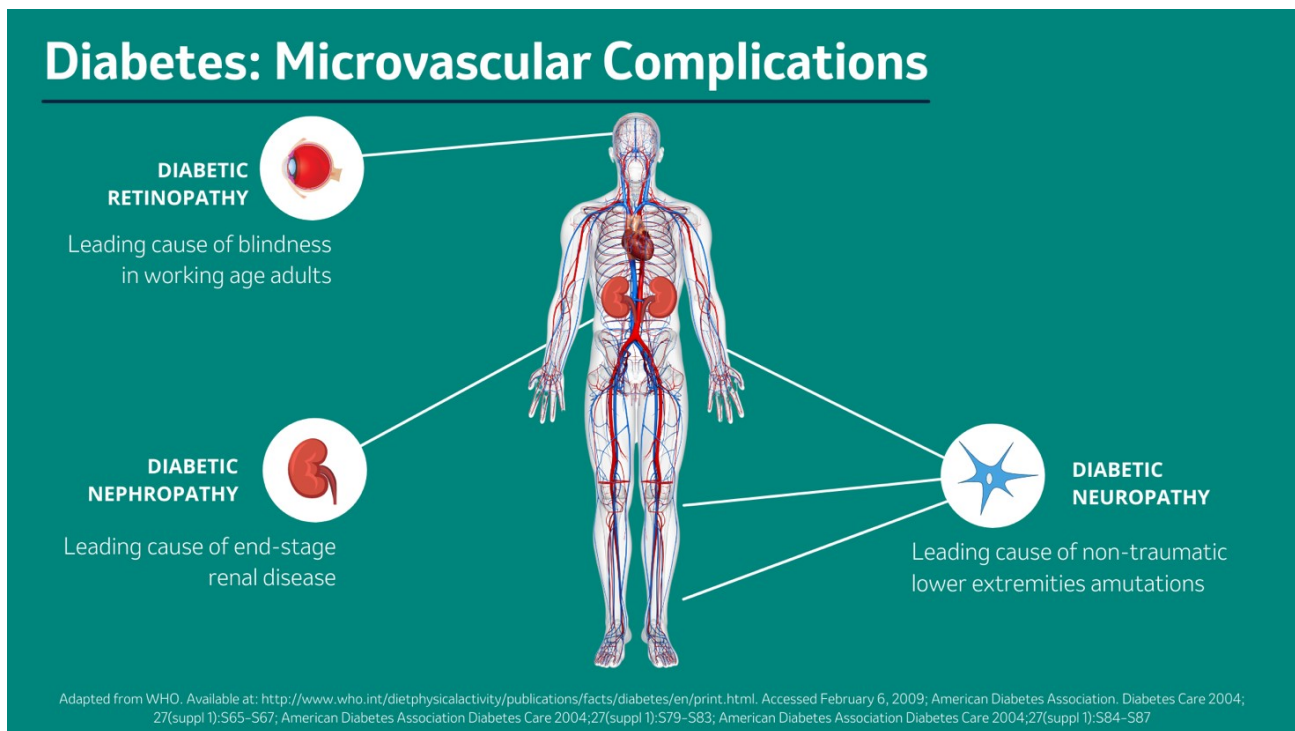


Overview of Type 2 Diabetes Microvascular Complications

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Diabetes and Chronic Kidney Disease

Chronic kidney disease (CKD) is diagnosed by the persistent presence of elevated urinary albumin excretion (albuminuria), low estimated glomerular filtration rate (eGFR), or other manifestations of kidney damage. It occurs in 20–40% of patients with diabetes. CKD typically develops after diabetes duration of 10 years in type 1 diabetes but may be present at diagnosis of type 2 diabetes. CKD can progress to end-stage renal disease (ESRD) requiring dialysis or kidney transplantation and is the leading cause of ESRD in the U.S.

Screening Recommendations:

1. At least annually, urinary albumin (e.g., spot urinary albumin-to-creatinine ratio) and estimated glomerular filtration rate should be assessed in patients with type 1 diabetes with duration of >5 years and in all patients with type 2 diabetes regardless of treatment
2. Patients with diabetes and urinary albumin >300 mg/g creatinine and/or an estimated glomerular filtration rate 30–60 mL/min/1.73 m² should be monitored twice annually to guide therapy

Treatment:

- Optimize glucose control to reduce the risk or slow the progression of chronic kidney disease.
- For patients with type 2 diabetes and diabetic kidney disease, consider use of a sodium–glucose cotransporter 2 inhibitor in patients with an estimated glomerular filtration rate ≥ 30 mL/min/1.73 m² and urinary albumin >300 mg/g creatinine.
- In patients with type 2 diabetes and diabetic kidney disease, consider use of sodium–glucose cotransporter 2 inhibitors additionally for cardiovascular risk reduction when estimated glomerular filtration rate and urinary albumin creatinine are ≥ 30 mL/min/1.73 m² or >300 mg/g, respectively.

- In patients with chronic kidney disease who are at increased risk for cardiovascular events, use of a glucagon-like peptide 1 receptor agonist reduces renal end point, primarily albuminuria, progression of albuminuria, and cardiovascular events
- Optimize blood pressure control to reduce the risk or slow the progression of chronic kidney disease.

Diabetic Retinopathy Recommendations

Diabetic retinopathy is a highly specific vascular complication of both type 1 and type 2 diabetes, with prevalence strongly related to both the duration of diabetes and the level of glycemic control.

Diabetic retinopathy is the most frequent cause of new cases of blindness among adults aged 20–74 years in developed countries. Glaucoma, cataracts, and other disorders of the eye occur earlier and more frequently in people with diabetes.

In addition to diabetes duration, factors that increase the risk of, or are associated with, retinopathy include chronic hyperglycemia, nephropathy, hypertension, and dyslipidemia

Screening:

- Patients with type 2 diabetes should have an initial dilated and comprehensive eye examination by an ophthalmologist or optometrist at the time of the diabetes diagnosis.
- If there is no evidence of retinopathy for one or more annual eye exams and glycemia is well controlled, then screening every 1–2 years may be considered. If any level of diabetic retinopathy is present, subsequent dilated retinal examinations should be repeated at least annually by an ophthalmologist or optometrist. If retinopathy is progressing or sight-threatening, then examinations will be required more frequently.
- Women with preexisting type 1 or type 2 diabetes who are planning pregnancy or who are pregnant should be counseled on the risk of development and/or progression of diabetic retinopathy.
- Eye examinations should occur before pregnancy or in the first trimester in patients with preexisting type 1 or type 2 diabetes, and then patients should be monitored every trimester and for 1 year postpartum as indicated by the degree of retinopathy.
- The preventive effects of therapy and the fact that patients with proliferative diabetic retinopathy (PDR) or macular edema may be asymptomatic provide strong support for screening to detect diabetic retinopathy.

Treatment:

Promptly refer patients with any level of macular edema, severe non proliferative diabetic retinopathy (a precursor of proliferative diabetic retinopathy), or any proliferative diabetic retinopathy to an ophthalmologist who is knowledgeable and experienced in the management of diabetic retinopathy.

Neuropathy Screening Recommendations

- The diabetic neuropathies are a heterogeneous group of disorders with diverse clinical manifestations. The early recognition and appropriate management of neuropathy in the patient with diabetes is important.
- Up to 50% of diabetic peripheral neuropathy may be asymptomatic. If not recognized and if preventive foot care is not implemented, patients are at risk for injuries to their insensate feet.

- All patients should be assessed for diabetic peripheral neuropathy starting at diagnosis of type 2 diabetes and at least annually thereafter.
- Assessment for distal symmetric polyneuropathy should include a careful history and assessment of either temperature or pinprick sensation (small fiber function) and vibration sensation using a 128-Hz tuning fork (for large-fiber function). All patients should have annual 10-g monofilament testing to identify feet at risk for ulceration and amputation
- Foot ulcers and amputation, which are consequences of diabetic neuropathy and/or peripheral arterial disease (PAD), are common and represent major causes of morbidity and mortality in people with diabetes.
- Early recognition and treatment of patients with diabetes and feet at risk for ulcers and amputations can delay or prevent adverse outcomes.
- The risk of ulcers or amputations is increased in people who have the following risk factors:
 - Poor glycemic control
 - Peripheral neuropathy with LOPS
 - Cigarette smoking
 - Foot deformities
 - Pre ulcerative callus or corn
 - PAD
 - History of foot ulcer
 - Amputation
 - Visual impairment
 - CKD (especially patients on dialysis)

Treatment

- Optimize glucose control to slow the progression of neuropathy in patients with type 2 diabetes.
- Assess and treat patients to reduce pain related to diabetic peripheral neuropathy and symptoms of autonomic neuropathy and to improve quality of life.
- Pregabalin, duloxetine, or gabapentin are recommended as initial pharmacologic treatments for neuropathic pain in diabetes.

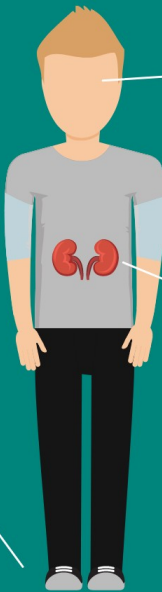
Diabetes: Microvascular Complications

Diabetes might cause complications like nerve damage and kidney failure. To detect common microvascular (small vessel) diseases early, regular screenings are essential.

NERVE DAMAGE

Diabetes might lead to nerve damage and loss of feeling in the feet. This means patients can injure their feet without feeling it, which increases risk for ulcers and infections.

What to do
Foot Screening



RETINOPATHY

Diabetes might lead to retinopathy - Damage the blood vessels in the eye - which could lead to blindness.

What to do
Retinal Photography



KIDNEY FAILURE

Diabetes increases risk for kidney disease. This could lead to kidney failure which requires dialysis to treat.

What to do

- Urine Test for Microalbumin / Protein
- Blood Test for Kidney Function

Adopted from <https://www.healthhub.sg/a-z/diseases-and-conditions/676/pocket-guide-to-diabetes>

HOW TO PREVENT OR SLOW THE PROGRESSION OF DIABETIC KIDNEY DISEASE



Medications to control high blood pressure



Manage blood glucose levels



Changes in eating, diet and nutrition



Regular physical activity



Weight loss in case patient is overweight or obese

Adopted from; <https://www.thediabetescouncil.com>

THE FOOT CARE GUIDE

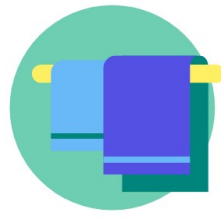
THE 9-STEP DAILY FOOT CARE GUIDE FOR PEOPLE WITH DIABETES

1



**WASH FEET EVERYDAY
WITH LUKE WARM
WATER AND SOAP**

2



**DRY FEET WELL
ESPECIALLY BETWEEN
THE TOES**

3



**MOISTURIZE FEET
BUT NOT BETWEEN
THE TOES**

4



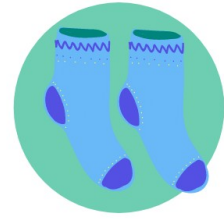
**CHECK FEET
FOR BLISTERS, CUTS
OR SORES**

5



**KEEP TOENAILS
AT A REASONABLE
LENGTH**

6



**WEAR CLEAN SOCKS
THAT AREN'T TOO BIG
OR SMALL**

7



**KEEP FEET WARM AND
DRY WITH SHOES THAT
FIT COMFORTABLY**

8



**NEVER WALK
BAREFOOT INDOORS
OR OUTDOORS**

9



**EXAMINE SHOES FOR
THINGS THAT MIGHT
HURT THE FEET**

PROTECT THEIR VISION FROM DIABETES

Patients should have a dilated eye exam every year and make sure they follow these steps to keep their health on **TRACK**

T Take medications
as prescribed by their doctor



R Reach and maintain
a healthy weight



A Add more physical activity
to their daily routine



C Control their ABC's :
A1C, Blood Pressure
and Cholesterol levels



K Kick the smoking habit



ANNUAL SCREENING

FOOT AND EYE CARE

Diabetes increases the risk of foot and eye problems. Patients can prevent complications or detect them early by going for yearly foot and eye screenings. Here's what to expect from the screenings.

Foot Screening

Care providers might check for:

Blood Circulation to the Feet

Pulses and skin health will be checked to assess blood circulation



Nerve Sensitivity

Pulses and skin health will be checked to assess blood circulation



Signs of Neuropathy (Diseases of the Nerve)

Feet will be examined for skin damage, eg. ulcers and deformity



Calluses

Calluses and other conditions like blisters might lead to problems like ulcers or infection

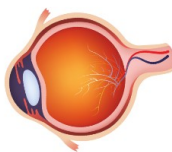


Eye Screening

Care provider will check for:

Signs of Retinopathy (Damage to blood vessels in the eye)

Involves an eye examination; photographs of the retina will also be taken



A healthcare team can also advise on proper foot and eye care.
Make sure patients voice their concerns!

