Foot & Ankle
Health Center
Dr. Sonia Goyal, D.P.M.

Diabetic Lower Extremity Health

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FOOT AND ANKLE HEALTH CENTER

Diabetes Impact

Nearly 24 million people, or 8 percent of the U.S. population, have diabetes

17.9 million people have been diagnosed

5.7 million people are still undiagnosed

At-risk feet need to be screened for. Ulcer classification is essential, to set treatment strategy and determine prognosis.

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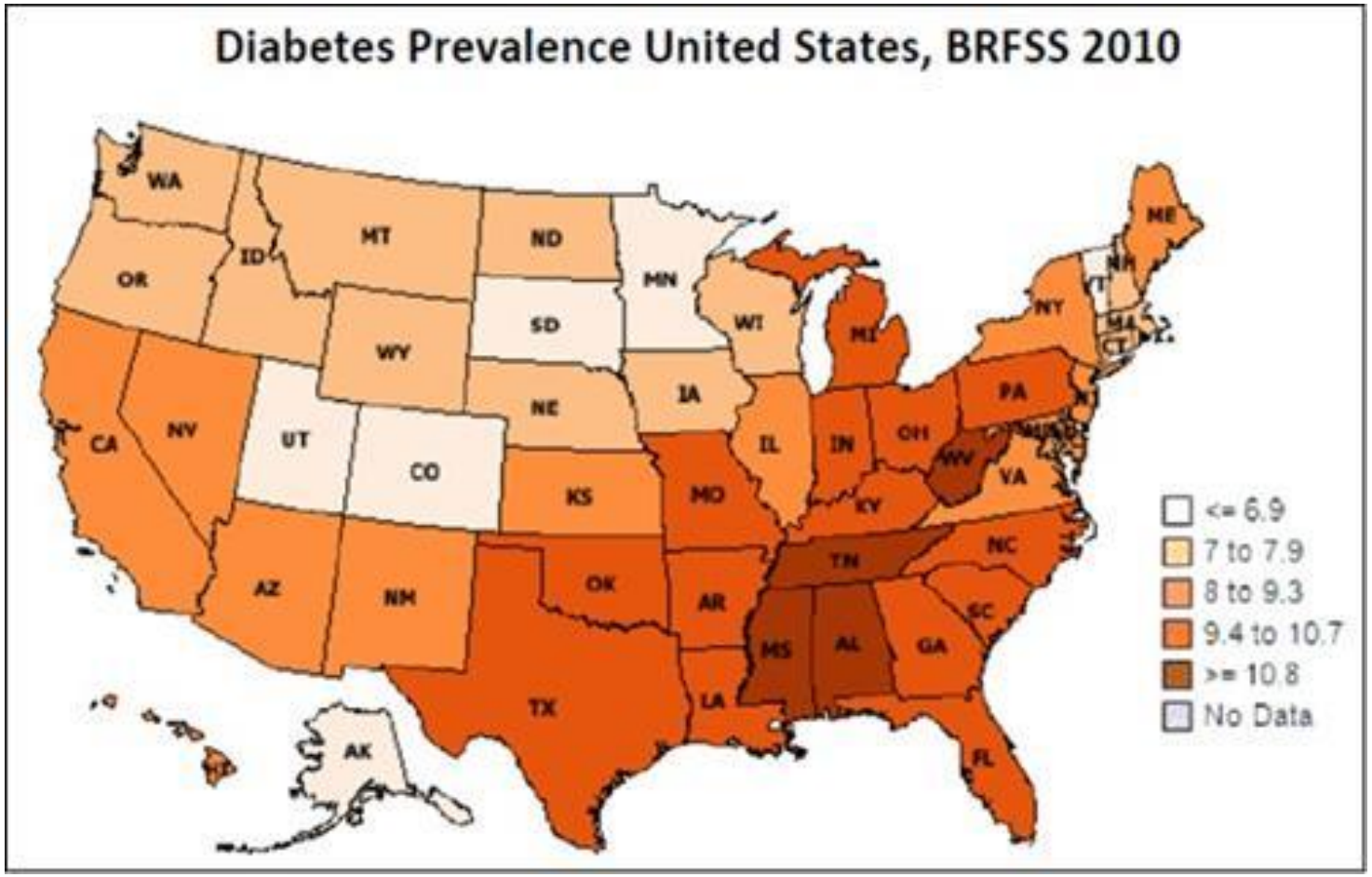

Type 1 Diabetes

As many as three million Americans may have type 1 diabetes.

Each year, more than 15,000 children and 15,000 adults - approximately 80 people per day - are diagnosed with type 1 diabetes in the U.S.

Eighty-five percent of people living with type 1 diabetes are adults.

The rate of type 1 diabetes incidence among children under the age of 14 is estimated to increase by three percent annually worldwide.

Type 1 Diabetes

An autoimmune disease action where the body attacks insulin-producing beta cells in the pancreas and destroys them.

- When the pancreas no longer makes insulin, blood glucose (blood sugar) cannot enter the cells to be used for energy, leaving high levels in the blood.

People with type 1 diabetes must take exogenous insulin (from outside the body) to stay alive.

Type 1 Diabetes Criteria

Fasting blood glucose---equal or greater than 126 mg/dl (2 occasions)

Two hours after eating---equal or greater than 200 mg/dl

Random blood sugar---over 200 mg/dl with symptoms

Hemoglobin A1C 6.5 percent or higher.

Type 2 Diabetes Goals

Fasting and before meals: 70-130 mg/dl

2 hours after start of a meal: <180 mg/dl

A1C: <7%(tested every 3 months or more)

Type 2 Diabetes

A number of systems may be functioning poorly

5-10 years for type 2 diabetes to develop.

A slow progression of the following issues:

- Your pancreas, particularly the beta cells, is not able to make enough insulin to control blood glucose levels. Your fasting blood glucose slowly creeps up over the years (pre-diabetes)

Type 2 Diabetes

Insulin resistance is also a factor

- Body resists the normal functioning of the insulin because of chronic inflammation related to excess weight and inactivity.
- An increased demand for more insulin since it is less effective. This is called impaired glucose tolerance.

Hepatic glucose output—the liver, with its storage bank of glucose

- Begins to release more glucose than it needs to
  - Fasting blood glucose rises.

Gestational Diabetes

This is a list of factors that increase the risk of developing gestational diabetes for women during pregnancy:

- Overweight prior to pregnancy (20 percent or more over ideal body weight)
- High risk ethnic group: Hispanic, African American, Native American, Asian
- Impaired glucose tolerance or traces of glucose in the urine
- Family history of diabetes
- Previously giving birth to a baby over 9 lbs. or stillborn
- Previous pregnancy with gestational diabetes

Risk Factors

Ethnicity plays a large factor in developing diabetes. The following groups are at an increased risk:

African-American
American Indian/Alaskan Native
Asian-American
Pacific Islander
Hispanic-American/Latino

Overweight or obese

A family history of diabetes or gestational diabetes raises the risk

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Diabetes & African-Americans

3.7 million, or nearly 15 percent of all African-Americans aged 20 years or older, have diabetes

25 percent of African-Americans between the ages of 65 and 74 are affected

Fourth leading cause of death among African-Americans

Signs & Symptoms

Diabetes warning signs in the feet:

- Redness
- Numbness
- Swelling
- Cold to touch
- Inflammation

Diabetes' Impact on the Feet

- **Neuropathy -** causes numbness, burning or tingling and diminishes sensation in the feet.
- **Ulcers -** a breakdown of skin on the foot that is difficult to heal and often leads to infection.
- **Amputations -** occur as a result of foot wounds and ulcers that do not heal.

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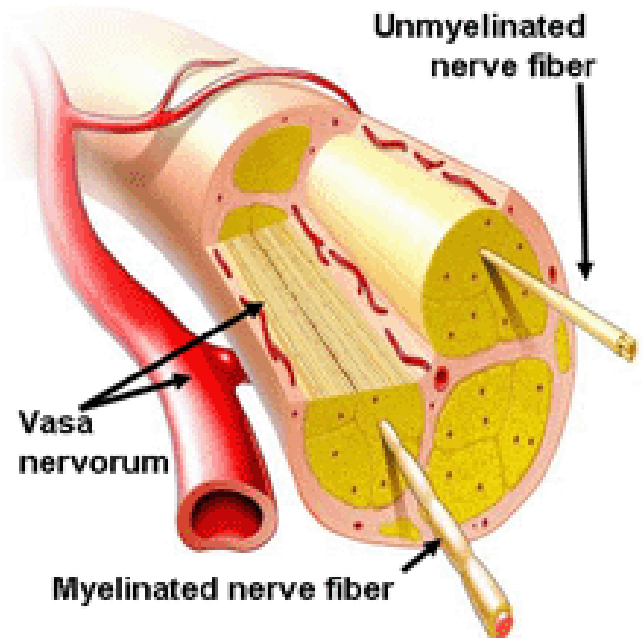
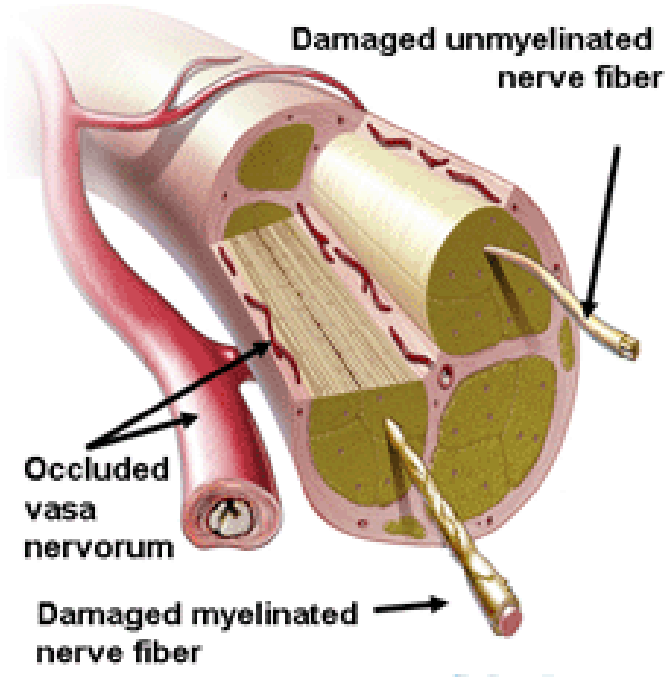
Diabetic Peripheral Neuropathy

Healthy Nerves and Blood Vessels



Nerves and Blood Vessels Damaged by DPN



Diagnostic tests for Diabetic Peripheral Neuropathy include:

Vibration perception tested with tuning fork

Monofilament screening test

Nerve conduction velocity measurements

Prevalence of Ulcers

Up to **25 percent** of those with diabetes will experience an ulcer or wound at some point.

Amputation rates can be reduced by 45 to 85 percent with a comprehensive foot care program.

Without proper treatment, ulcers can quickly escalate into amputation.

Early Detection is Key

A simple foot exam can reveal the first signs and symptoms of diabetes, and identify more serious complications that could potentially lead to lower-limb amputations.

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Multi-Specialty Care

Primary Care/Internal Medicine

Endocrinology

Podiatry

Opthamology

Vascular Surgery

Nutritionist

Podiatry Savings

Limbs

Cost

Quality of life

DIABETIC FOOT HEALTH

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Up to **25%**of those with **DIABETES** will develop a **FOOT ULCER**

COST OF DIABETES IN THE US **$245B**

Estimated annual U.S. burden of diabetic foot ulcers is at least **$15 BILLION**

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INVESTMENT IN CARE

$1 invested in care by a podiatrist results in **$27** to **$51** of savings for the health-care system, among patients with commercial insurance.

$1 invested in care by a podiatrist results in **$9** to **$13** of savings, among Medicare eligible patients.

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How to Examine?!

The three minute diabetic foot exam

Three Minute Exam

What to ask (1 minute)[5,12]

Does the patient have a history of:

- previous leg/foot ulcer or lower limb amputation/surgery?
- prior angioplasty, stent, or leg bypass surgery?
- foot wound requiring more than 3 weeks to heal?
- smoking or nicotine use?
- diabetes? (If yes, what are the patient's current control measures?)

Does the patient have:

- burning or tingling in legs or feet?
- leg or foot pain with activity or at rest?
- changes in skin color, or skin lesions?
- loss of lower extremity sensation?

Has the patient established regular podiatric care?

Three Minute Exam

Dermatologic exam:

- Does the patient have discolored, ingrown, or elongated nails?
- Are there signs of fungal infection?
- Does the patient have discolored and/or hypertrophic skin lesions, calluses, or corns?
- Does the patient have open wounds or fissures?
- Does the patient have interdigital maceration?

Neurologic exam:

- Is the patient responsive to the Ipswich Touch Test?

Musculoskeletal exam:

- Does the patient have full range of motion of the joints?
- Does the patient have obvious deformities? If yes, for how long?
- Is the midfoot hot, red, or inflamed?

Vascular exam:

- Is the hair growth on the foot dorsum or lower limb decreased?
- Are the dorsalis pedis and posterior tibial pulses palpable?
- Is there a temperature difference between the calves and feet, or between the left and right foot?

Three Minute Exam

Recommendations for daily foot care:

- Visually examine both feet, including soles and between toes. If the patient can't do this, have a family member do it.
- Keep feet dry by regularly changing shoes and socks; dry feet after baths or exercise.
- Report any new lesions, discolorations, or swelling to a health care professional.

Education regarding shoes:

- Educate the patient on the risks of walking barefoot, even when indoors.
- Recommend appropriate footwear and advise against shoes that are too small, tight, or rub against a particular area of the foot.
- Suggest yearly replacement of shoes—more frequently if they exhibit high wear.

Overall health risk management:

- Recommend smoking cessation (if applicable).
- Recommend appropriate glycemic control.

Mapping a Treatment and Follow-up Plan

Priority	Indications	Timeline	Suggested follow-up by specialist
Urgent (active pathology)	Open wound or ulcerative area, with or without signs of infection New neuropathic pain or pain at rest Signs of active Charcot neuroarthropathy (red, hot, swollen midfoot or ankle) Vascular compromise (sudden absence of DP/PT pulses or gangrene)	Immediate referral/consult	As determined by specialist
High (ADA risk category 3)	Presence of diabetes with a previous history of ulcer or lower extremity amputation Chronic venous insufficiency (skin color change, or temperature difference)	Immediate or "next available" outpatient referral	Every 1-2 months
Moderate (ADA risk category 2)	Peripheral artery disease +/- LOPS DP/PT pulses diminished or absent Presence of swelling or edema	Referral within 1-3 weeks (if not already receiving regular care)	Every 2-3 months
Low (ADA risk category 1)	LOPS +/- longstanding, nonchanging deformity Patient requires prescriptive or accommodative footwear	Referral within 1 month	Every 4-6 months
Very low (ADA risk category 0)	No LOPS or peripheral artery disease Patient seeks education regarding: foot care, athletic training,	Referral within 1-3 months	Annually at minimum

eCQM:	**Diabetes: Foot Exam**
CMS ID:	CMS 123v5
Measure Type:	Process
MIPS High Priority Measure:	No
Quality ID:	163
Eligible for Quality Programs:	•Merit-Based Incentive Payment System (MIPS) •Medicaid EHR Incentive Program (Meaningful Use)
Performance Benchmark for MIPS:	76.17%

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•**Numerator**: Patients who received visual, pulse and sensory foot examinations during the measurement period.

•**Denominator**: Patients 18-75 years of age (>=18 and <75) with diabetes with an eligible visit (defined as a signed chart note with one of the following encounter types: *Office Visit*, *Nurse Visit*,*Nursing Home Visit*, or *Home Visit*) during the measurement period.

The percentage of patients 18-75 years of age with diabetes (type 1 and type 2) who received a foot exam (visual inspection and sensory exam with monofilament and a pulse exam) during the measurement year.

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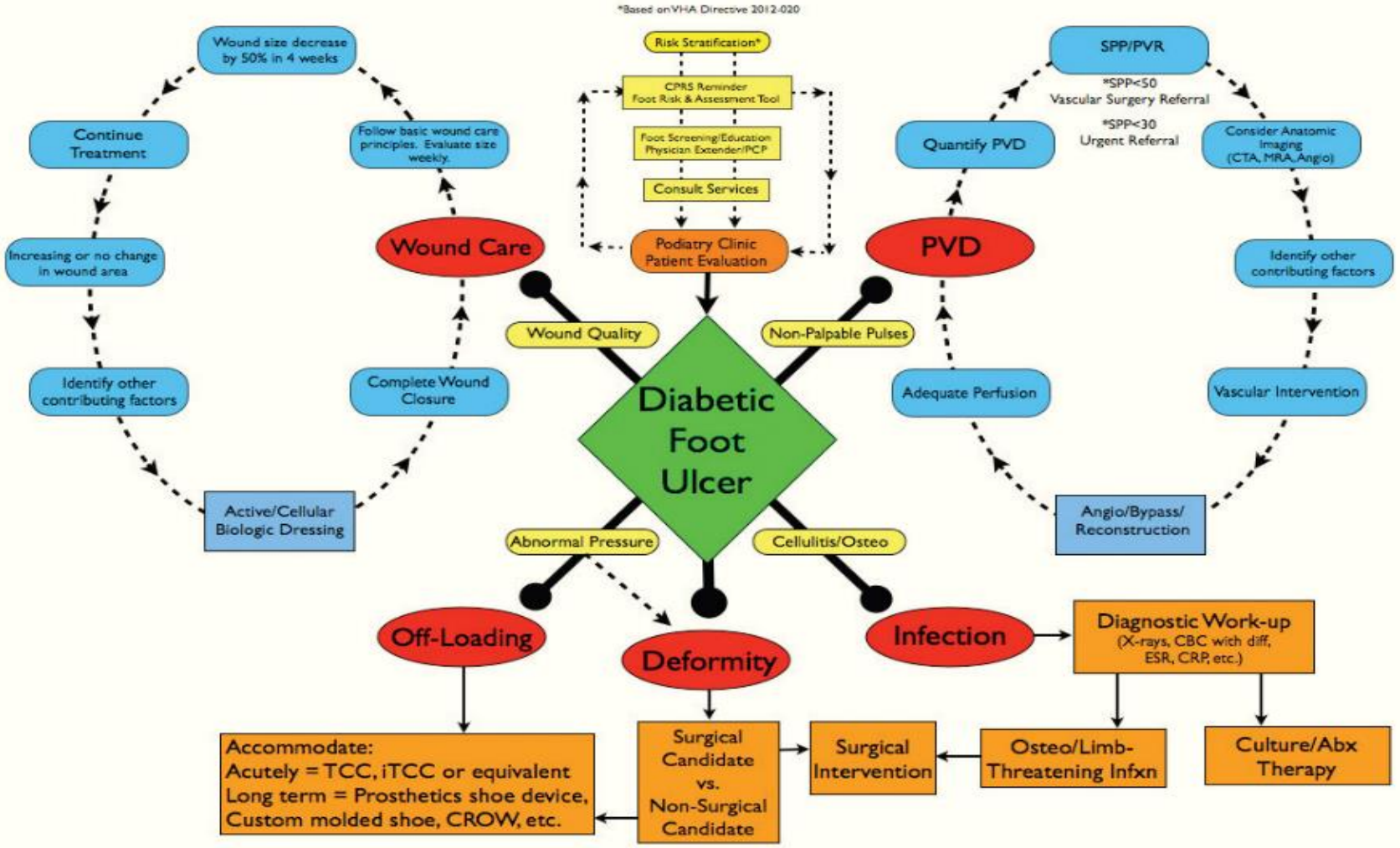
DVA San Francisco Podiatry Protocol for Diabetic Foot Ulcer Management



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Assess foot pulses, monofilament sensation, history of foot ulcer, presence of foot deformity and inability to self-care

LOW RISK

Able to detect at least one pulse per foot

AND

Able to feel 10g monofilament

AND

No foot deformity, physical or visual impairment. No previous ulcer

MODERATE RISK

Unable to detect both pulses in a foot

OR

Unable to feel 10g monofilament

OR

Foot deformity

OR

Unable to see or reach foot

(No history of previous foot ulcer)

HIGH RISK

Previous ulceration or amputation

OR

absent pulses AND unable to feel 10g monofilament

OR

One of above with callus or deformity

Table 3—Risk scores for amputation in patients with an infected diabetic foot ulcer

	Any amputation (points)	Amputation excluding lesser toes (points)
Sex		
Female	0	0
Male	0.5	1
PAD		
No	0	0
PAD	1	1
PAD with ABI <0.5	1.5	2
Pain or tenderness on palpation		
No		0
Yes		0.5
Ulcer size (cm^2)		
<1		0
1–5		0.5
>5		1
Ulcer depth		
Superficial	0	0
Deep without probing to bone	1.5	1
Deep with probing to bone	2	2
Periwound edema		
No	0	
Yes	0.5	

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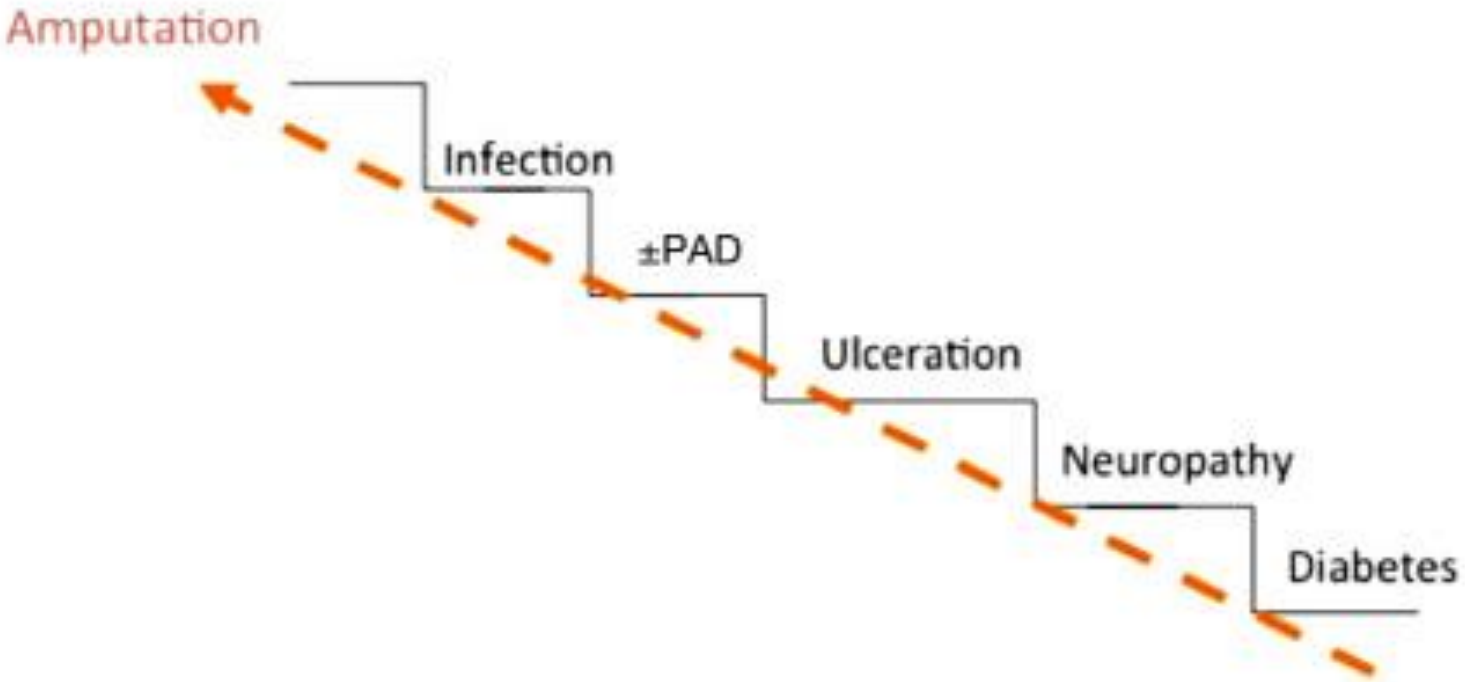
Diabetes is a multi-specialty affair

Diabetic retinopathy is prevalent in patients with DFU and about half of DFU patients had PDR

The presence or absence of ischemia and PAD largely impacts the outcomes in the treatment of DFUs

Peripheral arterial disease in DFUs is associated with the most severe adverse outcomes, including lower probability of healing, longer healing times, higher probability of ulcer recurrence, greater risk of toe as well as major amputations, and potentially higher mortality


Amputation
Infection
±PAD
Ulceration
Neuropathy
Diabetes

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Questions?

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