The *icky, squishy, & smelly:*
Chronic Wound Care

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Objectives

- Recognize a chronic wound and describe distinguishing factors.
- Identify the etiology of a non-healing wound.
- Discuss treatment options for chronic wounds.
- Assess the need for a multidisciplinary approach to wound healing.

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No disclosures

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What is a chronic wound?

A wound which fails to advance through the normal healing process within an expected timeframe

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A cute wound

Not cute

Unknown Author: http://www.tipsnips.com/tip/20/how-to-painlessly-remove-band-aids#.Xbmk1ehKhaQ

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Chronic Wound Characteristics

- Devitalized tissue
- Decreased angiogenesis
- Hyperkeratotic tissue in/around
- Exudate
- Biofilm formation

→ it just looks bad

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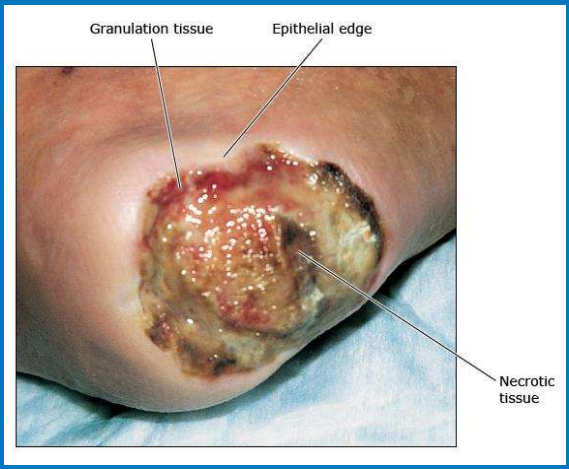
Describe the wound



- Location
- Etiology
- Color
- Exudate amount
- Tissue type
- Odor

https://www.uptodate.com/contents/images/SURG/52383/RYB_wound_class_PR.jpg

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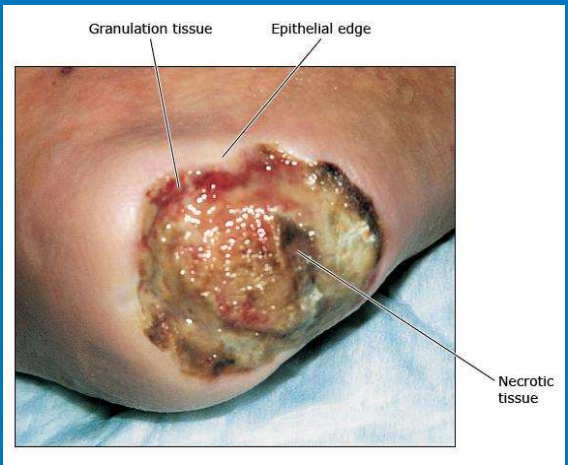
Describe the wound



- Location: right heel
- Etiology: decubitus ulcer
- Color: tan/brown
- Exudate amount: moderate serosanguinous drainage
- Tissue type: slough
- Odor: N/A

https://www.uptodate.com/contents/images/SURG/52383/RYB_wound_class_PR.jpg

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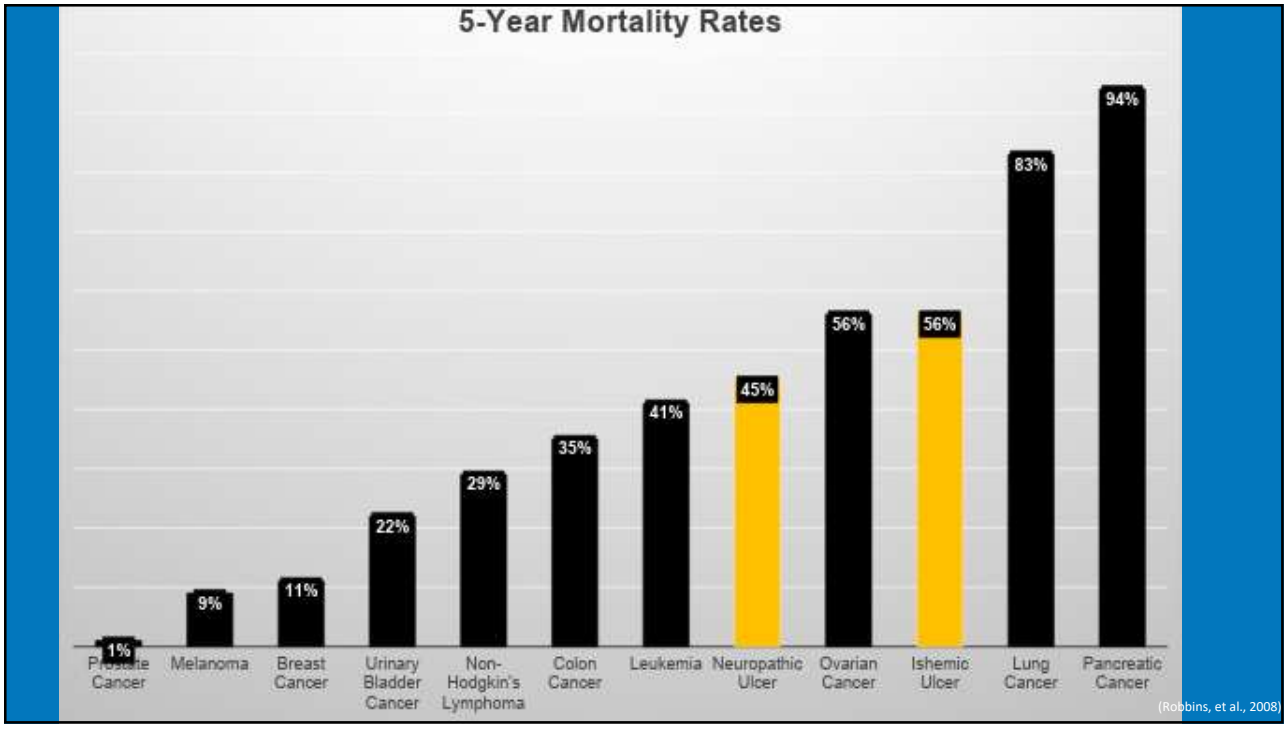
5-Year Mortality Rates
1%
9%
11%
22%
29%
35%
41%
45%
56%
56%
83%
94%
Prostate Cancer
Melanoma
Breast Cancer
Urinary Bladder Cancer
Non-Hodgkin's Lymphoma
Colon Cancer
Leukemia
Neuropathic Ulcer
Ovarian Cancer
Ischemic Ulcer
Lung Cancer
Pancreatic Cancer
(Robbins, et al., 2008)

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Save a leg, save a life

https://www.thesalsal.org/

80% of nontraumatic amputations are preceded by diabetic ulcer.

NON-traumatic amputations occur **every 20 seconds**.

5-year mortality after an amputation is 50%.

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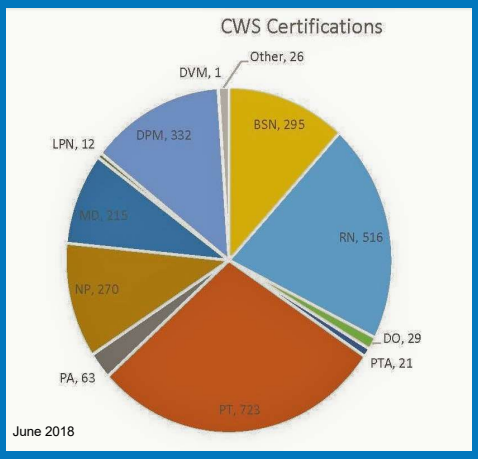
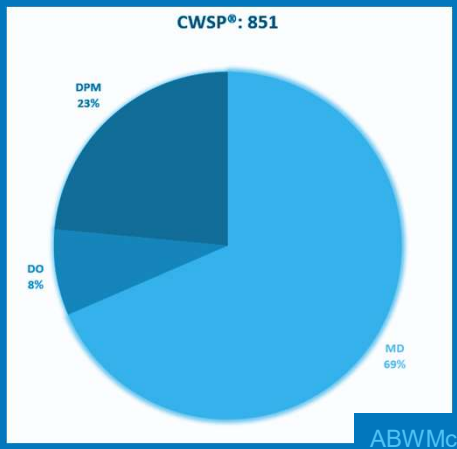
American Board of Wound Management Certified Wound Specialist

3,443 certified specialist in US





ABWMcertified.org/

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Basics

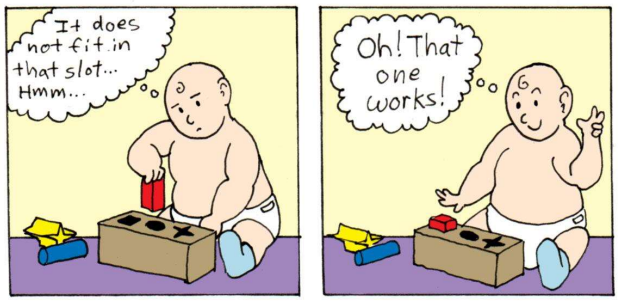
Treat the ***CAUSE***

Choose a dressing

- Dry wound → moist dressing
- Wet wound → dry/absorbent dressing

Debridement Q7-10 days prn

Trial & error …



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Step 1: Identify cause of wound

Identify why pt isn't healing

- Nutrition
- Education
- Blood sugars
- Vascular supply
  - arterial & venous
- Swelling
- Trauma
- Other? …

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Wound Vocabulary

- **Granulation** – beefy, pink tissue
- **Slough** – devitalized tissue; various colors: yellow, tan, brown; +/- odor
- Eschar - scab-like tissue, dry
- Periwound – area around a wound
- Hypergranulation - pink, friable tissue above periwound level skin.

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Wound Vocabulary

- **Undermining** – wound progresses under epidermal edge **parallel** with skin
- **Tunneling** – wound progresses **deep** from the surface
- Communication – a wound progresses through tissue to another wound opening

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Describe

Mix of *hyper*granulation and tan slough
with rolled edges (epiboly)
and undermining at 12 – 2 o'clock.

Mild inflammation at periwound

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Describe the LLE

Healthy open ulcer left popliteal fossa with beefy granulation

-s/p dog bite

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Physiology of a Healing Wound

Hemostasis ~ first 10 minutes

Inflammation ~ 1 – 7 days

Proliferation ~ 4 days – 3 weeks

Remodeling ~ 3 weeks – 1 year

McCulloch, Nathan, & Mulder, 2018

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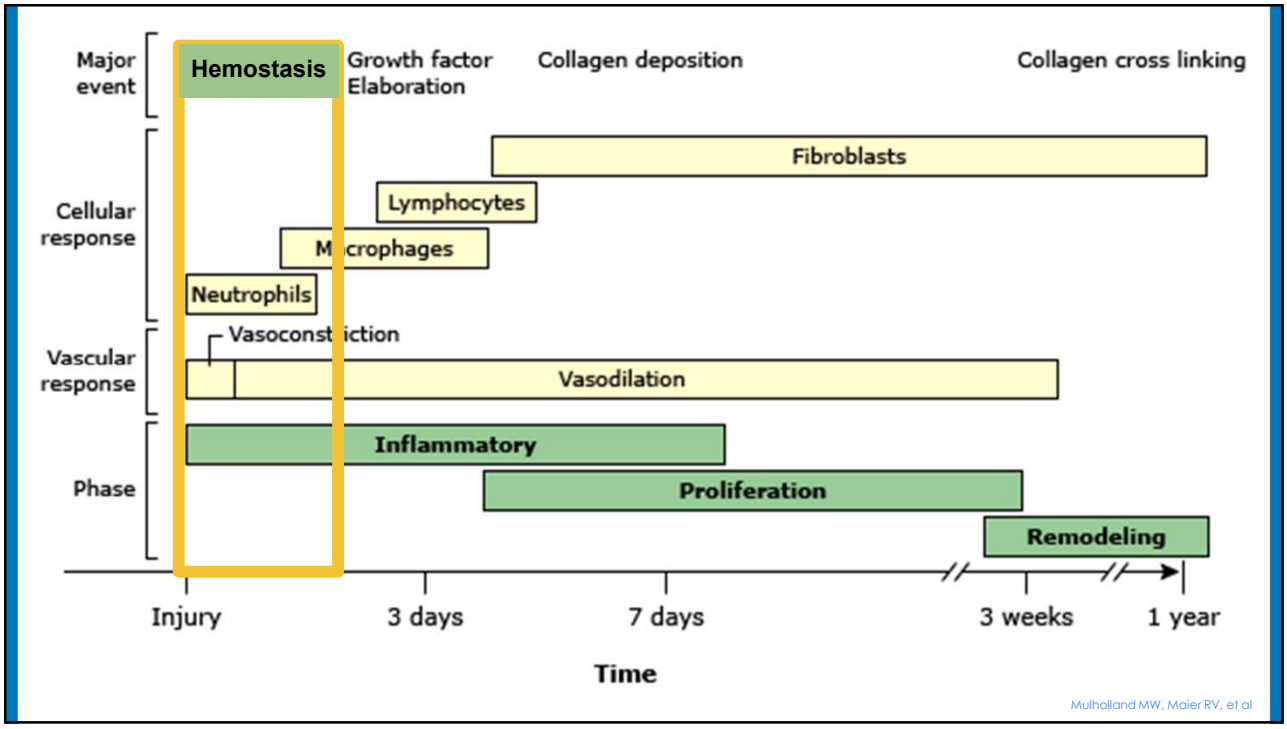
Major event
Hemostasis
Growth factor Elaboration
Collagen deposition
Collagen cross linking
Cellular response
Fibroblasts
Lymphocytes
Macrophages
Neutrophils
Vascular response
Vasoconstriction
Vasodilation
Phase
Inflammatory
Proliferation
Remodeling
Injury
3 days
7 days
3 weeks
1 year
Time
Mulholland MW, Maier RV, et al

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Debridement

Starts the healing cascade over

Remove non-viable tissue

Reduces bacterial load

"Clinicians should debride any wound that has necrotic tissue or surrounding callus."

- Infectious Disease Society

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Sharp Debridement

Advantages:

- Fastest way to remove nonviable tissue

Disadvantages:

- Painful (??)
- Anesthesia risks

Selective removal of nonviable tissue
Curette, scalpel, scissors, other sharp instrument

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Biological Debridement

Selective enzymatic debridement with sterile maggots

- ***Myiasis*** – maggot infestation

Rx **collagenase** (Santyl) ointment

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Diabetic Foot Ulcer (DFU)

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DFU

Common sites affected:

- Pressure points
- Plantar foot

Originate from:

- Callus, infection, trauma, deformities, PAD...

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Diabetic foot ulcer (DFU)

Impairments of healing [2]

- Decreased & impaired growth factor production
- Macrophage dysfunction
- Collagen accumulation
- Decreased angiogenesis

1. (McCulloch, Nathan, & Mulder, 2018) 2. (Armstrong & Meyr, 2018)

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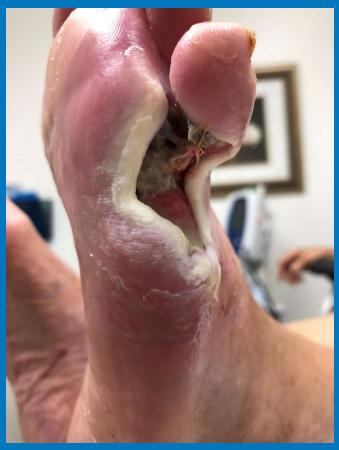
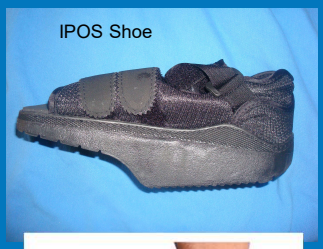
DFU

Most important treatment: OFFLOAD!





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Total Contact Cast

Gold Standard for plantar foot offloading

95% of weight is offloaded

Change ~ Q7 days

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Arterial Wounds

Ischemia:

Oxygenated blood flow *in*sufficient for metabolic demands of a tissue

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Arterial Testing

Ankle Brachial Index *with waveforms & toe index*

- 1.0 - Normal
- 0.7 - Claudication; refer to vascular surgery
- 0.5 - Rest pain
- 0.3 - Ulcer unlikely to heal; risk of limb loss; needs urgent revascularization

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Arterial Wounds

Vascular surgery eval/tx

- Angiogram w intervention
- Bypass

Goal is limb salvage

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Arterial wounds



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Venous Stasis Ulcers

Irregular edges,

Heavily exudative,

Painful,

+/- Periwound inflammation

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Venous Stasis Ulcer (VSU)

Pathology: venous HTN +/- lymphedema
- Leakage of **protein** rich fluid out of high pressure capillaries

Time to heal 4 – 6 months

Most important treatment:
20 - 30mmHg compression

*Alguire & Scovell

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Venous Insufficiency

Symptom progression

- Itching, heaviness
- Edema
- Hyperpigmented – *hemosiderin deposition*
- Skin hardening - *lipodermatosclerosis*
- Skin atrophy – *atrophy blanche*
- Ulcer

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Refer to vein specialist

Venous duplex with mapping & reflex study

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VSU & Lymphedema

Treatment: **COMPRESSION**

Compression wraps

- Unna Boot
- Multilayer wraps
- Short stretch Velcro wraps

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Deep Tissue Injury

aka decubitus ulcer

Pressure induced tissue ischemia causing injury to deep tissue over a bony prominence

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Stage 1

Skin **intact**; non-blanchable redness

Stage 2

Partial thickness skin loss

Stage 3

Full thickness tissue loss. Subcutaneous fat or muscle visible

Stage 4

Full thickness skin loss with involvement of **bone**

Unstageable

Base of wound is **not visible;** covered by slough and/or **eschar**

* From the National Pressure Ulcer Advisory Panel.

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Eschar
UNstageable
NPUAP.org | Copyright © 2011 Gordian Medical, Inc. dba American Medical Technologies

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Burns

Moist dressings

OT – frequent mobilization of affected joints

Debride devitalized tissue

Ex: Diabetic fell asleep with hot pack on popliteal fossa

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Burns

Dressing to ADD moisture

ex: hydrocolloid, antibiotic ointment, xeroform, hydrogel

~~Silvadene cream~~ (silver sulfadiazine 1%)

"No evidence to support improved wound healing or reduction in bacterial wound infections." -Gauglitz GG

Takes friction to remove to re-evaluate wound = **painful**

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8/15/19 - 50% smaller, granulating

s/p xeroform and tegaderm dressing in place x1 week since burn

9/4/2019 - healed

Used duoderm hydrocolloid Q3 days the last week b/c of itching

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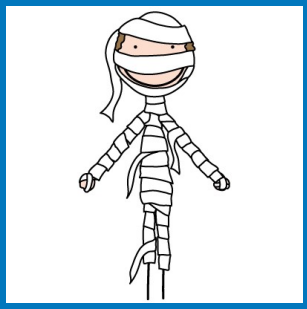
Wound Treatment Basics

1. Keep wound clean - Irrigate
2. Wound bed preparation - debridement
3. Apply a new dressing
    a. Frequency of dressing changes dependent on saturation & type of dressing



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Clean the Wound

Saline

Wound cleansers

Distilled water $0.88/gal

Sodium hypochlorite (Dakin's)

Diluted Vinegar/water solution

NO:

Hydrogen peroxide

Tap water

Washing wounds in shower

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DIY Dakin's solution

Makes approximately 0.025% sodium hypochlorite (Dakin's) solution

Supplies:
- Household bleach, unscented
- Baking soda
- Tap water

Instructions:
- Pour 4 cups (32 oz) of water into a clean pot.
- Boil for 15 min with lid on. Allow to cool completely.
- Add ½ tsp baking soda.
- Add 2 ½ tsp (12-14mL) bleach.
- Pour solution into a clean, sanitized jar.
- Keep protected from light.
- Discard after 4 days after opening. Unopened jar can be stored for 1 month.

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Dressings

Always cover an open wound

- Protect wound from outside forces
- Prevent infection
- Promote autolytic debridement
- Protect periwound
- Absorb drainage but keep moist environment

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Dressings

Step 1: Choose a dressing based on exudate amount

Scant or minimal drainage

Occlusive film; Collagen; contact layer

Moderate to heavy drainage

Foam

Heavy drainage

Alginate

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Dressings

Step 2: Secondary dressing - add layers for absorbency & protection.

+

Step 3: Secure in place

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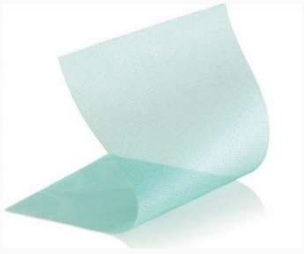
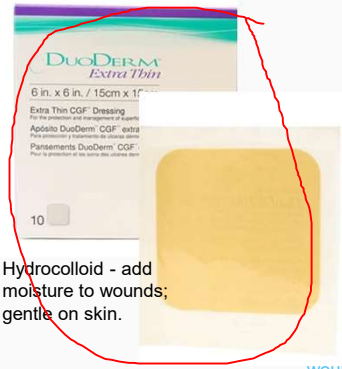
Dressings

Dressing choice is specific to the wound, patient, clinic, and provider.



Contact layers - nonstick; allow absorption of draining through the mesh



Hydrocolloid - add moisture to wounds; gentle on skin.

Hydrofera blue - foam dressing

woundeducators.com/wp-content/uploads/2013/03/Fleck.pdf

What dressing?

Options:

1. No dressing
2. Gauze
3. Collagen
4. Foam
5. Alginate
6. Wound vac (NPWT)
7. Skin Graft

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What dressing?

Collagen

or a foam border

or gauze and kerlix

or combination.

OFFLOAD!

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What dressing?

Alginate ag dressing until

Surgical debridement

then wound vac (NPWT)

OFFLOAD!

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Dressings: Wet - to- dry?

Technique:

- Saturate gauze with saline. Apply to wound bed.
- Cover with dry gauze and secure.

When removing dressing, the gauze ***RIPS*** away tissue from the wound

= NONselective mechanical debridement. **PAINFUL**!

Hingorani et. al.

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What's Manuka Honey?

Honey – naturally antimicrobial

Keeps wound moist → assists **autolytic debridement**

Manuka = honey harvested in Australia/New Zealand

Most common medically applied honey: medihoney

Not covered by Medicare

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Standard Wound Care Order

Change dressing on right foot 3x/week and prn as follows:

1. Clean wound with NS or wound cleanser. Pat dry.
2. Apply Prisma collagen dressing to wound bed.
3. Cover with mepilex border (or substitute with 4x4 gauze and kerlix).

Pt should leave dressing intact, clean, and dry when bathing.

Elevate & offload affected limb.

RTC in 1 week or prn.

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Infection, Inflammation, or colonization?

- **ALL** wounds are colonized
- **Not all** wounds are infected

Advanced wound dressings are antimicrobial

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To Culture or not to culture

When is it beneficial?

Tissue culture > swab culture

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Wound Pathogens & Antibiotics

Most Common:

- Staph G+
- Strep G+
- Pseudomonas G-
  - Foul odor, blue-green drainage

Others based on cultures

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Advances in Wound Healing

- Split thickness skin grafts
- Skin Substitutes – amniotic tissue, cadaver grafts, etc
- DNA Sequencing Biofilms
- Hyperbaric Oxygen Therapy

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Split thickness skin graft

Day surgery

Preferred over synthetic grafts

Thigh donor Site 1 week s/p STSG

Wound 1 week s/p STSG

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Hyperbaric Oxygen Therapy (HBOT)

- Adjunct treatment
- 100% oxygen at 33ft below sea level
- Aids in angiogenesis, decrease pain, decreased edema, decreased bacterial burden
- Daily for 90 min x20 sessions

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HBOT

Major indications:

- Diabetic ulcers
- Radiation necrosis
- Skin flap necrosis
- The bends (N2 toxicity)

Possible Complications:

- Middle ear barotrauma
- Flash pulmonary edema in CHF
- Oxygen toxicity

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Other Pearls

- Order supplies through DME provider
- Order home health care
- No ointments on plantar feet (gentamicin, bactroban, etc)

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Wound Healed!! Now what?

Gold standard to prevent foot ulcers:

- Daily foot exam
- Diabetic foot exam annually
- *Custom* diabetic shoe and insoles

High rate of recurrence: DFUs >50% re-open within 3 years (Boulton)

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Summary

1. Treat the cause first, the wound second.
2. Pick a dressing based on drainage.
3. Debride nonviable tissue.
4. Follow often and/or refer to specialty clinic.
   - Find a ***certified*** wound specialist
     www.ABWMcertified.org

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Thank You!

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