

# QUICK REFERENCE GUIDE TO DIABETES FOR HEALTH CARE PROVIDERS

A special project of the Michigan Diabetes Outreach Network

## Chapter 19 Chronic Complications of Diabetes

Chronic complications of diabetes include cardiovascular disease, neuropathy, nephropathy, retinopathy, periodontal disease, as well as complications from flu and pneumonia.

### Research Studies

Striving for optimal glycemic control is the cornerstone in the prevention of diabetes complications. The **Diabetes Control and Complications Trial (DCCT)** compared intensive vs. conventional control in persons with type 1 diabetes. Intensive diabetes care reduced the risk of:

- Retinopathy 76%
- Neuropathy 60%
- Nephropathy 50% and
- Cardiovascular disease 35%.

Most participants were then enrolled in the **Epidemiology of Diabetes Interventions and Complications (EDIC)**, an 8 year observation study. It showed further risk reduction in:

- Heart and blood vessel disease by 42%
- Heart attack, stroke, or heart and blood vessel disease-related death by 57%.

Similarly, the **United Kingdom Prospective Diabetes Study (UKPDS)** showed that improved blood glucose control in those with type 2 diabetes reduced risk of:

- Retinopathy by 21%
- Nephropathy by 33%.

The UKPDS also showed that improved blood pressure control reduced incidence of stroke and microvascular complications.

However, in light of recommended treatment goals, only:

- **37% of adults with diagnosed diabetes achieved an A1C of <7%**
- **36% had a blood pressure <130/80 mmHg**
- **48% had a cholesterol <200 mg/dl**
- **7.3% met all three above goals.**

**Cardiovascular Disease (CVD)**, the number one killer in those with diabetes, includes coronary artery disease, myocardial infarction, peripheral vascular disease and cerebral vascular disease. Risk factors for CVD include duration of diabetes, age, genetics, race and gender, along with modifiable risk factors listed in the table below.

**Guidelines for Reducing Risk of CVD**

	<b>Goal</b>
<b>Blood Pressure</b>	<b>Check at every medical visit</b> Optimal: < 120/80 mmHg Minimal goal: < 130/80 mmHg Take medications as prescribed
<b>Cigarette Smoking</b>	<b>Advise not to smoke</b> <b>Smoking cessation counseling for those who smoke</b>
<b>Diabetes</b>	<b>Strive for near normal blood glucose levels</b> Monitor blood glucose levels regularly Take medications as prescribed
<b>Diet</b>	Limit saturated fats to <7% of total calories Limit dietary cholesterol to < 200 mg Minimize intake of trans fatty acids DASH Diet (See chapter 13 Hypertension and Diabetes)
<b>Lipids</b>	<b>Check lipid profile at least once a year</b> LDL cholesterol < 100 mg/dl HDL cholesterol > 40 mg/dl (men); > 50 mg/dl (women) Triglycerides < 150 mg/dl Non-HDL cholesterol* < 130 mg/dl Take medications as prescribed
<b>Physical Activity</b>	<b>Minimum of 150 minutes of moderate-intensity activity and 3 days of resistance training (in those without complications) per week</b>
<b>Weight management</b>	<b>Strive for a BMI of 18.5-24.9 and Waist circumference: &lt; 35" (women); &lt; 40" (men)</b>
<b>Antiplatelet agents</b>	<b>Consider low dose aspirin in those over age 40, those with a history of CVD, those with additional risk factors: family history, hypertension, smoking, dyslipidemia or albuminuria</b> Consider other antiplatelet agent if contraindication to aspirin

\* Current NCEP/ATP III guidelines suggest that "non-HDL cholesterol" (total cholesterol minus HDL) be utilized in those with triglycerides  $\geq$  200 mg/dl.

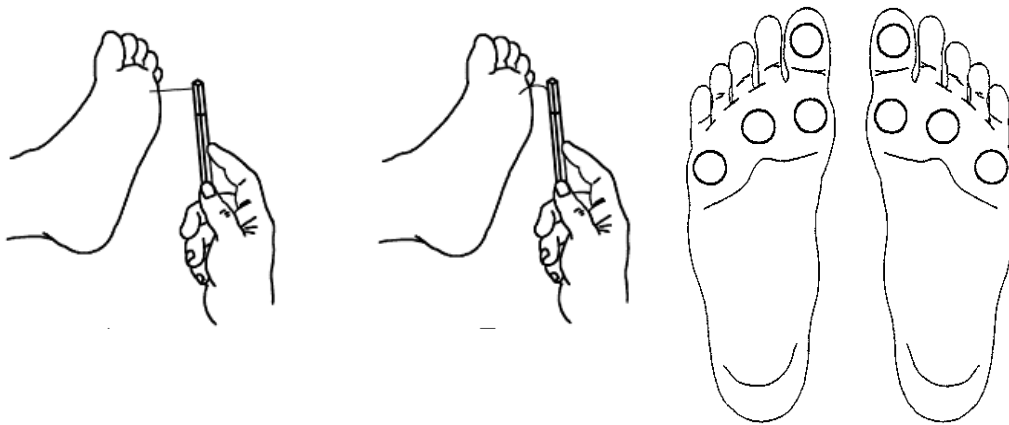
**Lower Extremity Complications and Neuropathies**

Diabetic neuropathy involves acute nerve abnormalities, followed by more chronic nerve damage, atrophy and loss. Up to 70% of persons with diabetes have nerve damage, which can lead to lower limb amputation. Common foot problems associated with diabetes include circulation, structural and neuropathic issues.

All persons with diabetes should be screened for distal symmetric polyneuropathy (DPN) at diagnosis and annually

Initial screening for peripheral arterial disease (PAD) should include a history for claudication and an assessment of pedal pulses. Consider obtaining an ankle-brachial index (ABI) as many patients with PAD are asymptomatic. Refer patients with significant claudication or a positive ABI for further vascular assessment.

**An annual comprehensive foot exam should include the use of a monofilament, tuning fork, palpation and a visual examination.** Suggested sites for monofilament testing are shown below.



Persons with diabetes should be taught to examine their feet daily and report changes to their health care provider, including redness, swelling, ulcers, temperature change or structural changes. Reducing risk for lower extremity complications includes smoking cessation, controlling blood lipids, blood pressure and blood glucose, weight management and being physically active. For those with DPN, facilitate foot care education and refer for special footwear.

A multidisciplinary approach is recommended for those with foot ulcers and high-risk feet. Refer those who smoke, have loss of protective sensation and structural abnormalities or have history of prior lower extremity complications to foot care specialists

**Autonomic neuropathy** affects blood flow, perspiration and skin hydration. This can lead to dry, cracking skin and calluses. It may also impair one's ability to fight infection. Autonomic neuropathy can also affect other body systems:

- Genitourinary: problems with bladder, erectile dysfunction.
- Gastrointestinal: gastroparesis, diarrhea, constipation
- Cardiovascular: orthostatic hypotension, silent heart attack
- Impaired insulin counter-regulation: hypoglycemia unawareness
- Sudomotor: abnormal sweating
- Pupillary: difficulty seeing in the dark.

**Screening for signs and symptoms of autonomic neuropathy should be done at diagnosis (type 2) and 5 years after the diagnosis (type 1).** Medication for relief of specific symptoms related to DPN and autonomic neuropathy are recommended.

### Nephropathy

Diabetic nephropathy occurs in 20-40% of those with diabetes. Risk factors are listed below.

Non-modifiable risk factors	Modifiable risk factors
Duration of diabetes Family history of hypertension or diabetic nephropathy Race (higher in African American, Hispanic and Native Americans) Gender (men higher than women)	Hypertension Hyperglycemia Dyslipidemia Smoking

A family history of high blood pressure and/or the presence of hypertension increase the risk to develop kidney disease and hypertension speeds the progress of kidney disease when it already exists.

### Guidelines for reducing one's risk of Kidney Disease

	Goal
<b>Blood Pressure</b>	<b>Check at every medical visit</b> Optimal: < 120/80 mmHg Minimal goal: < 130/80 mmHg Take medications as prescribed
<b>Cigarette Smoking</b>	<b>Advise not to smoke</b> <b>Smoking cessation counseling for those who smoke</b>
<b>Diabetes</b>	<b>Strive for near normal blood glucose levels</b> Monitor blood glucose levels regularly Take medications as prescribed
<b>Diet</b>	<b>Avoid a high protein diet.</b> Limiting protein to 0.8 g/kg if any evidence of chronic kidney disease. DASH Diet (See chapter 13 Hypertension and Diabetes)
<b>Lipids</b>	<b>Check lipid profile at least once a year</b> LDL cholesterol < 100 mg/dl HDL cholesterol > 40 mg/dl (men); > 50 mg/dl (women) Triglycerides < 150 mg/dl Non-HDL cholesterol* < 130 Take medications as prescribed
<b>Lab Testing</b>	<b>Microalbumin:</b> < 30 ug/mg Type 1: within 5 years of diagnosis, then annually Type 2: at diagnosis, then annually <b>Serum Creatinine and Calculated GFR*:</b> annually
<b>Weight management</b>	<b>BMI of 18.5-24.9</b> <b>Waist circumference:</b> <b>&lt; 35" (women); &lt; 40" (men)</b>

\* For GFR calculator: go to [www.nkdep.nih.gov/professionals/gfr\\_calculators/](http://www.nkdep.nih.gov/professionals/gfr_calculators/)

### Retinopathy

Diabetes is the leading cause of blindness in the US among those aged 20-74. Eye disease is 25 times more common among persons with diabetes than the general population. Listed below are common eye problems in persons with diabetes.

	Functional losses	Treatment	Prevention
<b>Cataracts</b> (clouding of the lens of the eye)	Blurry vision Reduced night vision Problems with glare Fading of colors	Surgery to replace the lens	BG control Annual eye exam
<b>Glaucoma</b> (group of eye diseases that damage the optic nerve)	<i>None in early stages</i> Loss of peripheral vision Difficulty with night or low vision	Lower eye pressure (eye drops or surgery)	Annual eyeball pressure check
<b>Retinopathy</b> (microvascular disease of the retina)	<i>None in early stages</i> Later: blurry vision, floaters, flashing lights, sudden vision loss	Dependent on severity	Annual dilated eye exam Strive for optimal blood pressure, lipid and glycemic control Smoking cessation

### Periodontal Disease

Periodontal disease is the most common oral complication of diabetes. It is more prevalent in those with poorly controlled diabetes. Prevention of periodontal disease involves striving for optimal glycemic control, good oral hygiene (regular brushing and flossing of teeth) and follow-up every 6 months with a dental professional.

### Flu and Pneumonia

Influenza and pneumonia are common, preventable infectious diseases associated with high mortality and morbidity in those with chronic diseases. Vaccination guidelines are listed below.

- **Influenza:** annual to all with diabetes  $\geq$  6 months of age.
- **Pneumonia:** one lifetime vaccine for adults with diabetes. A one-time revaccination is recommended for those >65 years of age previously immunized when they were <65 years of age if the vaccine was administered >5 years ago.

### References:

Franz MJ et al. (2003). A Core Curriculum for Diabetes Educators, 5<sup>th</sup> Ed., Diabetes Complications. American Association of Diabetes Educators, Chicago.

Saydah SH, Fradkin J, Cowie CC: Poor control of risk factors for vascular disease among adults with previously diagnosed diabetes. *JAMA* 291:335–342, 2004.

American Diabetes Association (2008). Clinical Practice Recommendations. *Diabetes Care*. Supplement. Vol 31(1).