DPC SUMMIT

Case-Based Approach to Healing Common Wounds

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- I do not have any relevant financial relationships with the companies, products of which are mentioned in this presentation.

- Please note there are some intense graphic photographs and videos contained in this presentation.

Learning Objectives

1. Learn the core principles working through actual cases.
2. Utilize images and videos to illustrate core principles
3. Discover the evaluation of chronic wounds (greater than 4 weeks duration), identification of the etiology of wounds, subsequent evaluation (clinical and diagnostics) and definitive management therapies.

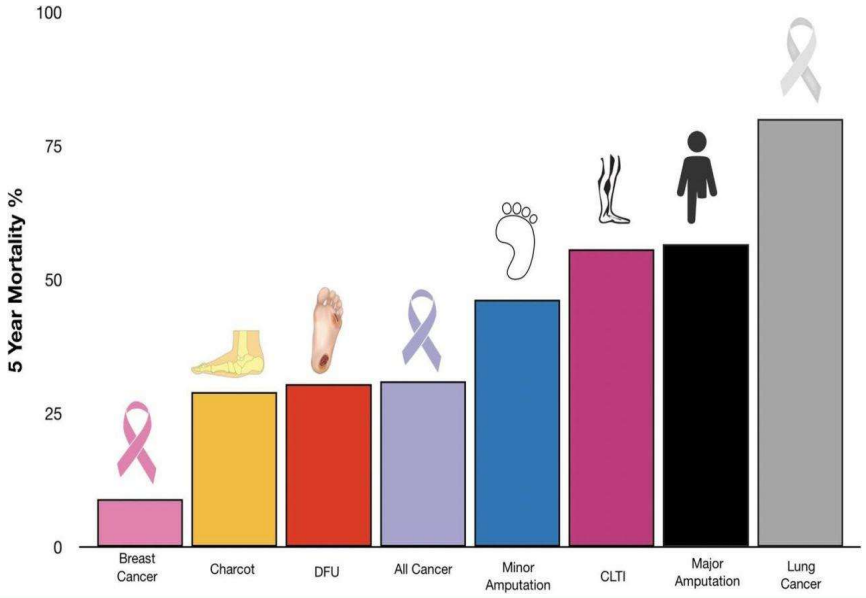
Overview

- Scope of the Problem of Chronic Wounds
- Basic Tenets of Wound Care
- Diabetic Foot Ulcers
- Venous Leg Ulcers and Lymphedema
- Peripheral Arterial Disease
- Pearls and Pitfalls

This Is Terrifying

- 25% of diabetics will develop a DFU (Diabetic Foot Ulcer)
- 15 billion spent on the care of DFUs annually in the US
- Every 1.2 seconds someone develops a DFU
- Every 30 seconds someone globally is getting an amputation from a diabetic foot ulcer
- In the US that correlates with 1200 amputations per week

Mortality Associated with DFU (Diabetic Foot Ulcer)



Our Goal is to Heal Wounds

- Acute Wounds (heal within 3 to 5 weeks)
- Chronic Wounds (heal in months to years)
- **Tenets of wound care**
- **Debridement – free of devitalized tissue and biofilm, expect bleeding (with bleeding comes healing)**
- **No infection present – colonization can lead to overt infection**
- **Good moisture balance**
- **Tissues need to be well vascularized**

Wound Description

Photograph the wound
Location
Potential Etiology
Size in cm /improvement?
Sinus tract/Tunneling/Undermining
Wound Bed
Wound Edge
Surrounding Tissues/Periwound
Drainage/exudate
Odor
Pain – Pre and Post, constant

Wound Description Basics

Thickness – full thickness, partial thickness, dermis, down to the bone

Size – can and will vary week to week and many times positional dependent

Base/bed – quality of the tissue present, slough, fibrous, healthy, friable, necrotic

Tissue exposed/debride to what depth: subcutaneous, muscle, fascia, bone

Wound Edge –adherent, smooth, epibole, violaceous

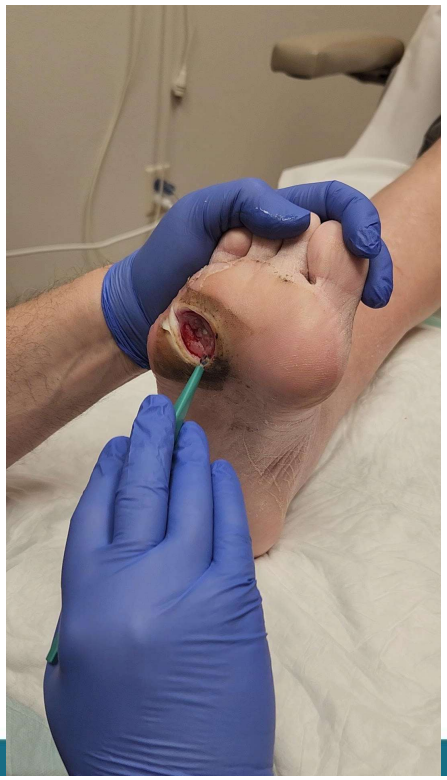
Surrounding Tissues – callus, scaly, excoriated

Drainage – exudate, purulent, color, amount, quality, description, color of drainage

Odor – present or not

Biofilm

- Ubiquitous - Bacterial biofilms protect the microbial community from external damage and promote the persistence of chronic infections/colonization.
- Think dental plaque
- Reforms rapidly within 24 to 48 hours – the reason we see our patients weekly (Optimal)
- Debridement – essential to mechanically remove the biofilm, slough and necrotic tissue (will also remove some viable tissue)



Tools of The Trade

- Disposable curette - 4 mm ring dermal curettes
- Practice using these by zesting a citrus. The leading edge is extremely sharp (think scalpel). Excellent for careful callus removal. Can easily damage underlying tissue.
- Iris scissors are useful for excising tissue and eschar to clean wound beds
- Forceps
- Nippers – useful tools for toenails (dangerous weapons) and callus
- Bonus: Rasp

What to Wear?

- Absorb moisture – Alginate, gauze, Drawtex
- Add moisture – hydrogel
- Antimicrobial – Silver alginate*, Silver Collagen *, Hydrofera Blue, and Acticoat
- Dressings choices can and will change frequently over time
- Beware of tissue adhesive injuries –large problem
- Need to protect the peri-wound area – if not the wound will expand

Dressing Choices

- We need to monitor the wound exudate and drainage (change dressings several times a day if needed) – insurance many not pay unless documented appropriately for DME
- Dressing like Optilock are fabulous. Absorb huge amounts of exudate which is key for venous stasis and lymphedema wounds.
- Moisture is vital for dry/desiccated wounds.
- Collagen – promotes granulation
- Honey sheets/liquid – osmotic, hydrates and antibacterial
- Adaptic/Oil emulsion, Xeroform
- The periwound area matters – without proper management the wounds can extend easily

Potentially Cytotoxic Agents

- Hydrogen Peroxide – I never use this agent
- Alcohol – I never use this agent
- **Betadine or Iodine Povidone** – decrease bacterial colony counts – paint versus dwell time – can dry out wounds – data conflicting inhibition on healing . **Primary use is in PAD**
- Xeroform (bismuth tri-bromophenate)

Infection Management

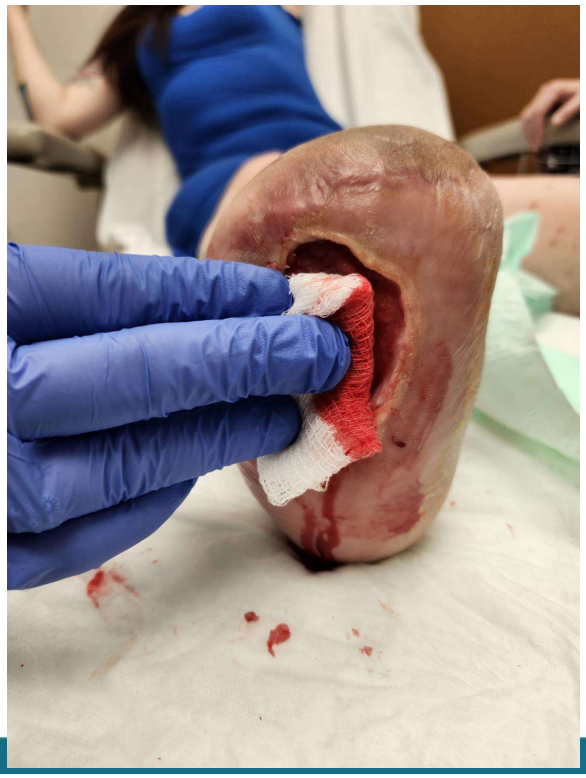
- If in doubt culture – slow to respond wounds despite optimal wound care
- Skin flora versus pathologic
- Colonization versus overt infection – topical agents
- MRSA, Pseudomonas, Staph aureus, Strep, Gram-negative rods
- Culture – proper technique debride first, essential to get an adequate representation, avoid surface slough, diabetics mixed flora (may need to work with the lab)
- For chronic wounds that are not overtly infected ***consider not*** initially treating empirically.

Infection Management

- Laboratory studies: CBC with differential, CRP, ESR (can guide using the trends)
- Topicals: Gentamicin, Mupirocin, and Santyl (Collagenase)
- Solutions: Vashe, Acetic Acid (recipe) , Betadine, Dakin's (recipe)
- Remember it is the Dwell Time that matters
- Acetic acid – decrease MRSA and Pseudomonas –the dwell time
- Vashe is tissue safe
- Recipes are easily followed: Acetic acid and Dakins

Anesthesia and Analgesia

- Albert Schweitzer wrote, "Pain is a more terrible lord of mankind than even death itself."
- First line agents are topical
- Rapid onset and ease of application
- My first choices are Lidocaine 2% gel, Lidocaine 5% ointment and Lidocaine 4% solution (all topical)
- Rarely infiltrate, field block or regional analgesia
- Always potential toxicity issues for exceedingly large wounds and surfaces (Venous Stasis and Lymphedema)



Hemostasis – Silver Nitrate and Battery Powered Cautery

- Silver nitrate is always useful.
- Explain to the patient about the grey/black tissue will resolve.
- May still need some direct pressure after application.
- Can use for hypergranulation tissue.

- Battery powered cautery is an exceedingly useful tool
- Can sting during application
- Explain the odor they will be smelling

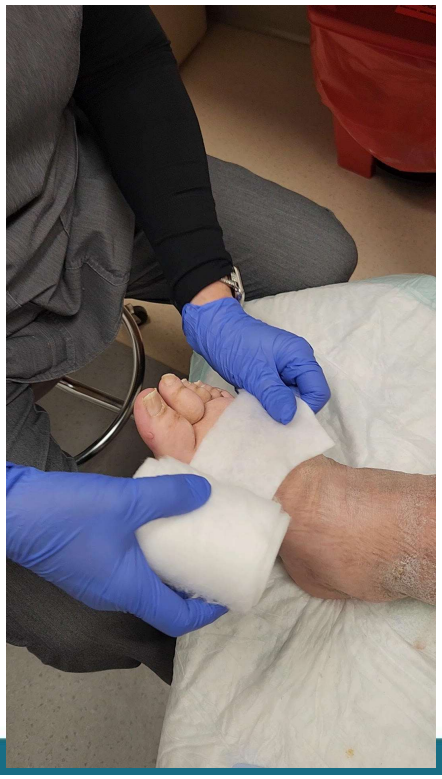

BVI Accu-Tem

People and Devices that Aid in Healing

- Orthotists – incredible resource
- Offloading devices – various offloading shoes, not regular post-op shoe
- Knee scooter
- Knee Walkers
- My least favorite device crutches (balance issues and brachial plexus injuries)

Compression Therapy – Key Stone of Therapy

- Safety and ABIs/TBIs
- Frequency of changing the wrap – 3 to 7 days
- Home Health involvement
- Ace Wrap
- Tubigrip
- Coban – very limited use
- Unna Boot – very limited use
- 2-layer and 3-layer compression devices
- Circiads and related devices
- Pneumatic compression devices




circaid®
juxtalite®
The clinically proven compression wrap
CIRCAID
30 40
20
50
Measurable compression
juxtalock™ band
NEW juxtaposed bands enhance fit & adjustability
Can be used day and night for maximum therapy
Silpure prevents odor and bacteria
Compressive undersock for foot edema control

Compression Therapy

- Compression therapy is the foundation of care for edematous lower extremities
- Management of fluid accumulation
- Contraindications: significant arterial insufficiency and acute and uncompensated congestive heart failure, DVT
- Elasticity: short versus long stretch devices
- Short stretch => rigid compression devices (2 or 3 Layers) and Unna boot
- Long stretch => large amount of elasticity and recoil. Can be for patients who are not ambulatory--Tubigrip and Ace wrap
- Start with lower pressures for example 20 mm Hg pressure

Need To Assess the Vasculature

- Is the patient at risk for lower extremity arterial disease?
  - Abnormal or absent pulses
  - Symptomatic claudication
  - Advanced age (equal to greater than 70)
  - Tobacco use (age equal to greater than 50 yr of age with tobacco use)
  - THC
  - Diabetes
  - Dyslipidemia
  - Hypertension
  - ESRD

Need To Assess the Vasculature

- Ankle Brachial Index can be done easily and rapidly in your office.
- https://www.youtube.com/watch?v=KnJDrmfIXGw
- Ensure your staff is performing correctly
- Can be unreliable in Diabetics and End Stage Renal Disease
  - Potentially needs TBIs – due to circumferential calcified Tibial Arteries

ABI and TBI Perfusion Status

- Above 1.3 elevated, incompressible vessels
- 0.9 to 1.30 normal
- 0.6 to 0.89 moderate disease
- Below 0.6 severe disease
- TBI – rough values
- 55 mm Hg – healing possible
- Between 30 to 50 mm Hg vascular compromise
- Less than 30 mm Hg inadequate

Compression Strength

- Low 20 mm Hg
- Moderate 21 to 40 mm Hg
- Strong 41 to 60 mm Hg
- Compression strength 30 mm Hg recommended to counteract the capillary filling pressure
- Stockings can be difficult to don and doff
- Tourniquet effect
- Need to be replaced every 3 to 6 months
- 2 pairs, one to wear and the other to wash

Tubigrip® Sizing Guide

	Tissue Support Circumference		
Size	Light	Medium	High
A	-	10–12.5cm/3.9–4.9"	12.5–15cm/4.9–5.9"
B	10–12.5cm/3.9–4.9"	12.5–15cm/4.9–5.9"	15–24.5cm/5.9–9.6"
C	13.5–15cm/5.3–5.9"	15–24.5cm/5.9–9.6"	24.5–35.5cm/9.6–14"
D	15–24.5cm/5.9–9.6"	24.5–35.5cm/9.6–14"	35.5–45cm/14–17.7"
E	24.5–35.5cm/9.6–14"	35.5–45cm/14–17.7"	45–50.4cm/17.7–19.8"
F	35.5–45cm/14–17.7"	45–50.4cm/17.7–19.8"	50.4–60.7cm/19.8–23.9"
G	45–50.4cm/17.7–19.8"	50.4–60.7cm/19.8–23.9"	60.7–70.3cm/23.9–27.7"
J	60.7–70.3cm/23.9–27.7"	70.3–75.5cm/27.7–29.7"	-
K	70.3–75.5cm/27.7–29.7"	-	-

Light **tissue support** = 5–10 mmHg
Medium **tissue support** = 10–20 mmHg
High **tissue support** = 20–30 mmHg

Pneumatic Compression Devices

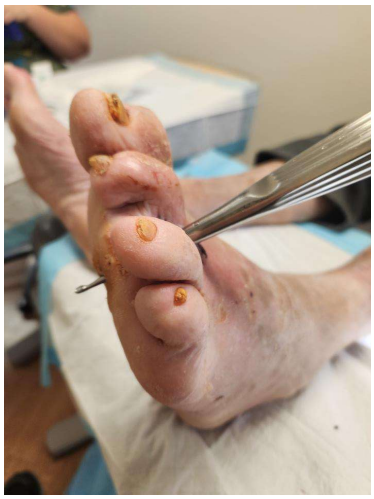
- Maintenance therapy
- Insurance will pay for these
- Contraindicated in acute DVT
- Contraindicated in severe PAD
- Contraindicated in acute CHF

Delayed Healing

- Medications that impede healing: steroids, NSAIDs, antithrombotic agents, DOACs, Warfarin, Norvasc, Methotrexate, and RA biologics (any immunosuppressive) and chemotherapeutics
- Smoking of any kind (cigarettes, vaping, and THC)
- Hyperglycemia
- Edema
- Obesity
- Hygiene
- Nutrition – not enough protein consumption or adequate hydration, lacking vitamins D & C, zinc and need multivitamins

Nutrition

- Nutrition – many patients can't afford supplements - Juven
- However, a good multivitamin can work
- Can check vitamin D levels - I treat empirically
- B complex for neuropathy
- Supplement vitamin C and Zinc
- Stress protein in patients able to tolerate (ESRD?)
- Appropriate caloric intake
- Hydration status (ESRD?)

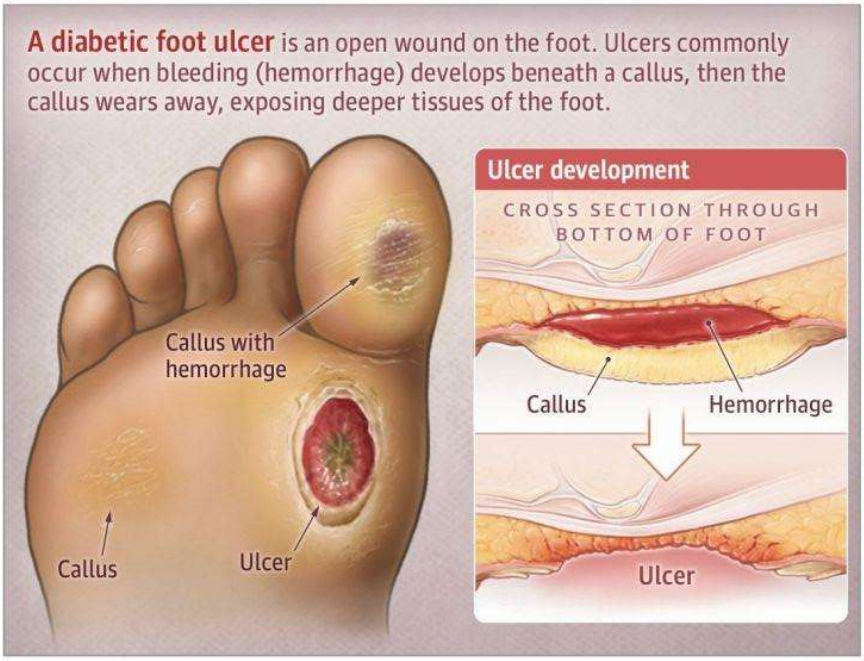


Diabetic Brief Overview

- Daily foot examinations – if they can catch it early limb salvage
- Callus - wounds routinely hide under the callous – tissue/callus interface
- Toenails – can use nippers cautiously
- Podiatry – not all are created equal
- Off loading – wedge shoes - extreme caution elderly – fall risk
  - Forefoot, wedge heel, not post-op shoe
- Total contact cast – hot spots – always check 2 in days
- Knee walkers and scooters

Diabetic Brief Overview

- Macrovascular versus microvasculature – either can be devastating, able to repair the macrovascular but the microvasculature is damaged forever (dorsal foot arch)
- HgbA1c and glycemic control
- Blood sugars above 200 wound healing grinds to a halt.
- Infection management
- Easily develop chronic foot wounds, that can progress to osteomyelitis, sepsis, AKI and death
- Amputation is a real risk for these patients



Diabetic Foot Ulcer

- Anatomy distortion– loss of neurons and then muscle denervation – flattening of the normal arch
- Alters moisture for the foot.
- Bones spread out flat (deformity)
- Neuropathy – loss of protective mechanisms – choice of shoes essential – Stress they never go barefoot
- Orthotics and diabetic shoes – have become fashionable
- Pulses – normal pulses can be deceiving – up to 50% diabetics have asymptomatic PAD
- Smoking cessation- I include vaping and marijuana

Venous Disease and Lymphedema

- Incredibly common, life-long issue that can be managed.
- Venous duplex- specify the following: Looking for reflux: Superficial system => **Perforators** => Deep system
- If not ordered correctly then the technologist and radiologist will comment on the presence or not of DVT.
- Ensure that your facility has the technical capability
- Infection control – do not use routine systemic antibiotics
- MRSA and Pseudomonas – chronic colonization
- Neomycin, Bacitracin – contact dermatitis risk

Venous Disease

- Skin hygiene daily – mild soap
- Eucerin (urea content) and AmLactin (lactic acid content)
- Barrier preparations – to protect the periwound
- Leg elevation – one part of the triad to heal
- Exercise – calf pumps and walking
- Diuretics – what is the cause of the peripheral edema? Leaves behind the proteins
- Venous ablation

Venous Disease

- 2 and 3 Layer wraps
- Compression devices – adjustable/Velcro are the best - maintenance
- Sequential compression devices (pneumatic devices) - fabulous
- Compliance issues and reoccurrence – stress this is now a lifestyle

Lymphedema and Phlebolymphedema

- Lifelong disease that can be managed – Decongestive Therapy by Physical Therapy
- Compressive devices – this can include wraps for toes, feet, ankle, calf and thigh
- There are devices for the arms, chest, head and body suits

Peripheral Arterial Disease

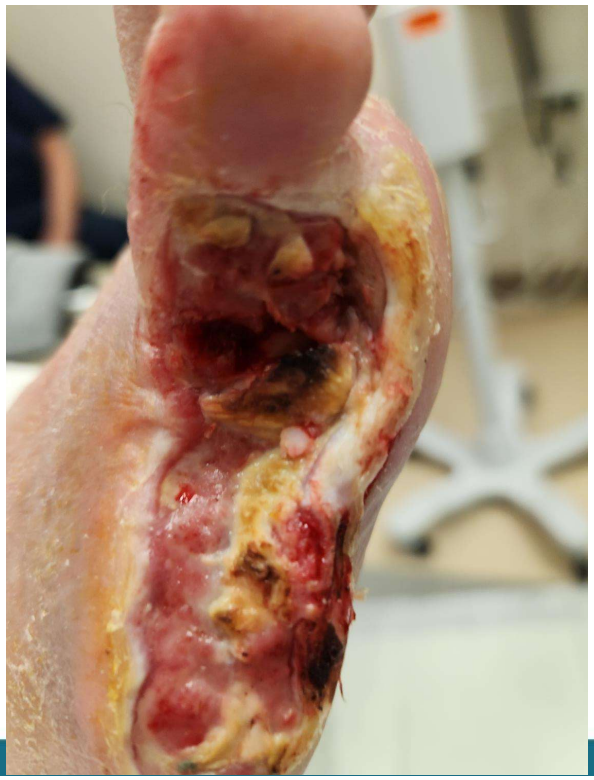
- Goal is to keep bacterial load low until revascularization
- Debride only what is needed
- Incredibly painful lesions
- High rates of amputation

Peripheral Arterial Disease

- AHA guidelines – 1-year outcomes
  - Alive with two limbs 50%
  - Amputation – 25%
  - Cardiovascular mortality – 25%
- Punched out lesions and painful
- Won't usually heal without establishment of perfusion again

Peripheral Arterial Disease

- Screening ABIs in your office – beware diabetics, ESRD and other causes of calcified vessels.
- ABIs and TBIs - Arterial duplex ultrasounds
- Vascular surgeon referrals based upon studies and wound evaluation



Miscellaneous

- Post-surgical wounds – dehiscence, open surgical wounds
- Negative Pressure Wound Therapy – full scale machines and disposable devices
- Hyperbaric Oxygen Therapy – we maximize everything before we can “dive them”.
- **New data on topical oxygen therapy**
- Cellular/Tissue products: made from placenta, foreskin, and fish skin

Can These Wounds Be Healed?

- Can we heal this wound?
- Palliative care?
- Collaborative Team – Vascular Surgeon, General Surgeon, Orthopedic Surgeon, Podiatrist, Emergency Medicine Physicians, Dermatology, and Infectious Disease Physicians

Pearls and Pitfalls

- If it dries it dies – don't air out wounds (remember moisture balance)
- Covering wounds absorbs drainage and prevents exudate affecting periwound (beware the marinating process if left on too long)
- Timing of getting the wound wet – shower not baths – remember all bags and cast sleeves leak (sponge baths)
- Remove wound dressing when showering

Pearls and Pitfalls

- Avoid lakes, rivers, ocean, spas and pools
- Dressings help maintain the moisture balance
- Not having the patient change dressings enough if highly exudative

Pearls and Pitfalls

- Hydrogen peroxide for chronic wounds – will be cytotoxic. Only use for acute wounds.
- Using isopropyl alcohol
- Epsom salts soaks – causes maceration and marinates the wounds
- Antibacterial soaps – are expensive and waste of time

Pearls and Pitfalls

- Colloidal silver in the wound or ingestion – no purpose, can get systemic toxicity, can cause seizures, can interfere with tetracycline, Ciprofloxacin and Levofloxacin antibiotics, and levothyroxine.
- Doxycycline and dairy
- Nuzyra (Omadacycline) – next generation Tetracycline for MRSA if Doxycycline resistant

Pearls and Pitfalls

- Prolonged betadine will dry out the wounds
  - Use mostly in PAD or briefly
- Remember supplements, vitamins and minerals can interfere with antibiotics absorption metabolism

Live Content Slide

When playing as a slideshow, this slide will display live content

Social Q&A for Case-Based Approach to Healing Common Wounds

QUESTIONS?

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