

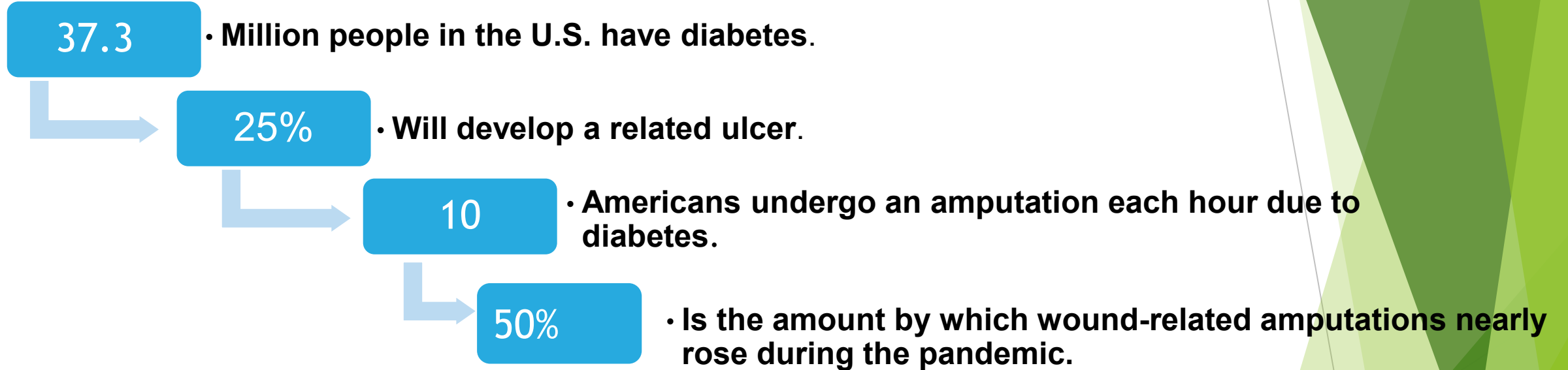
# Wound Care Essentials

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09/13/2023

# Did You Know?

Acute and chronic wounds have a \$96.8 Billion annual impact on the U.S. health system



## Amputation risk

Is reduced by 50% when care is provided by a multi-specialty wound care team.

## ***What is a wound center?***

Team of dedicated medical professionals whose focus is to provide cutting edge wound care including hyperbaric medicine.

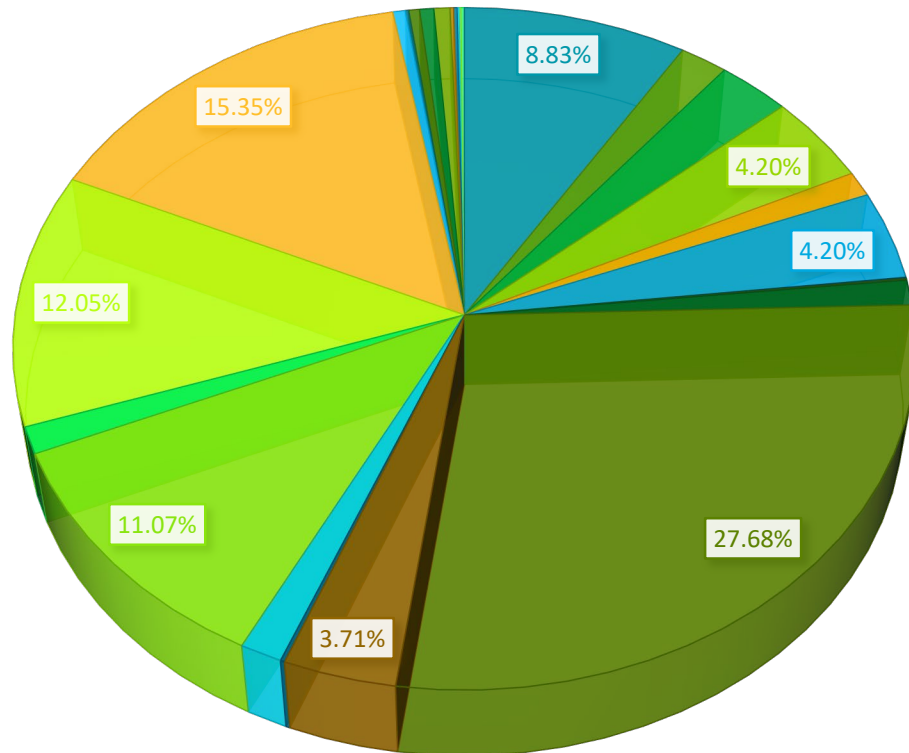
## ***Why?***

Improve the lives of patients and community through education, collaboration, skill, compassion, and evidenced based care.

## ***Why Might I Care as a PCP?***

Collaborating as a multi-disciplinary team to utilize evidence based clinical practices, optimize advanced treatment modalities and ensure our mutual patients have access to an exceptional continuum of care.

## NON-WOUND AND WOUND ETIOLOGIES FY22



- Open Surgical Wound
- Diabetic Wound/Ulcer of the Lower Extremity
- Lymphedema
- Pressure Ulcer
- Trauma, Other
- Venous Leg Ulcer
- Arterial Insufficiency Ulcer
- Bacterial Osteomyelitis

# Clinical Practice Guidelines

Perfusion

Edema

Infection & Inflammation

Debridement

Optimize Wound Bed

Tissue growth

Offloading

Pain Control

Optimize Host Factors

# Perfusion

- ▶ Pulse exam
- ▶ Vascular history
- ▶ ABI/TBI
- ▶ Skin Perfusion Pressure (SPP)
- ▶ Transcutaneous Oxygen Study (tcpO<sub>2</sub>) with hyperbaric oxygen (HBO)

# Edema

- ▶ Define Etiology
- ▶ If ABI > 0.8= compression
- ▶ ABI 0.7-0.8= reduced compression
- ▶ ABI <0.7= Clinical Judgment

(Mackenzie, 2023)



# Infection & Inflammation

- ▶ Coexisting systemic disease?
  - a.) Punch biopsy
  - b.) Labs
- ▶ Immune compromise?
  - a.) Consider infection
    - \* culture
- ▶ Rule out abscess
- ▶ Rule out osteomyelitis
  - a.) Infectious Disease consult







# Debridement

- ▶ What are indications for debridement?
- ▶ What are contraindications for debridement?
- ▶ Assess perfusion & infection before debriding
- ▶ Assess ability to heal prior to debriding
- ▶ Make sure your patient has the right tools

- ▶ Excisional debridement is the strongest predictor of healing within Clinical Practice Guidelines specification based on wound etiology.

Procedure	Benefits	Detractions	Time Frame	Types of Wounds
Sharp or surgical	Rapid, highly selective, may be used on all types of wounds	Requires skilled training; is painful, typically requires local or general anesthesia; possibility of removing viable tissue	Immediate	Useful for all types of wounds
Mechanical	Easy to perform, faster than autolytic debridement	Slow and may be painful	Days to weeks	Exudating and necrotic wounds
Enzymatic	Easy to perform, selective based on product, may be used in combination	Slow to moderate; surrounding tissue irritation; allergic reactions	Days to weeks	Exudating and necrotic wounds
Autolytic	Easy, readily available, minimal pain	Slow; requires compliance	Weeks to months	Well perfused wounds with minimal necrosis

# Sharp/Surgical Debridement

- ▶ Selective Sharp
- ▶ Non-selective
- ▶ Surgical Debridement
- ▶ Advantages of surgical debridement



(Anvar, 2019)



# Mechanical Debridement

- ▶ Wet to Dry
- ▶ Dakin's



# Enzymatic Debridement

- ▶ Santyl (Collagenase)
- ▶ Only one on the market currently
- ▶ Expensive
- ▶ Daily



# Autolytic Debridement

- ▶ What is Autolysis?
- ▶ How does it work?
- ▶ What products can I use?
- ▶ Iodosorb, Hydrogel, Hydrocolloid, Medihoney gels, Tegaderm, alginates
- ▶ When would I use this?
- ▶ Contraindications



# Optimize Wound Bed

- ▶ Moisture balance
- ▶ Protect periwound while managing moisture
- ▶ Maceration
- ▶ Dry and desiccated



Maceration



Desiccated



# Tissue Growth



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Wound stalled?

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Inadequate epithelialization?

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Deep tissue or dermis inadequate?

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Consider advanced modalities

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What are advanced modalities?

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\* Negative Pressure Wound Therapy (NPWT) aka Wound Vac

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\* Hyperbaric Oxygen Therapy (HBOT)

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\* Bioengineered Tissue

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\* Growth Factors

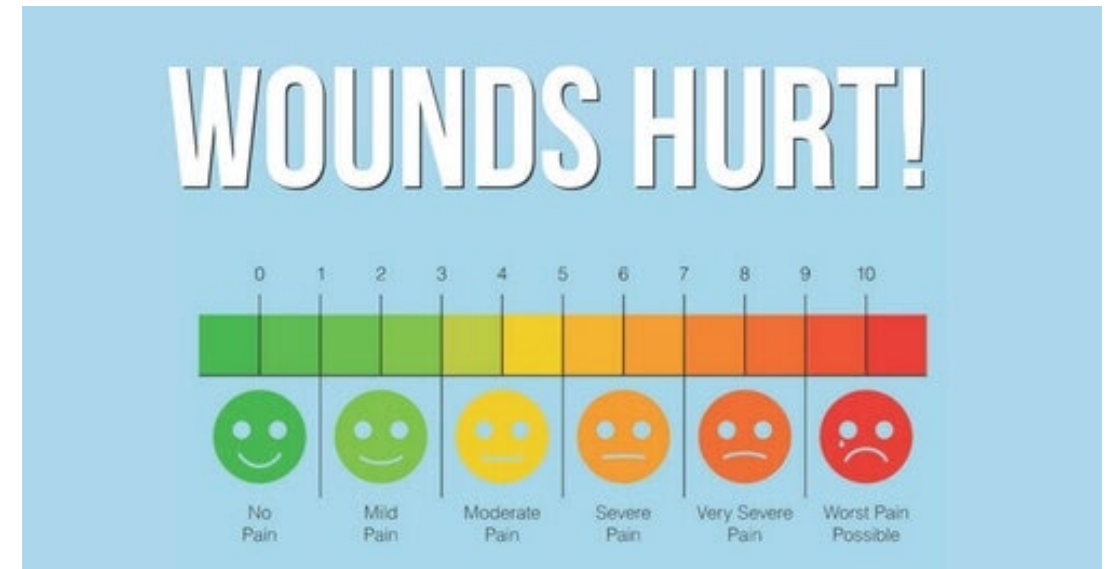
# Offloading

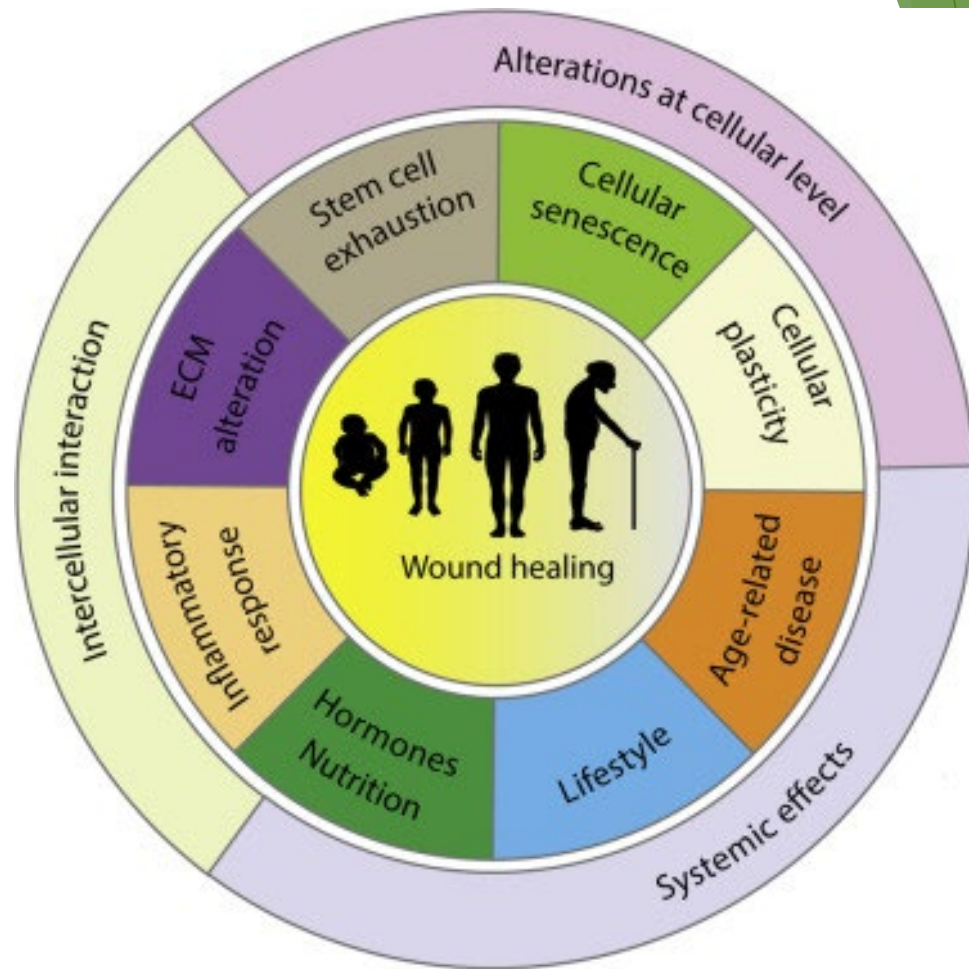
- ▶ Offloading and Pressure Relief
- ▶ Pressure ulcers
  - a. NO DONUTS
  - b. Pressure redistribution and pressure relief
  - c. Foam, Gel
  - d. Low Air Loss bed
  - e. Alternating Pressure
- ▶ Diabetic Foot ulcers



# Pain Control

- ▶ Assess at every visit
- ▶ Episodic vs. Persistent
- ▶ Neuropathic vx. Nociceptive
- ▶ Pain scale





# Optimize Host Factors

- ▶ Sick Patients!
- ▶ Documentation
- ▶ Good Assessment Skills
  - \*nutrition, DM, renal, mobility, psychosocial

# PRESSURE INJURY AND STAGES

A pressure injury is localized damage to the skin and underlying soft tissue usually over a bony prominence or related to a medical or other device. The injury can present as intact skin or an open ulcer and may be painful. The injury occurs as a result of intense pressure, prolonged pressure or pressure in combination with shear. The tolerance of soft tissue for pressure and shear may also be affected by microclimate, nutrition, perfusion, co-morbidities and condition of the soft tissue.

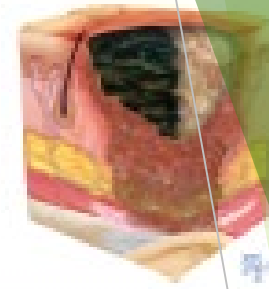


## STAGE 1 PRESSURE INJURY

**Non-blanchable erythema of intact skin**  
 Non-blanchable erythema of intact skin in which the extent of tissue damage and tissue loss in which the extent of tissue damage cannot be confirmed because it is obscured by slough or eschar. If slough or eschar is removed, a Stage 4 pressure injury will be revealed. Stable eschar (intact, intact without erythema or fluctuance) on an ankle or the heel(s) should not be softened or removed.

### SCHEMATIC DRAWING

### EXAMPLE



### DEFINITION

### SCHEMATIC DRAWING

### EXAMPLE

#### STAGE 1 PRESSURE INJURY

##### Non-blanchable erythema of intact skin

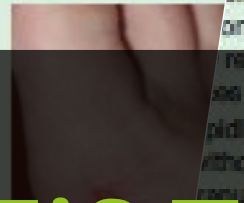
Intact skin with a localized area of non-blanchable erythema, which may appear differently in darkly pigmented skin. Presence of non-blanchable erythema or changes in sensation, temperature, or firmness may precede visual changes. Color changes do not include purple or maroon discoloration; these may indicate deep tissue pressure injury.



#### STAGE 2 PRESSURE INJURY

##### Partial-thickness skin loss with exposed dermis

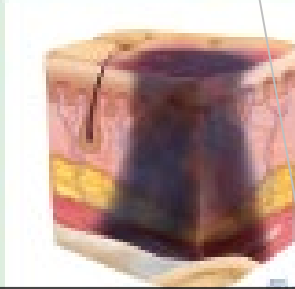
Partial-thickness loss of skin with exposed dermis. The wound bed is viable, pink or red, moist, and may also present as an intact or ruptured serum-filled blister. Adipose (fat) is not visible and deeper tissues are not visible. Granulation tissue, slough and eschar are not present. These injuries commonly result from adverse microclimate and shear in the skin over the pelvis and shear in the heel. This stage should not be used to describe moisture associated skin damage (MASD) including incontinence associated dermatitis (IAD), intertriginous dermatitis (ITD), medical adhesive related skin injury (MARS), or traumatic wounds (skin tears, burns, abrasions).



#### STAGE 3 PRESSURE INJURY

##### Full-thickness skin loss with visible subcutaneous fat

Full-thickness skin loss with localized area of persistent non-blanchable deep red, maroon, purple discoloration or epidermal slough or eschar revealing a dark wound bed or blood filled blister. Temperature change often precedes skin color changes. Discoloration may appear differently in darkly pigmented skin.

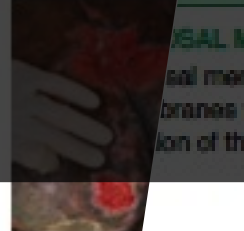


Results from intense and/or prolonged pressure and shear forces at the bone-muscle interface. The wound may rapidly reveal the actual extent of tissue injury, or may be obscured by slough or eschar. If necrotic tissue, subcutaneous granulation tissue, fascia, muscle or other underlying tissue is visible, this indicates a full-thickness pressure injury at least a Stage 3. Do not stage DTPIs on a patient with traumatic, neuropathic, or dermatologic conditions.

#### STAGE 3 PRESSURE INJURY

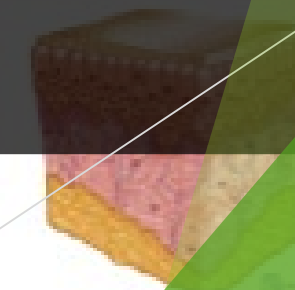
##### Full-thickness skin loss

Full-thickness loss of skin, in which adipose (fat) is visible in the ulcer and granulation tissue and epibole (rolled wound edges) are often present. Slough and/or eschar may be visible. The depth of tissue damage varies by anatomical location; areas of significant adiposity can develop deep wounds. Undermining and tunneling may occur. Fascia, muscle, tendon, ligament, cartilage or bone are not exposed. If slough or eschar obscures the extent of tissue loss this is an Unstageable Pressure Injury.



#### UNSTAGEABLE MEMBRANE PRESSURE INJURY

Unstageable membrane pressure injury is found on mucous membranes with a history of a medical device in use at the location of the injury. These ulcers cannot be staged.



#### STAGE 4 PRESSURE INJURY

##### Full-thickness loss of skin and tissue

Full-thickness skin and tissue loss with exposed or directly palpable fascia, muscle, tendon, ligament, cartilage or bone in the ulcer. Slough and/or eschar may be visible. Epibole (rolled wound edges) and undermining and/or tunneling often occur. Depth varies by anatomical location.



# LET'S TALK PRESSURE!



# Pressure ulcers

Stage 1



Stage 1



# Pressure Injuries

Stage 2



Stage 2





# Tricky ones....

What am I?



What am I?



# Pressure Injury

Stage 3



Stage 3



# Pressure Injury

► What Am I?



► What Am I?



# Pressure Injury

## ► Stage 4





# Pressure Ulcers

Unstageable



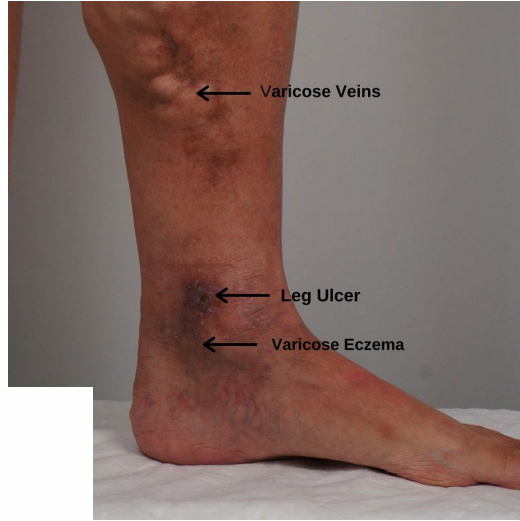
Deep Tissue Injury





What can I do?

- ▶ 1.) OFFLOAD OFFLOAD OFFLOAD.



# Lower Extremity Ulcerations



# Compression Therapy



# ABPI (Ankle-Brachial Pressure Index)

		brachial systolic pressure (mmHg)												
		100	110	120	130	140	150	160	170	180	190	200		
ankle systolic pressure (mmHg)	20	0.20	0.18	0.17	0.15	0.14	0.13	0.13	0.12	0.11	0.11	0.10	very severe ischemia	
	30	0.30	0.27	0.25	0.23	0.21	0.20	0.19	0.18	0.17	0.16	0.15		
	40	0.40	0.36	0.33	0.31	0.29	0.27	0.25	0.24	0.22	0.21	0.20		
	50	0.50	0.45	0.42	0.38	0.36	0.33	0.31	0.29	0.28	0.26	0.25	severe ischemia	
	60	0.60	0.55	0.50	0.46	0.43	0.40	0.38	0.35	0.33	0.32	0.30		
	70	0.70	0.64	0.58	0.54	0.50	0.47	0.45	0.41	0.39	0.37	0.35	moderate ischemia	
	80	0.80	0.73	0.67	0.62	0.57	0.53	0.50	0.47	0.44	0.42	0.40		
	90	0.90	0.82	0.75	0.69	0.64	0.60	0.56	0.53	0.50	0.47	0.45	mild ischemia	
	100	1.00	0.91	0.83	0.77	0.71	0.67	0.63	0.59	0.56	0.53	0.50		
	110	1.10	1.00	0.92	0.85	0.79	0.73	0.69	0.65	0.61	0.58	0.55	normal	
	120	1.20	1.09	1.00	0.92	0.86	0.80	0.75	0.71	0.67	0.63	0.60		
130	1.30	1.18	1.08	1.00	0.93	0.87	0.81	0.76	0.72	0.68	0.65			
140	1.40	1.27	1.17	1.08	1.00	0.93	0.88	0.82	0.78	0.74	0.70			
150	1.50	1.36	1.25	1.15	1.07	1.00	0.94	0.88	0.83	0.79	0.75			
160	1.60	1.45	1.33	1.23	1.14	1.07	1.00	0.94	0.89	0.84	0.80			
170	1.70	1.55	1.42	1.31	1.21	1.13	1.06	1.00	0.94	0.89	0.85			
180	1.80	1.64	1.50	1.38	1.29	1.20	1.13	1.06	1.00	0.95	0.90			
190	1.90	1.73	1.58	1.46	1.36	1.27	1.19	1.12	1.06	1.00	0.95			
200	2.00	1.82	1.67	1.54	1.43	1.33	1.25	1.18	1.11	1.05	1.00			

Use this table as a guide to interpret ABPI values in relation to compression.

  ABPI < 0.5: Very severe and severe ischaemia

  Compression should not be used

  ABPI 0.5– 0.8: Moderate and mild ischaemia

  3M™ Coban™ 2 Layer Lite Compression System

  ABPI ≥ 0.8: Normal

  3M™ Coban™ 2 Layer Lite Compression System

  3M™ Coban™ 2 Layer Compression System

Please refer to your facility's guidelines or policies.

Position Statement on the Use of the Ankle Brachial Index in the Evaluation of Patients with Peripheral Vascular Disease. A Consensus Statement Developed by the Standards Division of the Society of Interventional Radiology.

ABIs as high as 1.10 are normal; abnormal values are those less than 1.0. The majority of patients with claudication have ABIs ranging from 0.3 to 0.9. Rest pain or severe occlusive disease typically occurs with an ABI lower than 0.50. Indexes lower than 0.20 are associated with ischaemic or gangrenous extremities.

Sacks D, MD et al; J Vasc Interv Radiol 2003;

Bombas

Walgreens



FIGS

Sockwell

Jobst

Medline

Juzo

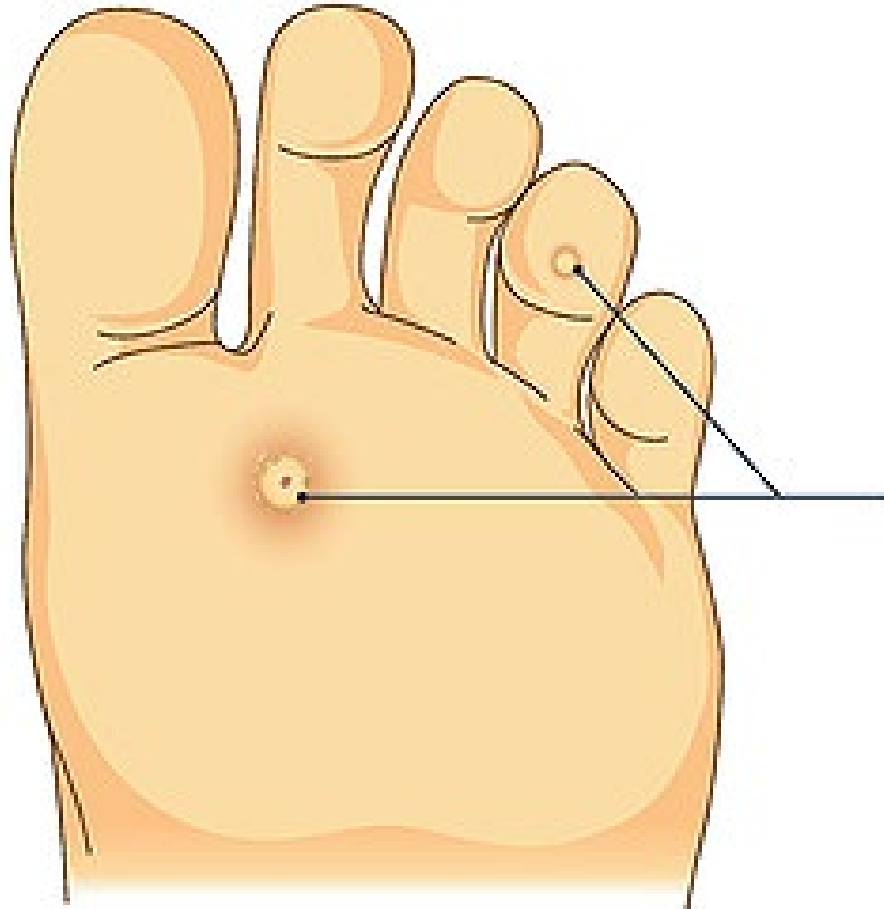
Sigvaris

Medi USA

Amazon

# Compression Therapy





# Diabetic Foot Ulcers By the Numbers

Wound Healing  
Awareness Month



#WHAM



Every **30 seconds**, a patient with diabetes requires an amputation



**70%** of all amputations are caused by Diabetic Foot Ulcers

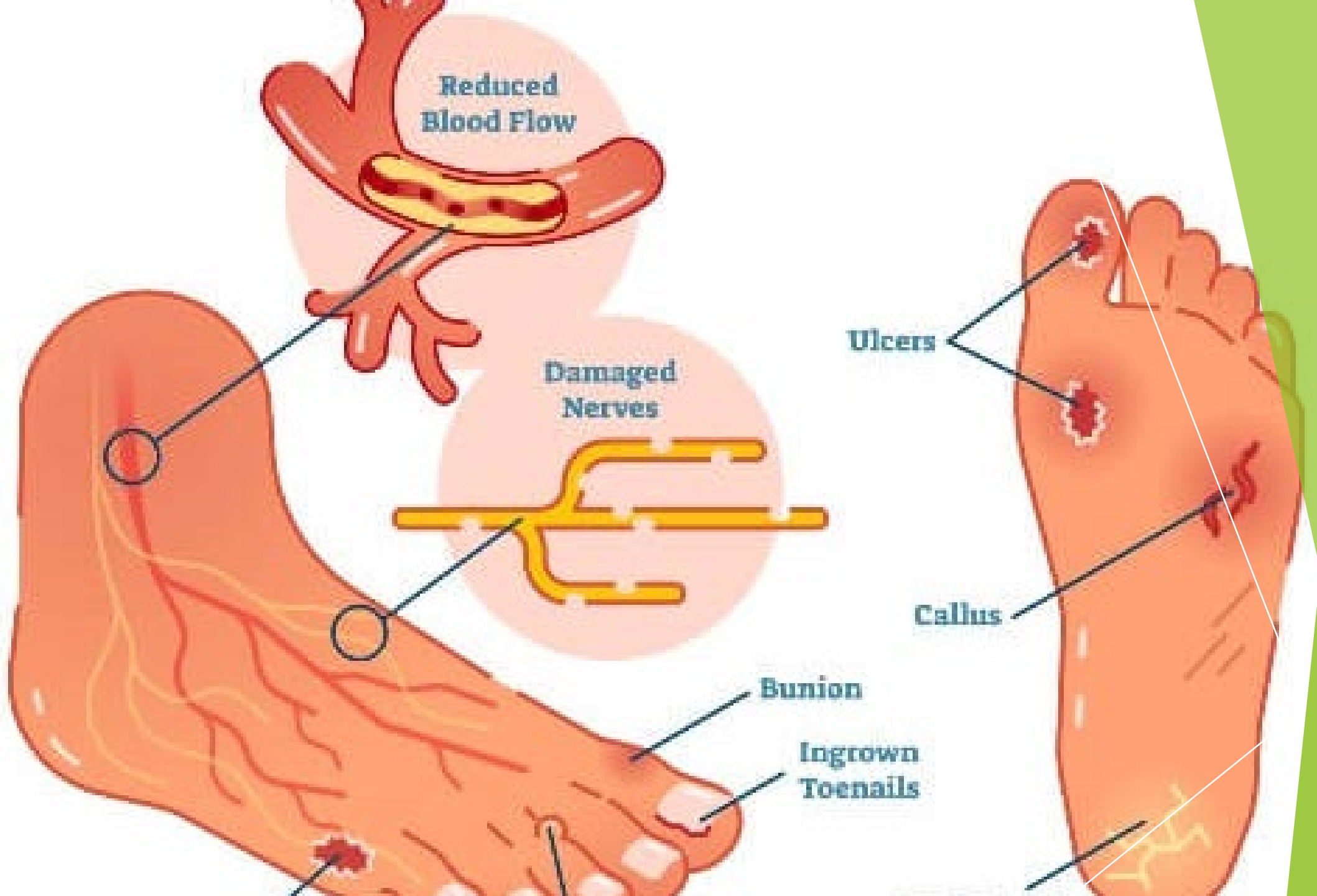


**More than half (58%)** of DFUs will get infected



**70%** of amputated DFU patients will die within **5 years**

SOURCES: [thewca.com/2022/06/06/diabetic-foot-ulcers-by-the-numbers](https://www.thewca.com/2022/06/06/diabetic-foot-ulcers-by-the-numbers)





<b>Ulcer grading</b>	<b>Description</b>
Grade 0	No ulcer but high-risk foot
Grade 1	Superficial ulcer
Grade 2	Deep ulcer, no bony involvement or abscess
Grade 3	Abscess with bony involvement (as shown by X-ray)
Grade 4	Localized gangrene e.g. toe, heel etc
Grade 5	Extensive gangrene involving the whole foot

**Note:** Grade 1–3 ulcers are termed *non-gangrenous ulcers* and Grade 4 and 5 ulcers are termed *gangrenous ulcers*



## A little Case Study

- ▶ M.M is a 45 year old diabetic Caucasian male with a non healing incision from an I&D of hematogenous MSSA septic arthritis.
- ▶ Non healing is secondary to non adherence to treatment plan: Poor glycemic control with last A1C 9.2%, continued smoking, failure to keep appointments, obesity, poor diet resulting in low albumin of 2.1
- ▶ The incision has opened up to a 8 x 3.5 x 2.5 ulceration that probes to bone with a sinus that extends into the joint space
- ▶ Seen at the outpatient wound center where our wound specialist provider
- ▶ Also followed by podiatry and infectious disease.



# What Can I do?

- ▶ 1.) Good glycemic control
- ▶ 2.) Diabetic educator
- ▶ 3.) Nutrition consult
- ▶ 4.) Foot inspection



# Now What?

- 1.) Podiatry
- 2.) Wound Center
- 3.) Both
- 4.) Total Contact Casting (TCC)
- 5.) Advanced Modalities
- 6.) Hyperbaric Oxygen (HBO)



(a)



(b)



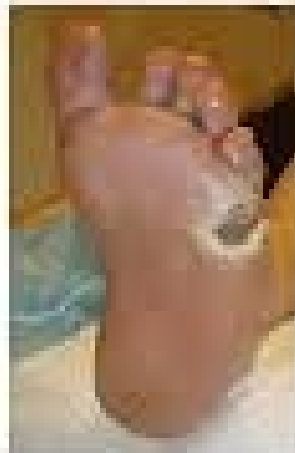
(c)



(d)



(e)



(f)



(g)



(h)

# When to Refer??

- ▶ 1.) Non healing wounds for longer than 4-6weeks
- ▶ 2.) Vascular concerns
- ▶ 3.) Venous leg ulcerations and need for compression therapy
- ▶ 4.) All Diabetic Foot Ulcers
- ▶ 5.) Arterial Ulcerations and poor blood flow
- ▶ 6.) Harborview for large burns
- ▶ 7.) All pressure injuries greater than a stage 2 (3 and 4)
- ▶ 8.) Hyperbaric Oxygen Therapy
- ▶ 9.) Or.....



When In  
Doubt, REFER  
IT OUT!

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