

Pennsylvania Academy of Family Physicians Foundation

## Pittsburgh CME Conference

November 7 - 9, 2014

### **Best Practices for Care of the Diabetic Foot** *(Patient Safety)*

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& Comprehensive Foot and Ankle Center, Pittsburgh, PA

#### **Disclosures:**

Speaker discloses he receives royalties from Arthrex and is a consultant for Stryker Corporation. No conflict of interest exists.


The speaker has attested that their presentation will be free of all commercial bias toward a specific company and its products.

The speaker indicated that the content of the presentation will not include discussion of unapproved or investigational uses of products or devices.

**“Best Practices for Care of the  
Diabetic Foot”**

Pennsylvania Academy of Family Physicians  
November 8, 2014

Dane K. Wukich MD  
Professor of Orthopaedic Surgery  
University of Pittsburgh School of Medicine  
Director, UPMC Mercy Center for Amputation Prevention



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**Goals**

- Be able to conduct a thorough diabetic foot exam
- Know the risk factors for foot complications
- List four factors for diabetic foot complications
- List three interventions that decreases risk for foot complications



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## Sobering Message

- \$2.3 million settlement for failure to diagnosis Charcot foot
  - Diabetic man alerted his PCP of swollen feet
    - Told he “would have to live with it.”
  - Later, his foot and ankle surgeon diagnosed active Charcot .
  - He did not lose his leg
  - Jury found in favor of the plaintiff but the judged decreased the award to 1.5 million
  - Reported on March 1, 2010
- Much better to recognize Stage 0 Charcot before it progresses!

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Reviews/Commentaries/ADA Statements

**TASK FORCE REPORT**

### Comprehensive Foot Examination and Risk Assessment

A report of the Task Force of the Foot Care Interest Group of the American Diabetes Association, with endorsement by the American Association of Clinical Endocrinologists

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Foot problems is the first step in preventing such complications, this report will focus on key components of the foot exam.

Diabetes Care 2008

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## Risk Factors for Foot Complications

- Peripheral neuropathy
- Foot deformity
- Peripheral artery disease
- Previous foot ulcer
- Trauma
- Diabetic nephropathy
- Visual impairment
- Poor glycemic control



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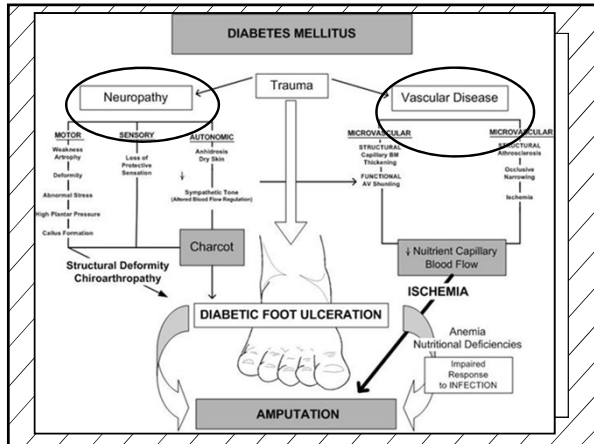
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### Key Points of the History

- Past History
  - Ulceration
  - Amputation
  - Charcot joint
- Pain as a symptom is unreliable in patients with diabetes with neuropathy




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### Key Points of the History

- Neuropathic Symptoms
  - Burning
  - Tingling
  - Numbness
- Vascular Symptoms
  - Claudication
  - Rest pain
  - Nonhealing wounds

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## Inspection

- Always remove shoes and socks
- Assess shoe wear
- Corns or Callus
- Fissures or ulcers
- Fungal infection



- Portals of entry for infection

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## Musculoskeletal Examination

- Deformity leads to pressure points
  - Hammertoes and bunions
  - Charcot arthropathy
  - Contractures of the foot or ankle



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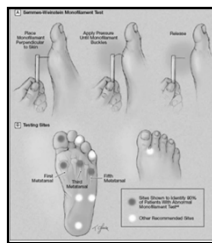
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## Neurological Examination

- Sensation testing
  - Semmes-Weinstein 10 gram monofilament
- Vibration testing
  - 128 Hz tuning fork
- Achilles reflex
- *Abnormalities identify high risk foot*



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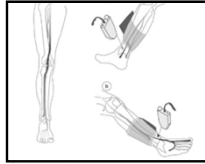
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## Vascular Examination

- Palpation of the dorsalis pedis and posterior tibial pulses
- Assess hair growth
- If abnormal utilize noninvasive testing
  - Ankle Brachial Index
  - Normally 1.0



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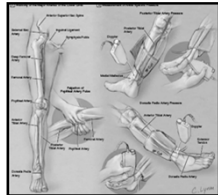
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## Ankle Brachial Index

- Recommended in diabetic patients > 50 years or younger patients with symptoms
  - ADA
  - Society of Vascular Surgery
  - AHA



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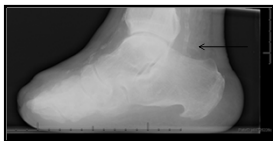
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## Ankle Brachial Index

- Normal range is 0.9 to 1.3
- Index > 1.3 indicative of noncompressible vessels
- Index < 0.9 indicates PAD (highly specific)
- Use great toe pressure for noncompressible vessels



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**Risk Assessment**

- Risk Category 0
  - Normal sensation, normal pulses and no deformity
    - Yearly examination
- Risk Category 1
  - Abnormal sensation but otherwise normal
    - Examination every 3-6 months
    - Consider diabetic shoes with accommodative inserts

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**Risk Assessment**

- Risk Category 3
  - Abnormal sensation and PAD
    - Examination every 3 months
    - Diabetic shoes with accommodative insert
    - Vascular consultation
- Risk Category 4
  - History of amputation and/or diabetic foot ulcer
    - Close follow up
    - Diabetic shoes with accommodative insert

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**Summary of History and Physical**

- Identify breaks in skin integrity
- Identify musculoskeletal deformity
- Identify neuropathy and/or PAD
- Stratify patient risk for diabetic foot disorder
- Prescribe therapeutic footwear if indicated
- Appropriate referral to subspecialist if needed
  - Podiatry
  - Orthopaedic surgery
  - Vascular surgery

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## Therapeutic Footwear

- Insurance provides for one pair of shoes and three pairs of inserts per year
- Patients who are at risk should utilize therapeutic shoes
  - Neuropathy
  - Foot deformity
  - Peripheral artery disease
- Therapeutic footwear
  - Extra depth to accommodate deformity
  - Inserts redistribute plantar pressure

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## What do Diabetic Patients Fear?

- Asked 260 patients with diabetes to rank their fears
  - Major amputation
  - Blindness
  - Death
  - Dialysis
  - Foot infection

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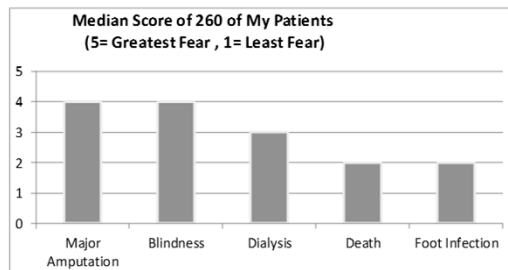
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## What do Diabetic Patients Fear?



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## Diabetic Foot Ulcers

- 15-25% lifetime chance
- 2% incidence per year
- Early referral
  - Offloading with a walking shoe, boot or cast
  - Debridement of callus and wound
  - Moist wound therapy



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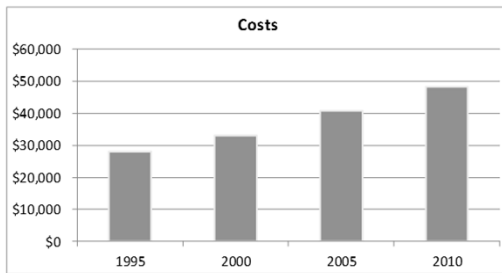
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## Two years costs to treat a DFU



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## Our Metropolitan Area of 2.4 million people

- 8% prevalence of diabetes
- 192,000 patients with diabetes
- 20% prevalence of neuropathy= 38,400 patients



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### Economics of Greater Pittsburgh

- Assume 2% incidence of foot ulcer each year
- 192,000 people with diabetes
  - 3840 diabetic foot ulcers per year
  - 14,000.00 dollars per ulcer episode per year
- Estimated costs approaches 54 million dollars per year based on 1995 dollars




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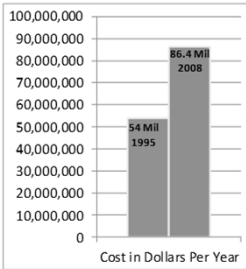
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### Greater Pittsburgh Economics



Year	Cost in Dollars Per Year
1995	54 Mil
2008	86.4 Mil

- Based on 2008 dollars the two year cost has increased to 45,000.00 per ulcer or 22,500.00 per year
- 3840 ulcers per year
- Estimated costs in our metropolitan area amounts to **\$86,400,000.00 / year based on 2008 dollars**

Based on Bureau of Labor Statistics CPI 2008

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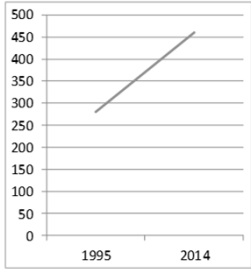
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### Economics of Pennsylvania

#### Cost of DFU/ year in millions !

- 12.8 million people
- 1.024 million patients with diabetes
- 20,480 diabetic foot ulcers per year @ 22,500.00 per ulcer/per year
- 460 million dollars/yr



Year	Cost in Millions
1995	280
2014	460

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### High Risk Zones for DFU

- Increased localized pressure
- Patient unable to feel increased pressure
- Ulcer results

The image contains several diagrams illustrating high-risk zones for Diabetic Foot Ulcers (DFU). On the left, there are two foot diagrams with shaded areas indicating high-pressure zones: the heel, the ball of the foot, and the toes. In the center, there are four smaller diagrams: the top two show side views of a foot with arrows pointing to the heel and ball of the foot; the bottom-left shows a close-up of a toe with an arrow pointing to the tip; the bottom-right shows a top-down view of a foot with arrows pointing to the ball of the foot and the toes. On the right, there are two foot diagrams with shaded areas on the heels and balls of the feet, indicating common ulcer locations.

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### Diabetic Foot Ulcer

- Infection is based on clinical signs
- Presence of pus or
- 2 of 4 signs of inflammation
  - Redness
  - Warmth
  - Swelling
  - Pain/Tenderness

The image shows a photograph of a diabetic foot ulcer on the lateral aspect of a foot. The ulcer is a deep, open wound with a dark, necrotic center and a surrounding area of redness and swelling.

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### 2014 Standard of Care for DFU

The image is a Venn diagram with three overlapping circles. The top-left circle is labeled "Offloading for pressure reduction". The top-right circle is labeled "Sharp weekly debridement to convert to acute wound". The bottom circle is labeled "Moist wound therapy to promote granulation". The intersection of all three circles is a downward-pointing triangle.

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### After treatment of healed ulcer: non-custom commercial shoe

- Comfortable sole
- Soft leather
- High toe box
- Oxford lace-up
- Custom insert to even the pressures



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### Treatment: Custom Foot Orthoses

- Accommodative means that they are molded to the foot and deformity
- Custom fabricated
- Hybrid materials
- Reulceration rates up to 80% if not vigilant



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### Summary of Diabetic Foot Ulcer

- Most patients have underlying neuropathy
- Most ulcers are neuropathic and caused by pressure
  - Ill fitting shoes
  - Increased activity (unusual walking)
- About a third of ulcers are neuroischemic
- Early referral to specialist or wound center for appropriate care

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**The most likely causal factor related to the development of a diabetic foot ulcer is**

- A. Peripheral artery disease
- B. Peripheral neuropathy
- C. Deformity of the foot such as hammertoes
- D. Ill-fitting shoes
- E. All of the above contribute to diabetic foot ulcers

Option	Percentage
A. Peripheral artery disease	21.3%
B. Peripheral neuropathy	21.3%
C. Deformity of the foot such as hammertoes	21.3%
D. Ill-fitting shoes	21.3%
E. All of the above contribute to diabetic foot ulcers	21.3%

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**Risk Factors for Infection in Diabetic Foot Ulcers**

Risk Factor	Odds Ratio
Penetrating to bone	~6.5
Wounds > 30 days	~4.5
Recurrent wounds	~2.5
Traumatic wounds	~2.5
PAD	~2.0

Lavery et al., Diabetes Care 2006

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**Clinical Infectious Diseases 2012**

**IDSA GUIDELINES**

**2012 Infectious Diseases Society of America Clinical Practice Guideline for the Diagnosis and Treatment of Diabetic Foot Infections<sup>a,b</sup>**

Benjamin A. Lipsky,<sup>1</sup> Anthony R. Berendt,<sup>2</sup> Paul B. Cannata,<sup>3</sup> James C. Fife,<sup>4</sup> Edgar J. G. Peters,<sup>5</sup> David G. Armstrong,<sup>6</sup> H. Goner Denny,<sup>7</sup> John M. Embil,<sup>8</sup> Warren S. Joseph,<sup>9</sup> Adolf W. Karchmer,<sup>10</sup> Michael S. Perra,<sup>11</sup> and Eric Senneville<sup>12</sup>

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### Diabetic Foot Infections

- Mild infection
  - < 2 cm of erythema
  - No systemic signs of illness
    - No fevers or chills
    - Normal vital signs
    - No leukocytosis
  - Usually treated with outpatient antibiotics




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### Diabetic Foot Infections

- Moderate infection
  - > 2 cm of erythema
  - No systemic signs of illness
    - No fevers or chills
    - Normal vital signs
    - No leukocytosis
  - May require admission if not responding to oral antibiotics




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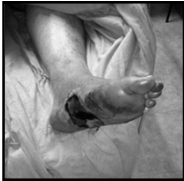
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### Diabetic Foot Infections

- Severe infection
  - Systemic signs of illness
    - Anorexia, nausea, vomiting, chills
    - "The Diabetic Flu"
  - SIRS (2 of the 4)
    - Fever > 38
    - Tachycardia
    - Tachypnea
    - Leukocytosis > 12,000
  - Admission required




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## Diabetic Foot Infections

- Patients may not manifest inflammatory signs
- Limb threatening infection can occur even with
  - No fever
  - No leukocytosis
- Be cautious




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## Diabetes Care 2014

Pathophysiology/Complications  
RESEARCH

### SIRS is Valid in Discriminating Between Severe and Moderate Diabetic Foot Infections

DAVID K. WILKIN, MD<sup>1</sup>  
KORINEE B. HENZEL, MD<sup>2</sup>

KORINEE MAH ROONEY, MD<sup>2</sup>  
BRIAN L. RENAKO, MD<sup>2</sup>

been of our knowledge, the use of SIRS has not yet been validated as a method of discriminating between moderate and severe DFI.

**OBJECTIVE**—This retrospective, single-center study was designed to distinguish severe diabetic foot infections (DFI) from moderate DFI based on the presence or absence of systemic inflammatory response syndrome (SIRS).

The aim of this study was to classify infection severity in a group of hospitalized diabetic patients based on the presence or absence of SIRS. The reason for hospitalization in this group of patients was their DFI. Our hypothesis was that patients with DFI who manifest SIRS (i.e., severe infection) will have longer hospital stays and higher rates of major amputation than patients who don't manifest SIRS (i.e., moderate infection).

**RESEARCH DESIGN AND METHODS**—The database of a single academic foot and ankle program was accessed and 119 patients were identified. Severe DFI was defined as local infection associated with manifestation of two or more objective findings of systemic toxicity using SIRS criteria.

**RESULTS**—Patients with severe DFI experienced a 2.55-fold higher risk of any amputation (DFI CI 1.21–5.30) and a 12.6-fold higher risk of major amputation (1.93–81.0) than patients with moderate DFI. The risk of major amputations was not significantly different between the two groups (odds ratio 1.02, 95% CI 0.51–2.03). The odds of having a severe DFI was 7.62 times higher in patients who presented with gangrene (2.03–44.8) and five times higher in patients who reported symptoms of abscess, cellulitis, necrosis, or ulcers (2.22–11.24). The mean hospital length of stay for patients with severe DFI was ~4 days longer than for patients with moderate DFI, and this difference was statistically significant.

**RESEARCH DESIGN AND METHODS**—After approval by our local institutional review board, the database of a single academic foot and ankle program was reviewed for patients hospitalized with a DFI from 2006 to 2012. Inclusion and exclusion criteria are as follows:

**CONCLUSIONS**—SIRS is valid in discriminating severe from moderate DFI in hospitalized patients. Patients with severe DFI, as by manifesting two or more signs of systemic inflammation (toxicity), had higher rates of major amputation and longer hospital stays and required more surgery and more subsequent admissions than patients who did not manifest SIRS.

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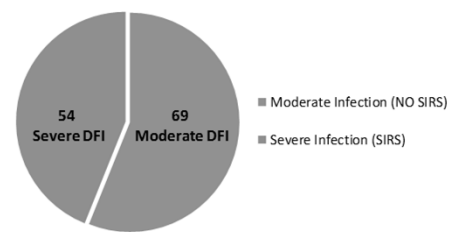
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## 119 Hospitalized Infections

Number of Diabetic Foot Infections




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## Admission

	Moderate DFI	Severe DFI	
ESR	71	107	P<0.0001
CRP	9.3	19.4	P<0.0001
WBC	9,400	15,600	P<0.0001
Albumin	2.9	2.4	P<0.0001
Prealbumin	15	10	P<0.001
Serum Glucose	256	315	P=0.02
A1C	9.0%	8.6%	P=0.33
Symptoms of nausea, vomiting, anorexia or chills "Diabetic Flu"	20%	56%	P<0.0001

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## Severe DFI can be Misleading

Presentation	No	Yes
WBC >12,000	15% did not	85%
T > 38	44% did not	56%
RR > 20	70% did not	30%
HR >90	20% did not	80%

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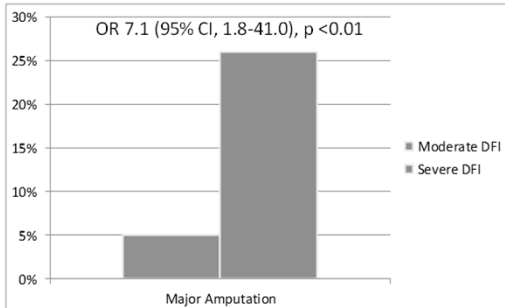
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## Risk of Major Amputation




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### Risk Factors for Major Amputation

- Younger age
- Neuropathy score
- Charcot
- Higher ESR
- Lower Albumin
- N/V and anorexia
- Discharge WBC
- T > 38
- On multivariate analysis lower serum albumin predicted major amputation

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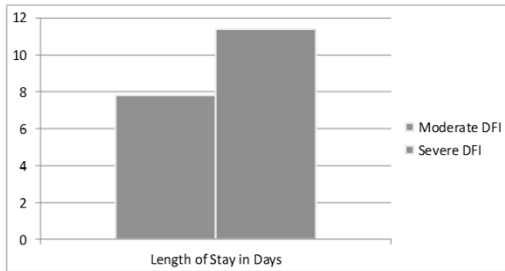
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### Mean Length of Stay is Nearly 4 Days Longer




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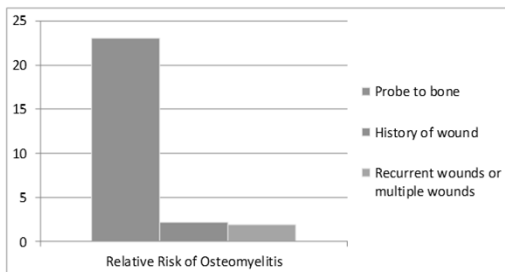
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### Risk Factors for Osteomyelitis



Lavery et al. Diabetes Research Clinical Practice 2008

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## Summary of DFI

- Diabetic patients may not manifest normal signs of inflammatory response
- Beware of the “Diabetic Flu”
- Remember that 5% of patients with moderate infections and 20% of severe infections ultimately require below knee amputation
- One of the earliest signs of infection may be unexplained hyperglycemia
- Virtually all infections (99%) are associated with a wound

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## Scenario

A 48 year old female with poorly controlled Type 1 diabetes presents to your office with nausea, vomiting and anorexia of two days duration. She admits to feeling warm with chills and says “her sugars have been really high”. Random glucose in your office is 350 mg/dL. Upon removal of her left shoe and sock you discover extensive erythema and swelling involving the entire foot, although the foot is warm. A wound is present on the plantar aspect of the foot that is associated with foul swelling drainage. You send her to the ER and they report back that she has a fever of 38.5, a WBC of 14,000, a heart rate of 100 and a respiratory rate of 22.

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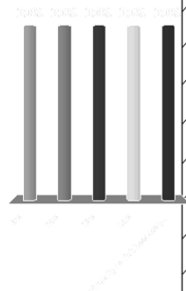
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## The risk of major transtibial amputation in this patient is:

- A. 5%
- B. 10%
- C. 15%
- D. 20%
- E. Virtually no risk because you detected this infection early and IV antibiotics should control the infection.



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## Charcot Neuroarthropathy

- Non-infectious destruction of bone
- Associated with neuropathy
- Described by Charcot 1868
  - patients with Syphilis
  - their spinal cord was involved
  - causing sensory loss
- Today the most common cause is diabetic neuropathy



Jean Martin Charcot  
(1825-1893)  
Drawing of Dr. Harold Sherrill

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## Locomotor Ataxia (Tabes Dorsalis)

“Sensation to touch, pressure and temperature in the lower extremities is decreased but not abolished and when the patient has her eyes closed, it is impossible for her to indicate the position in which her limbs are moved. She is completely unaware of their position in bed...”

J-M Charcot



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## Salpetriere, Paris



- Originally it was a gunpowder factory (saltpeter) then became a hospital for mentally ill patients and a prison for prostitutes
- During French revolution it housed 10,000 patients

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## Salpetriere

- Same institution where Lady Diana died in 1997



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## Stages of Charcot Neuroarthropathy

- Stage 0: normal Xrays
- Stage 1: fractures /dislocations
- Stage 2: healing
- Stage 3 consolidated



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## Charcot Neuroarthropathy

- Do ***Not*** miss this diagnosis !!!
- Must have high suspicion
  - Swelling
  - No wounds
  - No fevers
  - No systemic signs
  - May have minor trauma
    - Ankle sprain
    - Contusion

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**Charcot neuroarthropathy**

- Natural course of inflammation
- Response to injury
- Normal patients self treat with rest and decreased activity
- Neuropathic patients continue to walk because do not have the protective pain
- Ongoing injury and inflammation

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- CC “right ankle pain and swelling”
- HPI: 30 y/o male presented with ankle swelling and pain for for a few weeks. This began after missing one step on a small stool at work. He noted the onset of swelling and pain and this prompted him to seek medical attention in his local ER
- Type I Diabetes for 24 years
- Hypertension
- Worked full time as a laborer climbing stairs till this episode

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**Initial Xrays from ER visit**



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## Treatment

- Radiographs reviewed in the ER and were “normal”
- No immobilization or crutches
- Treated and released and advised to have follow up with a local orthopaedic surgeon
- Orthopaedic surgeon recommended a removable boot and weight bearing as tolerated
- Continued with pain and swelling

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## MRI demonstrates bone edema



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## Initial visit with UPMC Foot and Ankle Center

- CC “right ankle pain and swelling”
- HPI: 30 y/o male presents to clinic c/o ankle swelling and pain for 4 months.
- Dull pain with ambulation that is worsening, uncontrolled with pain medications such a propoxyphene
- Rated his pain as 7 out 10
- Complained of numbness and tingling in the foot

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### Physical examination

- General: 5'7 inches, Weight 165
- Pulses palpable but with edema right foot
- Neurological:
  - Absent SWMF, Achilles DTR and vibration
- Musculoskeletal
  - Soft tissue swelling
  - Decreased range of motion
- Skin
  - Warmth but no open ulcerations or lesions

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### Clinical Appearance

- Soft tissue swelling persists 4 months after injury



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### Xrays at 4 Months Collapse of Talus



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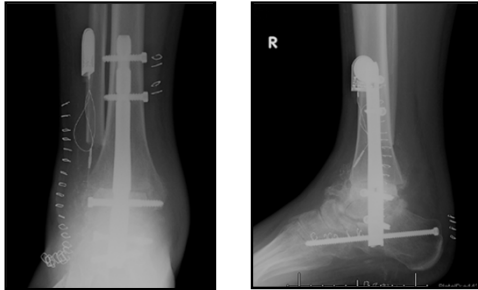
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## Patient Required Major Surgery



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## Unrecognized Charcot Feet

- 20 patients
  - Diagnosed retrospectively with stage 0 Charcot
  - 19 of the 20 patients were misdiagnosed (cellulitis, gout, DVT, osteomyelitis)
  - Other studies show that Charcot is missed 25-79%
- A delay in diagnosis was associated with a progression of Charcot and an increase in complications
  - Diagnosed within 4 weeks → low rate complications
  - Undiagnosed after 8 weeks → increased risk of complications

68 Wukitch DK, Sung W, Wipf SA, Armstrong DG. The Consequences of Complacency: Managing the Effects of Unrecognized Charcot Feet. *Diabet Med* 2011; 28(2):195-6

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## The Perils of Procrastination

- 24 patients
  - 19 of the 24 patients were misdiagnosed
  - Prior to referral all patients had a "normal" x-ray
  - 11 patients were treated with offloading and total contact casting before changes on x-ray, only 1 developed a gross foot deformity
- Early detection with offloading prevents pathological fractures → prevents irreversible foot deformity

Chantelau E. The Perils of Procrastination: Effects of Early vs. Delayed Detection and Treatment of Incipient Charcot Fracture. *Diabet Med* 2005; 22(12): 1707-12

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Charcot Stage	Phase	Description
0	Inflammatory	Inflammation Normal Radiographs Abnormal MRI or Bone Scan
1	Development	Inflammation Radiographic Changes
2	Coalescence	Decreasing inflammation Ongoing healing and consolidation
3	Remodeling	Marked decrease in inflammation. New bone and remodeling Residual deformity

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**Summary of Charcot Neuroarthropathy**

- ***Do not miss Stage 0***
- Beware of patients with swelling, warmth and minor trauma
- No signs of systemic inflammation
- If a wound is not present it is not infected!
- Cellulitis, Gout, DVT are often misdiagnosed
- Normal xray can be very misleading
- Prompt referral to specialist
- Crutches, Walking boot or even wheelchair
- MRI is diagnostic

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**Scenario**

A 60 year old male patient with diabetes presents to your office with a one week history of a “swollen” right foot. The patient cannot get his shoe on the foot. No history of trauma is present although the patient mowed his lawn for two hours on the day before the swelling started. His fasting morning glucose was 125 mg/dL and he feels well. He has no subjective pain. His examination does not demonstrate any open wounds. The foot is erythematous, edematous and warm. No tenderness is present in the foot, ankle or leg. The dorsalis pedis pulse and posterior tibial pulses are normal on his left contralateral foot, but not palpable due to swelling. He is unable to feel light touch and his vibration testing with a tuning fork is absent. Both Achilles reflexes are absent. Laboratory testing reveals a normal WBC, normal ESR and a normal CRP. Uric acid level is normal. Nonweightbearing X-rays show soft tissue swelling but are otherwise interpreted as “within normal limits”. The recommendation for treatment at this time is:

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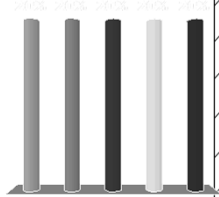
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### The recommendation for treatment at this time is:

- A. Reassurance that nothing serious is wrong because of the x-ray findings and normal labs.
- B. Emergency vascular surgery consult because you cannot feel the pulses.
- C. Admission to the hospital for IV antibiotics for cellulitis.
- D. Doppler study to rule out DVT
- E. Recommend off-loading of the foot with crutches or a wheelchair and prompt referral to a foot and ankle specialist for Stage 0 Charcot neuropathy.




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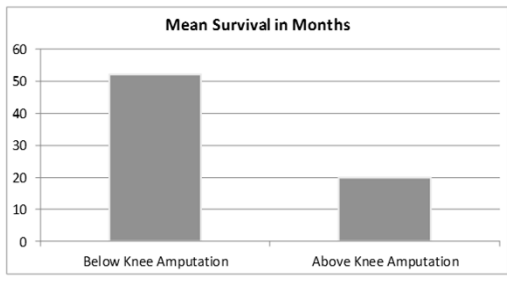
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### Why are amputations so bad?



Anesthesia and Analgesia 2005 (BI Deaconess)

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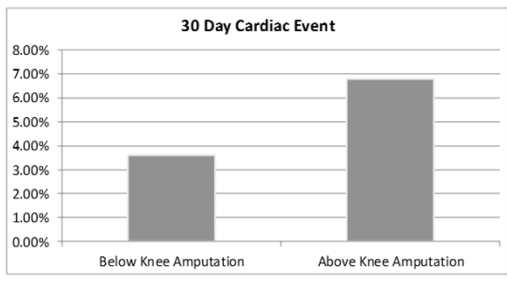
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### 30 Day Perioperative Cardiac Event



Anesthesia and Analgesia 2005 (BI Deaconess)

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### Is the Amputation Truly the Culprit?

- 5 yr mortality of diabetic patients undergoing amputation: 47%
- 5 yr mortality of patients whose diabetic foot ulcers healed: 44%
- *Moulik et al. Diabetes Care 2003*

Category	5 Year mortality (%)
Healed DFU	44%
Amputation	47%

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### Perhaps it is the patient!

Category	5 Year Survival (%)
PAD	60%
DFU	55%
Charcot	50%
Amputation	50%

*Moulik et al. Diabetes Care 2003    Gazis et al. Diab Med 2004*

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### Summary

- Brief but thorough history and physical examination
- Refer patients with diabetic foot ulcers early
- Recognize risk factors and signs of infection
- Aggressive management of DFI can save limbs
- Recognize signs and symptoms of early Charcot neuroarthropathy
- Patients with diabetic foot problems such as ulcers, infections and Charcot are sick and these problems are surrogate markers of mortality
  - Neuropathy, PAD and renal disease

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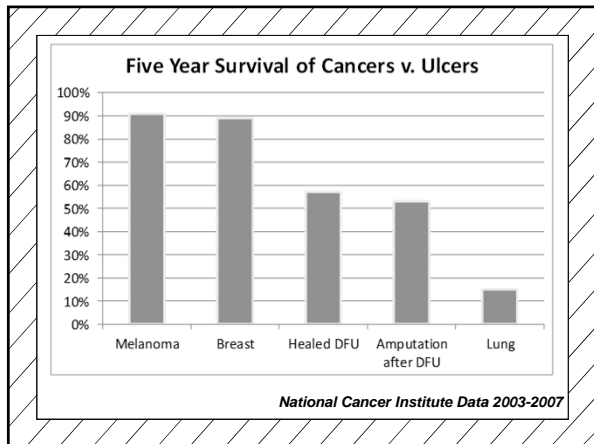
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An 82 year old female is admitted to the hospital with heart failure. She has Type 2 diabetes which is well controlled with Metformin and diet. She is responding well to diuresis and oxygen therapy. Since she is responding well to treatment and does not require insulin, she is at low risk for the development of decubitus heel ulcers and protection with foam boots is unnecessary.

A. True  
B. False

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**True or False.**

An 82 year old female is admitted to the hospital with heart failure. She has Type 2 diabetes which is well controlled with Metformin and diet. She is responding well to diuresis and oxygen therapy. Since she is responding well to treatment and does not require insulin, she is at high risk for the development of decubitus heel ulcers and protection with foam boots is unnecessary.

*Provide heel protection for decubitus heel ulcer.  
Considered a preventable complication*

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### Winston Churchill

- “A pessimist sees the difficulty in every opportunity while an optimist sees the opportunity in every difficulty.”



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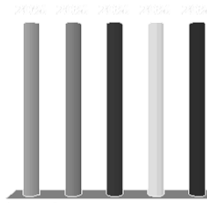
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The most likely causal factor related to the development of a diabetic foot ulcer is

- A. Peripheral artery disease
- B. Peripheral neuropathy
- C. Deformity of the foot such as hammertoes
- D. Ill-fitting shoes
- E. All of the above contribute to diabetic foot ulcers



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### Scenario

A 48 year old female with poorly controlled Type 1 diabetes presents to your office with nausea, vomiting and anorexia of two days duration. She admits to feeling warm with chills and says “her sugars have been really high”. Random glucose in your office is 350 mg/dL. Upon removal of her left shoe and sock you discover extensive erythema and swelling involving the entire foot, although the foot is warm. A wound is present on the plantar aspect of the foot that is associated with foul smelling drainage. You send her to the ER and they report back that she has a fever of 38.5, a WBC of 14,000, a heart rate of 100 and a respiratory rate of 22.

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**The risk of major transtibial amputation in this patient is:**

A. 5%  
 B. 10%  
 C. 15%  
 D. 20%  
 E. Virtually no risk because you detected this infection early and IV antibiotics should control the infection.

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**Scenario**

A 60 year old male patient with diabetes presents to your office with a one week history of a “swollen” right foot. The patient cannot get his shoe on the foot. No history of trauma is present although the patient mowed his lawn for two hours on the day before the swelling started. His fasting morning glucose was 125 mg/dL and he feels well. He has no subjective pain. His examination does not demonstrate any open wounds. The foot is erythematous, edematous and warm. No tenderness is present in the foot, ankle or leg. The dorsalis pedis pulse and posterior tibial pulses are normal on his left contralateral foot, but not palpable due to swelling. He is unable to feel light touch and his vibration testing with a tuning fork is absent. Both Achilles reflexes are absent. Laboratory testing reveals a normal WBC, normal ESR and a normal CRP. Uric acid level is normal. Nonweightbearing X-rays show soft tissue swelling but are otherwise interpreted as “within normal limits”. The recommendation for treatment at this time is:

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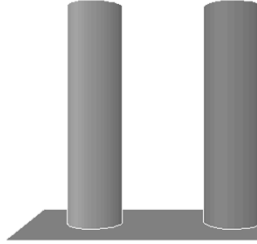
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- A. True
- B. False



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**PITTSBURGH**



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