles of people with diabetes and their loved ones, underscore the need for action. Both national studies and state data indicate that people with diabetes do not receive recommended levels of preventive care, leaving wide gaps between current recommendations and actual practice. These standards of care are intended to provide clinicians, patients, and other interested persons with the components of diabetes care, treatment goals, and tools to evaluate the quality of care.

The current revision of the NHPRI Guidelines for Diabetes Care is based on the 2009 guidelines of the American Diabetes Association; the full text of the guidelines and references can be found at: http://care.diabetesjournals.org/content/32/Supplement_1. The evidence-based recommendations included are diagnostic and therapeutic actions that are known or believed to favorably affect health outcomes of patients with diabetes.

CLASSIFICATION OF DIABETES

In 1997, ADA issued new diagnostic and classification criteria; in 2003, modifications were made regarding the diagnosis of impaired fasting glucose. The classification of diabetes includes four clinical classes:

- type 1 diabetes (results from β -cell destruction, usually leading to absolute insulin deficiency)
- type 2 diabetes (results from a progressive insulin secretory defect on the background of insulin resistance)
- other specific types of diabetes due to other causes, e.g., genetic defects in β -cell function, genetic defects in insulin action, diseases of the exocrine pancreas (such as cystic fibrosis), and drug- or chemical-induced (such as in the treatment of AIDS or after organ transplantation)
- gestational diabetes mellitus (GDM) (diabetes diagnosed during pregnancy)

Some patients cannot be clearly classified as type 1 or type 2 diabetes. Clinical presentation and disease progression vary considerably in both types of diabetes. Occasionally, patients who otherwise have type 2 diabetes may present with ketoacidosis. Similarly, patients with type 1 may have a late onset and slow (but relentless) progression of disease despite having features of autoimmune disease. Such difficulties in diagnosis may occur in children, adolescents, and adults. The true diagnosis may become more obvious over time.

DIAGNOSIS

Criteria for the Diagnosis of Type 2 Diabetes in Non-pregnant Adults

- An A1c level of 6.5% or more.

- Fasting Plasma Glucose (FPG) \geq 126 mg/dl (7.0 mmol/l). Fasting is defined as no caloric intake for at least 8 hours.
- 2 hour postload glucose $>$ 200 mg/dl during an Oral Glucose Tolerance Test (OGTT). The test should be performed as described by the World Health Organization, using a glucose load containing the equivalent of 75 g. anhydrous glucose dissolved in water.
- Symptoms of hyperglycemia plus casual plasma glucose concentration \geq 200 mg/dl (11.1 mmol/l). Casual (random) is defined as any time of day without regard to time since last meal. The classic symptoms of hyperglycemia include polyuria, polydipsia, and unexplained weight loss.

In the absence of symptoms of hyperglycemia, the first 3 options listed should be confirmed with repeated testing. The potential benefits of using A1c level in the initial diagnosis of type 2 diabetes include the ability to perform the test in the non fasting state and less perturbation of the test result because of stress and illness.

Criteria for Diagnosis of Pre-diabetes (Categories of Increased Risk for Diabetes)

- An A1c level between 5.7% and 6.4% may be categorized as prediabetes.
- Hyperglycemia not sufficient to meet the diagnostic criteria for diabetes is categorized as “impaired fasting glucose/IFG” (FPG 100-125 mg/dl) or
- “impaired glucose tolerance/IGT” (2 hr. plasma glucose 140-199 mg/dl).

These are termed “prediabetes” and are risk factors for future diabetes and cardiovascular disease (CVD).

SCREENING

Testing for diabetes in asymptomatic adults

- Testing should be considered for adults of any age who are overweight or obese (BMI \geq 25 kg/ m²; at-risk BMI may be lower in some ethnic groups) and have one or more additional risk factors for diabetes:
 - Physical inactivity
 - First-degree relative with diabetes
 - Members of a high-risk ethnic population (e.g. African American, Latino, Native American, Asian American, Pacific Islander)
 - Women who delivered a baby weighing $>$ 9 lb. or were diagnosed with GDM
 - Hypertension ($>$ 140/90 mmHg) or on therapy for hypertension
 - HDL cholesterol level $<$ 35 mg/dl (0.90 mmol/l) and/or a triglyceride level $>$ 250 mg/dl (2.82 mmol/l)
 - Women with polycystic ovarian syndrome (PCOS)
 - IGT or IFG on previous testing
 - Other clinical conditions associated with insulin resistance (e.g. severe obesity, acanthosis nigricans)
 - History of cardiovascular disease
- In absence of above criteria, testing should begin at age 45 years.
- If normal, testing should be repeated at least at 3 year intervals.
- Test: an A1c, FPG test or 2-h OGTT (or both FPG and 2-h OGTT) are appropriate.
- OGTT may be considered in patients with IFG to better define the risk of diabetes.
- In patients identified with pre-diabetes, identify and, if appropriate, treat other cardiovascular disease risk factors.

Testing for type 2 diabetes in asymptomatic children

The incidence of type 2 diabetes in adolescents is increasing, especially in ethnic minority populations. Distinction between type 1 and type 2 diabetes in children can be difficult, since the prevalence of overweight in children continues to rise and since autoantigens and ketosis may be present in a substantial number of patients with features of type 2 diabetes (including obesity and acanthosis nigricans). Such a distinction at the time of diagnosis is critical because treatment regimens, educational approaches, and dietary counsel will differ markedly between the two diagnoses.

- Test children who are overweight (BMI >85th percentile for age and sex, weight for height >85th percentile, or weight > 120% of ideal for height) and have any two of the following risk factors:
 - Family history of type 2 diabetes in first-or-second-degree relative
 - Race/ethnicity (as above for adults)
 - Signs of insulin resistance or conditions associated with insulin resistance (acanthosis nigricans, hypertension, dyslipidemia, PCOS, or small-for-gestational-age birthweight)
 - Maternal history of diabetes or gestational diabetes during the child's gestation.
- Testing should begin at age 10 years or at onset of puberty if puberty occurs at a younger age.
- Testing should be repeated every 3 years
- FPG is the preferred test.

Detection and diagnosis of gestational diabetes mellitus (GDM)

- Carry out GDM risk assessment at first prenatal visit. Women at very high risk for GDM should be screened for diabetes (using standard diagnostic testing) as soon as possible after confirmation of pregnancy, i.e. women with:
 - Severe obesity
 - Prior history of GDM or delivery of large-for-gestational-age infant
 - Presence of glycosuria
 - Diagnosis of PCOS
 - Strong family history of type 2 diabetes.
- All women of > low risk should undergo GDM testing at 24-28 weeks of gestation. To be low risk, a woman must have all of the following:
 - Age <25 years
 - Weight normal before pregnancy
 - Consider that some ethnic groups have a higher rate of diabetes(e.g. African American, Latino, Native American, Asian American, Pacific Islander)
 - No known diabetes in first-degree relatives
 - No history of abnormal glucose tolerance
 - No history of poor obstetrical outcome.
- Women with GDM should be screened for diabetes 6-12 weeks postpartum and should be followed up with subsequent screening for the development of diabetes or pre-diabetes.

PREVENTION/DELAY OF TYPE 2 DIABETES

- Patients with A1c range of 5.7%to 6.4%, IGT and/or IFG should be referred to an effective ongoing support program for weight loss of 5-10% body weight and increasing physical activity to ≥ 150 min./week of moderate activity such as walking.
- Follow-up counseling appears important for success

- Monitoring for the development of diabetes in those with pre-diabetes should be performed every year.
- Metformin may be considered (in addition to lifestyle counseling) in those at very high risk of developing diabetes; i.e. those who:
 - Have combined IFG and IGT plus at least one other risk factor for diabetes;
 - Are obese; and
 - Are under 60 years of age.

DIABETES CARE – EVALUATION

Medical History

- Age and characteristics of diabetes onset (diabetic ketoacidosis [DKA], asymptomatic lab finding)
- Eating patterns, physical activity, nutritional status, weight history; growth and development in children and adolescents
- Smoking status
- Contraception and reproductive and sexual history
- Vaccines
- Diabetes education history
- Review of previous treatment regimens and response to therapy; A1C records
- Current treatment of diabetes, including medications, meal plan, physical activity patterns, results of glucose monitoring, patient's use of data
- DKA frequency, severity, cause
- Hypoglycemic episodes (hypoglycemia awareness; any severe hypoglycemia: frequency and cause)
- History of diabetes-related complications, i.e.
 - Microvascular (retinopathy, nephropathy, neuropathy)
 - Macrovascular (CHD, cerebrovascular disease, peripheral artery disease)
 - Psychosocial problems, dental disease

Physical Exam

- Height, weight, BMI
- BP determination, including orthostatic measurements when indicated
- Fundoscopic exam
- Thyroid palpation
- Skin exam
- Comprehensive foot exam, i.e.
 - Inspection
 - Palpation of pulses
 - Presence/absence of patellar and Achilles reflexes
 - Determination of proprioception, vibration, and monofilament sensation

Laboratory Evaluation

- A1C, unless results available within past 2-3 months
- If not performed/available within the past year:
 - Fasting lipid profile
 - Liver function tests
 - Test for urine albumin excretion with spot urine albumin/creatinine ratio
 - Serum creatinine and calculated glomerular filtration rate (GFR)
 - Thyroid-stimulating hormone in type 1 diabetes, dyslipidemia, or women over age 50.

Referrals

- Annual dilated eye exam

- Family planning for women of reproductive age
- Registered dietitian for Medical Nutrition Therapy
- Diabetes self-management education
- Dental examination
- Mental health professional, if needed.

DIABETES CARE - 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 approach to treatment for type 1 diabetes consists of the following components:

- use of multiple dose insulin injections (3–4 injections per day of basal and prandial insulin) or CSII therapy (continuous subcutaneous insulin infusion);
- matching of prandial insulin to carbohydrate intake, premeal blood glucose, and anticipated activity; and
- for many patients (especially if hypoglycemia is a problem), use of insulin analogs.

For type 2 diabetes the approach to management includes:

- intervention at the time of diagnosis with metformin in combination with lifestyle changes (MNT and exercise)
- 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).
- The overall objective is to achieve and maintain glycemic control and to change interventions when therapeutic goals are not being met.

Glycemic Control

Two primary techniques are available for health providers and patients to assess the effectiveness of the management plan on glycemic control:

- patient self-monitoring of blood glucose (SMBG) or of interstitial glucose and
- measurement of A1C.

Glucose Monitoring Recommendations (ADA's Evidence grading System for CPGs- A = clear evidence from well conducted, generalizable, randomized controlled trials that are adequately powered, B = Supportive evidence from well-conducted cohort studies, C = Supportive evidence from poorly controlled or uncontrolled studies, E = Expert consensus or clinical experience)

- SMBG should be carried out ≥ 3 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) and physical activity 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)

*Note: CGM for three days at a time is a limited conditional benefit for Neighborhood members.

A1C Recommendations

- Perform the A1C test at least 2 times a year in patients who are meeting treatment goals (and who have stable glycemic control). (E)
- Perform the A1C test q 3 mo. 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 Non-Pregnant Adults

- **A1C <7.0%** reduce microvascular, macrovascular and neuropathic complications of diabetes
- **A1C (in selected patients) close to normal (4-6%)** to reduce microvascular complications, if this can be achieved without significant hypoglycemia or other adverse effects of treatment. Selected patients might include those with
 - short duration of diabetes,
 - long life expectancy, and
 - no significant cardiovascular disease.
- **Less stringent A1C goals than the general goal of <7%** 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)

Children/adolescents - consider age when setting glycemic goals in children and adolescents with type 1 diabetes, with less stringent goals for younger children.

Summary of glycemic recommendations for non-pregnant adults with diabetes	
A1C	<7.0%
Preprandial capillary plasma glucose	70–130 mg/dl (3.9–7.2 mmol/l)
Peak postprandial capillary plasma glucose	<180 mg/dl (<10.0 mmol/l)
Key concepts in setting glycemic goals:	
<ul style="list-style-type: none"> ▪ A1C is the primary target for glycemic control. ▪ Goals should be individualized based on: <ul style="list-style-type: none"> - 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.

Medical Nutrition Therapy (MNT)

Individuals who have pre-diabetes or diabetes should receive individualized MNT as needed to achieve treatment goals.

- **Weight loss** recommended for all overweight or obese individuals who have or are at risk for diabetes.
 - Either low-carbohydrate or low-fat calorie-restricted diets may be effective in short-term (up to 1 year).
 - Monitor lipid profiles, renal function, and protein intake for patients on low-carb diets
 - Physical activity and behavior modification are important components for maintenance of weight loss.
- **Dietary fat intake:**
 - Saturated fat intake <7% total calories
 - Minimize transfat intake
- **Carbohydrate intake**
 - Monitor carbohydrate intake (by carbohydrate counting, exchanges, or experience-based estimation) to achieve glycemic control
 - Consider use of glycemic index and glycemic load to provide additional benefit for glycemic control.

Bariatric Surgery

- Bariatric surgery should be considered for adults with BMI ≥ 35 kg/m² and type 2 diabetes, especially if the diabetes is difficult to control with lifestyle and pharmacologic therapy. (B)
- Patients with type 2 diabetes who have undergone bariatric surgery need life-long lifestyle support and medical monitoring. (E)

Diabetes Self-Management Education (DSME)

- People with diabetes should receive DSME when their diabetes is diagnosed and as needed thereafter. (B)
- Self-management behavior change is the key outcome of DSME and should be measured and monitored as part of care. (E)
- DSME should address psychosocial issues, since emotional well-being is strongly associated with positive diabetes outcomes. (C)

Physical Activity

- People with diabetes should be advised to perform ≥ 150 min./week of moderate - intensity aerobic activity (50-70% of maximum heart rate)
- People with type 2 diabetes should be encouraged to perform resistance training 3 times/week, in absence of contraindications.

Psychosocial Assessment and Care

- Assessment of psychological and social situation should be included as an ongoing part of diabetes medical management.
- 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, emotional)
- Psychiatric history.
- Screen for psychosocial problems (e.g. depression, anxiety, eating disorders, cognitive impairment) when adherence to medical regimen is poor.

Hypoglycemia

- Glucose (15-20g.) is preferred treatment for conscious individual with hypoglycemia.
- Repeat treatment if SMBG 15 min. after treatment shows continued hypoglycemia.
- Once SMBG level returns to normal, individual should consume a snack or meal to prevent recurrence.
- Glucagon should be prescribed for all individuals at significant risk of severe hypoglycemia; caregivers or family members of these patients should be instructed in its administration.
- Severe hypoglycemia may require emergency care.

Immunization

- Annual influenza vaccine to all diabetic patients ≥ 6 months of age.
- Pneumococcal polysaccharide vaccine to all diabetic patients ≥ 2 years of age.
- One-time revaccination recommended for
 - persons >64 years of age if vaccine administered >5 years ago and
 - persons with nephritic syndrome, chronic renal disease, and other immunocompromised states.

PREVENTION AND MANAGEMENT OF DIABETES COMPLICATIONS

Hypertension/Blood Pressure Control – BP goal **<130/80**

- If BP 130-139/80-89, give lifestyle therapy alone for a maximum of 3 months; add pharmacological agents if targets are not achieved.
- If BP $\geq 140/90$ at diagnosis or follow-up, start pharmacologic therapy in addition to lifestyle therapy.
- Pharmacologic regimen should include either an ACE inhibitor or an angiotensin receptor blocker (ARB). If one class is not tolerated, the other should be substituted.
- If needed to achieve BP targets, add thiazide diuretic if GFR ≥ 30 ml/min per 1.73 m² or loop diuretic if GFR <30 ml/min. per 1.73 m².
- If ACE inhibitors, ARBs, or diuretics are used, kidney function and serum potassium levels should be closely monitored.
- **Children/adolescents**
 - Treat high-normal blood pressure (systolic or diastolic BP between 90-95th percentile for age/sex/height) with dietary intervention and exercise. If target BP not reached within 6-12 months, initiate pharmacologic treatment.
 - Treat high blood pressure (BP consistently $>95^{\text{th}}$ percentile or consistently $>130/80$ for adolescents) with pharmacologic treatment and lifestyle intervention as soon as diagnosis is confirmed.
 - ACE inhibitors should be considered for the initial treatment of hypertension.
 - Goal of treatment is BP $<130/80$ or $<90^{\text{th}}$ percentile, whichever is lower.

Dyslipidemia/Lipid Management

Screening

- Measure fasting lipid profile at least annually.

- In adults with low-risk lipid values (LDL-C <100, HDL >50, triglycerides <150) assessments may be repeated every 2 years.
- **Children/adolescents**
 - Perform fasting lipid profile on children >2 years of age after glucose control has been established when there is family history of
 - hypercholesterolemia (cholesterol >240 mg/dl)
 - cardiovascular event before age 55 years
 - family history unknown.
 - If family history not a concern, perform first lipid screening at puberty (≥ 10 years)
 - Perform lipid profile soon after diagnosis for children diagnosed with diabetes at or after puberty.
 - If lipids are abnormal, monitor annually
 - If LDL cholesterol values are <100 mg/dl, repeat a lipid profile every 5 years.

Lipid Goal

- **LDL-C** <100 mg/dl (in absence of overt CVD)
<70 mg/dl (an option in presence of overt CVD)

Desirable but not targeted goal of therapy:

- **HDLC** >40 mg/dl (men) or >50 mg/dl (women)
- **Triglycerides** <150 mg/dl

Treatment

- Recommend lifestyle modification focusing on reduction of saturated fat, trans fat, and cholesterol intake; weight loss (if indicated); and increased physical activity
- Statin therapy should be added, regardless of baseline lipid levels, for diabetic patients
 - With overt CVD
 - Without CVD but are >40 years of age and have ≥ 1 other CVD risk factors.
- Consider statin therapy in addition to lifestyle therapy in other adults if LDL-C remains >100 mg/dl or in those with multiple CVD risk factors.
- If patients on maximal tolerated statin therapy do not reach LDL-C targets, an alternative goal is reduction in LDL-C of 30-40% from baseline.
- **Children/adolescents:**
 - Initial therapy should consist of optimization of glucose control and MNT
 - Add statin for patients > 10 years who, after MNT and lifestyle changes have
 - LDL cholesterol >160 mg/dl or
 - LDL cholesterol >130 mg/dl and ≥ 1 CVD risk factors

Aspirin/antiplatelet Therapy

- Aspirin therapy (75-162 mg/day) as primary prevention strategy in those with type 2 and type 1 diabetes at increased cardiovascular risk, including those who are >40 years of age or who have additional risk factors (family history CVD, hypertension, smoking, dyslipidemia, albuminuria)
- Aspirin therapy (75-162 mg/day) as secondary prevention strategy in those with history of CVD.
- For patients with CVD and documented aspirin allergy, use clopidogrel (75 mg./day)
- Combination of aspirin and clopidogrel is reasonable for up to a year after acute coronary syndrome.

Smoking Cessation

- Advise all patients not to smoke
- Include smoking cessation counseling and other forms of treatment as routine component of diabetes care.

Coronary Heart disease (CHD) Screening and Treatment

Screening

- In asymptomatic patients, evaluate risk factors at least annually to stratify patients by 10 year risk and treat risk factors accordingly

Treatment

- In patients with known CVD, use ACE inhibitor, aspirin, and statin therapy (if not contraindicated) to reduce risk of cardiovascular events.
- In patients with prior myocardial infarction, add β -blockers to reduce mortality (if not contraindicated).
- In patients >40 years of age with another cardiovascular risk factor, use aspirin and statin therapy (if not contraindicated) to reduce risk of cardiovascular events.
- In patients with congestive heart failure (CHF), thiazolidinedione use is contraindicated.
- Metformin may be used in patients with stable CHF if renal function is normal. It should be avoided in unstable or hospitalized patients with CHF.

Nephropathy Screening and Treatment

General Recommendation

Optimize glucose control and blood pressure to reduce risk or slow progression of nephropathy.

Screening

- Perform annual test to assess urine albumin excretion
 - In type 1 diabetes patients (adults and children >10 years) with diabetes duration ≥ 5 years
 - In all type 2 diabetic patients starting at diagnosis
- Measure serum creatinine at least annually in all adults with diabetes.
- Initiate annual random spot urine for microalbumin-to-creatinine ratio for children >10 years who have had diabetes for 5 years.
- Use serum creatinine to estimate GFR and stage level of chronic kidney disease (CKD), if present.

Treatment

- Use ACE inhibitors or ARBs in treatment of nonpregnant patient with micro- or macroalbuminuria. If one class is not tolerated, the other should be substituted.
- For children/adolescents with confirmed, persistently elevated microalbumin levels on 3 urine specimens, treat with ACE inhibitor titrated to normalization of microalbumin excretion if possible.
- Recommend reduction of protein intake in patients with CKD to
 - 0.8-1.0 g per kg body wt per day in patients with diabetes and earlier stages of CKD
 - 0.8 g per kg body wt per day in later stages of CKD
- When ACE inhibitors, ARBs, or diuretics are used, monitor serum creatinine and potassium levels for development of acute kidney disease and hyperkalemia.
- Continue monitoring urine albumin excretion to assess response to therapy and progression of disease.
- Consider referral to physician experienced in care of kidney disease when
 - There is uncertainty about etiology of the kidney disease
 - There are difficult management issues, or
 - In the presence of advanced kidney disease.

Retinopathy Screening and Treatment

General Recommendation

Optimize glycemic control and blood pressure control to reduce the risk or slow the progression of retinopathy.

Screening

- Initial dilated and comprehensive eye exam by ophthalmologist or optometrist
 - Within 5 years of onset of type 1 diabetes in adults; within 3-5 years of onset in children ≥ 10 years
 - At diagnosis for patients with type 2 diabetes.
- Repeat exam annually
 - Consider less frequent exams following one or more normal eye exams
 - For children, consider less frequent exams at the recommendation of an eye care professional.
 - Examine more frequently if retinopathy is progressing.

Treatment

- Refer patients with any level of macular edema, severe nonproliferative diabetic retinopathy (NPDR), or any proliferative diabetic retinopathy (PDR) to an ophthalmologist experienced in management of diabetic retinopathy.
- Laser photocoagulation therapy is indicated to reduce risk of vision loss in patients with
 - High-risk PDR
 - Clinically significant macular edema, and
 - Some cases of severe NPDR.
- Presence of retinopathy is not a contraindication to aspirin therapy for cardioprotection.

Neuropathy Screening and Treatment

- Screen all patients for distal symmetric polyneuropathy (DPN) at diagnosis and annually thereafter using simple clinical tests. (See foot care below) (Electrophysiological testing is rarely needed.)
- Screen for other autonomic neuropathies including
 - gastrointestinal neuropathies (e.g., esophageal enteropathy, gastroparesis, constipation, diarrhea, fecal incontinence), or
 - genitourinary tract disturbances (e.g. erectile dysfunction in men, bladder dysfunction).
 - cardiovascular autonomic neuropathy (e.g. resting tachycardia, exercise intolerance, orthostatic hypotension, intraoperative cardiovascular instability, silent myocardial infarction(MI) and ischemia, QT prolongation, and increased mortality)
- Medications for relief of specific symptoms related to DPN and autonomic neuropathy are recommended.

Foot Care

- Perform an annual comprehensive foot exam to identify risk factors predictive of ulcers and amputations; the exam should include
 - Inspection
 - Assessment of foot pulses
 - Testing for loss of protective sensation
 - 10-g monofilament plus testing any one of the following:
 - Vibration using 128-Hz tuning fork
 - Pinprick sensation
 - Ankle reflexes or

- Vibration perception threshold
- Provide general foot self-care education
- Referral to foot care specialists for ongoing preventive care and life-long surveillance is recommended for patients who
 - smoke,
 - have loss of protective sensation and structural abnormalities, or
 - have history of prior lower-extremity complications
- Initial screening for peripheral arterial disease should include
 - History of claudication
 - Assessment of pedal pulses
 - Consider obtaining ankle-brachial index (ABI)
- Refer patients with significant claudication or positive ABI for further vascular assessment and consider exercise, medications, and surgical options.

Preconception Care

- A1C levels should be as close to normal as possible (<7%) before conception is attempted.
- Incorporate preconception counseling in routine diabetes clinic visit for all women of child-bearing potential, starting at puberty.
- Women contemplating pregnancy should be evaluated and, if indicated, treated for diabetic retinopathy, nephropathy, and CVD.
- Eye exam should occur in the first trimester with close follow-up throughout pregnancy and for 1 year postpartum.
- Women planning pregnancy should be counseled on the risk of development and/or progression of diabetic retinopathy.
- Evaluate medications used by such women before conception, since drugs commonly used to treat diabetes and its complications may be contraindicated or not recommended in pregnancy, including statins, ACE inhibitors, ARBs, and most noninsulin therapies.

Children/Adolescents with Type 1 Diabetes – Celiac Disease

- Screen patients with type 1 diabetes soon after diagnosis for celiac disease by measuring tissue transglutaminase or anti-endomysial antibodies, with documentation of normal serum IgA levels.
- Repeat testing if growth failure, failure to gain weight, weight loss, or gastroenterologic symptoms occur.
- Consider periodic rescreening of asymptomatic individuals.
- Children with positive antibodies should be referred to a gastroenterologist for evaluation.
- Children with confirmed celiac disease should have consultation with a dietitian and be placed on a gluten-free diet.

Children/Adolescents with Type 1 Diabetes– Hypothyroidism

- Patients with type 1 diabetes should be screened for thyroid peroxidase and thyroglobulin antibodies at diagnosis.
- Thyroid stimulating hormone (TSH) concentrations should be measured after metabolic control has been established. Recheck every 1-2 years or if patient develops symptoms of thyroid dysfunction, thyromegaly or abnormal growth rate.
- Measure free T4 if TSH is abnormal.

REFERENCES

1. “Standards of Medical Care in Diabetes – 2009”, Diabetes Care January 2009 vol. 32 no. Supplement 1
2. “ADA Revises Diabetic Guidelines”, Diabetes Care December 2009