

UNDERSTANDING HOW BLOOD GLUCOSE LEVELS MAY AFFECT FOOT ULCERS

WHAT IS A FOOT ULCER?

A foot ulcer is an open sore that usually develops on the bottom of the foot.

The wound may begin as a minor injury, burn or exposure to extreme cold that is unnoticed. The wound may then become infected and not heal due to common complications of diabetes: *nerve damage and poor blood flow.*

UP TO **34%** OF PEOPLE WITH DIABETES DEVELOP FOOT ULCERS.¹

WHAT CAUSES A FOOT ULCER?

The main reason someone with diabetes may get foot ulcers is high blood glucose (sugar) levels.²

What is considered high blood sugar?

- Higher than 130 mg/dL before a meal
- Higher than 180 mg/dL one to two hours after a meal



HOW CAN HIGH BLOOD SUGAR HARM YOUR FEET?



NERVE DAMAGE

High blood sugar damages the nerves in your feet and makes them feel numb. When the feeling is gone, you may not know you have a sore on your foot. If untreated, the sore can turn into a foot ulcer.



BLOOD VESSEL DAMAGE

High blood sugar can thicken blood which may damage blood vessels over time; so less blood, oxygen, and nutrients reach your feet.



INFECTIONS AND POOR WOUND HEALING

High blood sugar and poor nutrition may lead to an infection in the ulcer and slow wound healing.

FACTORS THAT INCREASE THE RISK OF DEVELOPING A FOOT ULCER



WEARING SHOES THAT DON'T FIT can create friction and rubbing to cause blisters.



HAVING CALLUSES OR CORNS ON YOUR FEET OR TOES can worsen and become ulcers.



NOT CLEANING YOUR FEET REGULARLY can cause a sore to become infected.



CARRYING EXTRA WEIGHT can put additional pressure on your feet.



SMOKING OR VAPING can damage the nerves and interfere with wound healing.



DRINKING ALCOHOL can interfere with your diabetes medications or insulin and affect your blood sugar. Check with your healthcare provider to see if drinking alcohol is safe for you.

OTHER RISK FACTORS THAT INCREASE THE RISK OF DEVELOPING A FOOT ULCER:

- Foot deformity and callus formation resulting in focal areas of high pressure
- Limited joint mobility
- Autonomic neuropathy causing decreased sweating and dry, fissured skin
- Impaired vision
- History of foot ulcer or lower extremity amputation

POSITIVE STEPS YOU CAN TAKE TO KEEP YOUR FEET HEALTHY



MANAGE YOUR BLOOD SUGAR LEVELS

Create a nutrition plan, maintain enjoyable physical activities, take your medications, and check your blood sugar as recommended by your healthcare team.



CONNECT WITH YOUR CARE TEAM REGULARLY

Keep them informed about your diabetes. Have your physician check your feet at every visit. If there are changes, the team can adjust your care as needed.



MAINTAIN A HEALTHY WEIGHT

Follow your nutrition plan and keep track of what you eat.



STOP SMOKING

Protect your nerves, blood vessels and overall health by not smoking. Talk with your healthcare team about resources to support you.

FOOT CARE BASICS

Check your feet every day, especially if you've lost feeling in your feet. Look for:

- ✓ Cuts, blisters, or sores
- ✓ Areas that are red or warm to the touch
- ✓ Ingrown toenails
- ✓ Corns and calluses

Before putting on your shoes, inspect the insides for pebbles or other small objects that could harm your feet.

Wear shoes that fit well and protect your feet. Always wear socks and shoes, even indoors.

Prop up your feet when sitting to keep the blood moving.

Improve circulation by walking, massaging your feet, and wearing support socks.



HOW TO KNOW IF YOU HAVE A FOOT ULCER

YOU MAY NOTICE:

Redness or swelling on any area of your feet.

An open sore on the ball of your foot or your big toe.

Fluid in your socks that isn't sweat.

If the liquid is red, yellow or green or has an unpleasant odor, it may mean you have an ulcer that is infected.

If you see any of these, it is important to seek medical care immediately. Your physician may refer you to a podiatrist, a medical specialist who is trained to treat foot problems like foot ulcers.



CARING FOR A FOOT ULCER

A foot ulcer requires medical treatment and time to heal. Without treatment, it can get infected and spread to other areas of your foot, which can limit your normal daily activities.

A podiatrist (also known as a foot doctor), or your physician may provide you with daily wound care guidance such as:

- Stay off your feet until it's OK to put weight on your foot
- Take your medications as prescribed
- Keep your wound clean
- Change your bandages
- Follow a nutrition plan

GOOD NUTRITION FOR YOUR FEET: WHAT YOU CAN DO TO HELP HEAL A FOOT ULCER

MANAGE BLOOD SUGAR WITH GOOD NUTRITION

Eat a variety of foods that have a mix of carbohydrates (commonly referred to as “carbs”), protein, and fats to help manage your blood sugar.

KEY NUTRIENTS THAT AFFECT YOUR BLOOD SUGAR

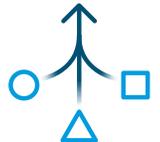


CARBS – can have a big impact on your blood sugar and raise it faster than protein or fat.

FIBER – can help slow digestion and limit the rise in your blood sugar after you’ve eaten.

PROTEIN & FAT – can help keep your blood sugar from spiking after a meal.

STRATEGIES FOR SUCCESS



BE MINDFUL OF SERVINGS SIZES:
Keep track of what and how much you eat.

CHOOSE LOW GLYCEMIC OR FIBER-RICH CARBS:
Whole grains, vegetables, and fruits.

SELECT FEWER REFINED CARB FOODS:
White bread, cookies, and chips, etc.

LIMIT FOODS WITH ADDED SUGAR:
Muffins, cakes, sweetened beverages, fruit juice, etc.

INCLUDE PROTEIN AT EVERY MEAL

CONSUME HEALTHY FATS:
Nuts and seeds, avocado, and olive oil or canola oil.

NUTRITION THAT SUPPORTS WOUND HEALING

Your body needs nutrients to maintain healthy tissue and build new tissue. These nutrients support wound healing and keep your immune system healthy and strong.



KEY NUTRIENTS YOUR BODY NEEDS TO SUPPORT THE WOUND HEALING PROCESS

CARBS: provide energy (calories) to help heal a wound.

PROTEIN: helps repair and rebuild your ulcer’s damaged tissues. Protein also maintains your muscle mass and your immune system.

VITAMIN C: helps your body make collagen, a protein that helps build new tissue to promote wound healing.

OTHER VITAMINS AND MINERALS: may help to reduce the risk of infections.

WATER: keeps you hydrated to maintain skin strength and supports blood circulation to provide nutrients and oxygen to help heal your ulcer.

AMINO ACIDS such as arginine and glutamine

The National Academy of Medicine recommends drinking about 9 cups of fluid for women and about 13 cups of fluid for men each day.



ORAL NUTRITIONAL SUPPLEMENTS

Your healthcare team may recommend oral nutritional supplements as part of your nutrition care plan.

Oral nutritional supplements can help people with diabetes meet their nutritional needs. Diabetes and wound specific oral nutritional supplements can help manage blood sugar and provide additional calories, protein, vitamins, and minerals that your body needs to help heal your foot ulcer.^{3,4}

CREATING YOUR NUTRITION PLAN

Eating a variety of foods from different food groups provides key nutrients for wound healing and helps control blood sugar. A dietitian can partner with you to develop your personalized nutrition plan that's based on your age, weight, activity level, and your preferences and goals.⁵ One place to start is by choosing a variety of foods from the following food groups every day. Make sure you include foods you enjoy – and be open to trying new foods.

FRUITS & VEGETABLES

2-3 SERVINGS A DAY

Choosing a variety of colorful fresh or cooked vegetables provides you with a variety of vitamins and minerals for good health.



PROTEIN

5-7 OUNCES* A DAY

Vary your protein: try unsalted nuts or seeds, seafood, beans, peas, lean meats, seafood, and eggs.

*1 ounce = 1 oz meat, 1 egg, ¼ c cooked peas or beans, or 1 tablespoon peanut butter

GRAINS

5 SERVINGS A DAY

Make half your daily grains whole grains, such as whole wheat pita bread, whole grain tortillas, whole wheat pasta, or brown rice.

DAIRY

3 SERVINGS A DAY

Choose low fat dairy foods and beverages.



Fruits: Whole fruits can be a good source of fiber and contain less sugar than fruit juice or dried fruit. Fruits may cause your blood sugar to spike.

WHAT IS A SERVING SIZE?

1 CUP
COOKED PASTA =

1 BASEBALL

1/2 CUP FRUITS
OR VEGGIES =

1/2 BASEBALL

1 OUNCE
LEAN MEAT =

1 PACK OF
DENTAL FLOSS

1 OUNCE
CHEESE =

3 DICE

PLATE RATIO



WHEN SHOULD I EAT?



There's no one-size-fits-all rule for when you should eat. When you eat depends on your needs, medications, and goals.

Some general advice about meal times for someone with diabetes:

- Never skip a meal.
- Start your day by eating breakfast within an hour of waking up.
- Eat a portion-controlled meal every 4 to 5 hours after breakfast.
- Have a light snack between meals if you're hungry.

Talk with your dietitian about the best time for you to eat meals and snacks.

SAMPLE MEAL TIMES:

MEAL 1

7 am - 8 am

MEAL 2

11 am - 12 pm

MEAL 3

3 pm - 4 pm

MEAL 4

7 pm - 8 pm

Changing the way you eat can be challenging, so talk with your dietitian or healthcare team about your progress and ask about resources to support you.



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1. Armstrong DG, et al. *N Engl J Med.* 2017;376(24):2367-2375. doi: 10.1056/NEJMra1615439 2. ElSayed NA, et al. American Diabetes Association. *Diabetes Care* 2023;46(Suppl. 1):S203-S215 3. Mustad VA, et al. *BMJ Open Diabetes Res Care.* 2020;8(1):e001258. doi: 10.1136/bmjdr-2020-001258 4. Quain AM, Khardori NM. *Wounds.* 2015;27(12):327-35. 5. American Diabetes Association. *Diabetes Care.* 2021;43(Suppl 1):S53-S72. doi:10.2337/dc21-S005