

**American Osteopathic College of Occupational and Preventive Medicine
2012 Mid-Year Educational Conference
St. Petersburg, Florida**

Wound Care Practice Updates



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What is the ultimate goal of a wound care specialist ?

- To get skin coverage of open wounds and have it stay there.
 - The function of the skin is to protect the delicate internal environment from the harsh external environment
 - The tissues below the skin are moist!!

Learning Objectives

- Discuss common misconceptions regarding chronic wounds
- Understand the basic principles of good wound care
- Discuss factors that are beneficial and detrimental to wound healing
- Provide examples of treatment for venous stasis disease
- Discuss new concepts in chronic wound care that are cost effective, efficient and medico-legally appropriate

What is a chronic wound?

- Definition - Any wound that fails to go through the normal phases of healing (inflammation, proliferation, maturation)
- Multiple causes
- Unrelated to a specific time of healing/ lack of healing
- Can be in any location

Chronic Wound Mgmt is one of the few specialties where treatment is started aggressively without a diagnosis; where the workup is secondary to the treatment and where failure is met with more treatment

Chronic Wound Management is a Misnomer

- No one can heal a "chronic wound", that's why they are chronic.
- A chronic wound specialist identifies why the wound failed to heal and corrects it. The goal is to turn a chronic wound back into an acute wound to allow it to heal.

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Wound etiologies

- Arterial
- Venous
- Diabetic
- Traumatic
- Surgical
- Autoimmune
- Pressure
- Mixed

What is B.A.D. Wound Care??

- Betadine, Bacitracin, Bactroban, Boric Acid
- Acetic Acid, Air, Antibiotics (including Silvadene)
- Dakin's Solution, Dry Therapies, Dyes (Scarlet Red, Gentian Violet)
- Whirlpools, Water Spray

Keys to good wound care

- Keep the wound base moist
- Keep the skin dry
- Pack open spaces
- Offloading
- Adequate nutrition
- Adequate blood flow in and out

What is the big concern?

- Loss of the protective barrier encourages the loss of fluids, nutrients, allows exposure to toxic external substances and forces

- Infection ?

Here is the usual scenario:

● "Dr. McCrary, Your patient Mrs. Decubitis' wound has a lot of drainage and a foul odor. I took a culture (swab). Should I call the surgeon to put in a PICC line and what antibiotic do you want to start?"

Lets get back to basics

- The definition of infection is...
 - Redness
 - Increased temp
 - Swelling
 - Tenderness, and...
 - Infectious agent must be present

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You have to have all
of these!!!

Infection is basically inflammation
(think sprained ankle) with documented
presence of bacteria overwhelming the
body's normal response

What about the foul odor
and the drainage??

- They are not necessarily a part of the spectrum of infection !!!

Still don't believe it ?

- The next time you step on a rusty nail-
 - Swelling, pain, fevers, but,...
 - No odor/no drainage
 - The puncture wound heals and so...
- NO INFECTION !!!

How about the other
side of the argument?

- If you really feel that foul odor and drainage are always definitive for infection then...
- The next time you get a bad head cold with drainage and foul breath then...
- Culture the drainage (MRSA, VRE, ?)
- Start Gorillacillin via central line

Definition of infection

- Red, hot, swollen, tender, and presence of bacteria
- So how do you document the presence of bacteria in a wound?

Wound swabs are out !!!

- Accuracy is less than 30%
- U.S. Department of Health and Human Services
- AHCPR guidelines
- 1994- out of date

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Problems with this text

- Much has changed since 1994
- Much of the information is anecdotal, not research based
- Recent literature considers “quantitative swabs” as supportive, if other definitive signs and symptoms are present.
 - Problem is that many facilities cannot do quantitative cultures

If you are concerned about the wound, you must diagnose the wound

- Wound swabs only measure what is on the wound, not infecting the wound
- Deep tissue (punch or needle) biopsy
- Deep aspiration
- Quantitative swabs?

The wound is red, feels hot, there is identifiable swelling, and the patient reports pain in the area. The “good” culture demonstrates a pathologic bacteria. Do you order the IV antibiotics now ?

Not Yet!!!

- A systemic infection should be identified.
- How about a lab test?
 - CBC -
 - WBC must be elevated
 - CRP, ESR, Chem, LFT

The wound is red, feels hot, there is identifiable swelling, and the patient reports pain in the area. The “good” culture demonstrates a pathologic bacteria. The WBC is 13,000 with a left shift. Do you order the IV antibiotics now ?

Not Yet!!!

- A patient with a systemic disease should have systemic signs such as ...
 - Malaise
 - Fevers
 - Nausea

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The wound is red, feels hot, there is identifiable swelling, and the patient reports pain in the area. The "good" culture demonstrates a pathologic bacteria. The WBC is 13,000 with a left shift. He feels nauseated and weak with a 102° F temp. Now do you order the IV antibiotics?

Not Yet!!!

You need to rule out other sources of infection (urosepsis, pneumonia), carcinomatosis, autoimmune diseases, etc.

The wound is red, feels hot, there is identifiable swelling, and the patient reports pain in the area. The "good" culture demonstrates a pathologic bacteria. The WBC is 13,000 with a left shift. She feels nauseated and weak with a 102° F temperature. Work up fails to identify other etiologies other than the wound. Do you order the IV antibiotics now ?

Yes, now you have sufficient evidence...

The question to ask is-



How many of those patients that you treated for a wound infection were truly infected?

Costs

- Lab costs
- Swabs, cultures, lab tech time, pathologist review
- Nursing time:
 - To obtain swab, paperwork, calling doctor, faxing results
- Antibiotic related costs, isolation costs
- Physician time

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Risks from Antibiotics

- Subjecting patient to unneeded antibiotics
- Superinfection/bacterial resistance
- Antibiotic colitis
- Risk of central lines
- Sepsis
- Bleeding
- Pneumothorax
- Deafness and other side effects
- Liver/kidney damage

The top 5 statements you make when the lawyer has you on the stand...

1. We've always done it that way.
2. That clinic/nursing home always does that sort of thing.
3. The insurance company never told me it was wrong and always paid for it and the subsequent care.
4. What do you mean, "18 years out of date?"
5. Where do you want the check sent?

Common misconception

- The reason the wound won't heal is because it's infected
- Leads to "*scorched earth*" wound care --
 - If I can kill the infection, the wound should heal !!!

MAKE SURE THAT GOOD WOUND CARE IS.... GOOD MEDICAL CARE

Treat the **WHOLE PATIENT!**
(Blood sugars, nutrition, renal dx, anemia, edema, etc.)

When does Old Faithful lead you down the Wrong Path?

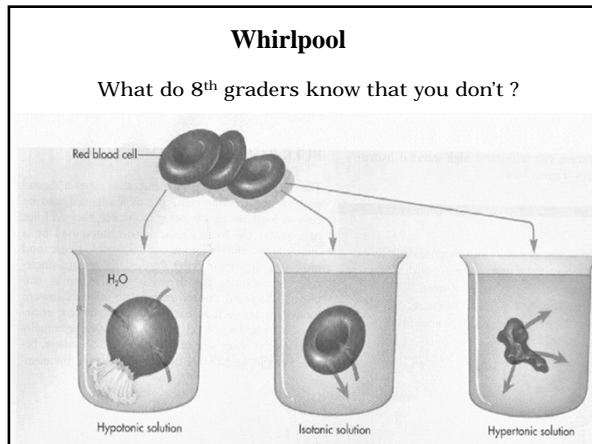
B.A.D. Wound Care:

- Betadine, Bacitracin, Bactroban, Boric Acid
 - Acetic Acid, Air, Antibiotics (including Silvadene)
 - Dakin's Solution, Dry therapies, Dyes (Gentian Violet, Scarlet Red)
 - Whirlpools, water spray
- Because we've always done it that way

Betadine

- Not sterile, in fact some bacteria, fungi and viruses thrive in it.
- It merely reduces the bacterial count temporarily
- Inhibits white cells from moving into the wound, decreases collagen synthesis and inhibits epithelialization

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Additionally, whirlpools cause adjacent tissue maceration, making it more susceptible to breakdown.

-Can also spread bacteria to other areas and from person to person

Topical antibiotics

- Have been shown to promote superinfection by killing the native flora
- Neosporin: Significant potential for local allergic reaction

SILVADENE

POISINDEX(R) SUBSTANCE IDENTIFICATION

SILVADENE TOPICAL CREAM 10 MG/1 G (CREAM 1%) from HOECHST MARION ROUSSEL

COLOR: WHITE
SHAPE: SOFT, WATER-MISCIBLE
FORM: TOPICAL CREAM

ACTIVE INGREDIENTS:
MICRONIZED SILVER SULFADIAZINE 10 MG/1 G

INERT INGREDIENTS:
WHITE PETROLATUM
STEARYL ALCOHOL
ISOPROPYL MYRISTATE
SORBITAN MONOLEATE
POLYVINYL 4B STEARATE
PROPYLENE GLYCOL
WATER
METHYLPARABEN (AS PRESERVATIVE) 3%

AVAILABLE CONTAINER:
Choose toxicologic management by its number

1. SULFONAMIDES
2. SILVER

Product Reference: 2504440 03/77

F1 HELP F9 Previous Subs.
F2 Main Menu ESC3 Next Substance
F3 New Substance F11 Last Menu F4 Print (c)1974-1999 Micromedex

Rule #1

Never put anything in an clean, open wound that you would not put in your own eye!!

What's another name for Dakin's solution?

SODIUM HYPOCHLORITE

Actions:
Pharmacology: Sodium hypochlorite has germicidal, deodorizing and bleaching properties. It is effective against vegetative bacteria and viruses, and also, to some degree, against spores and fungi.

Indications:
Applied topically to the skin as an antiseptic.

Precautions:
Chemical burns may be produced; avoid skin or eye contact with this solution.

or Dakin's Solution: 0.25% In pt.
(Century Pharm.) 0.5% In pt and gal.

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1 Activated dihaldehyde is stable for 14 days after activation.
2 Long life activated dihaldehyde is stable for 28 days after activation.
3 Vial of activator contains solid sodium salts as buffer to adjust pH to 8.2 to 8.9.
4 Vial of activator contains aqueous potassium salts as buffer to adjust pH to 7.5 to 8.1.
5 Vial of activator contains aqueous potassium salts as buffer to adjust pH to 7.2 to 7.8.

CLOROX !!!

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Acetic Acid

- Detrimental to healing tissues by damaging the granulation tissue

- Changes Ph of the wound bed; no cell migration

Hydrogen Peroxide

Why do patients like it so much? It

Foams !!!

Rule #2

Dry is a four letter word

- What is one of the most common reasons for admissions to the hospital?
- Dehydration ... also known as dry!!
- Why is it unacceptable for whole bodies to be dry, but OK for small parts to be dry?
- Dry is not beneficial to wounds

Wet to dry dressings

- How many of you believe that there is intelligent life in saline or gauze?
- It basically sticks to some tissue and then pulls it out but...
 - It leaves dry tissue behind...
- A very inexact debridement- and painful!!
- Labor intensive if done correctly
- Out of date for 20 years

Debridement

- Mechanical
- Surgical
- Enzymatic
- Autolytic

Debridement

- Removal of devitalized tissue
- Medium for infection
- Remove *potentially* infected tissue
- Obtain appropriate deep cultures
- Healthy bleeding tissue introduces beneficial platelets and growth factors
- Allows for thorough investigation of the wound

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Gauze

- Okay for rough debridement and protective outer layer of dressing
- Gets absorbed into wounds and removes vital tissues on removal, often has to be cut out...don't use directly on wounds
- Use Telfa or Adaptic layer under gauze

Support Surfaces

No such thing as pressure relief!!!

- Pressure reduction
- Clinitron vs Egg crates
- Movement is the key!!
- Chair cushions
- Mattress overlays
- Pressure reducing boots
- Total contact casts

Is there adequate blood flow to the wound?

ARTERIAL DISEASE

- Palpate the pulse
 - Segmental pressures
 - Doppler examination
 - Waveforms
 - A.B.I.
 - TcPO2
- Can you examine the microvascular circulation?

Is there adequate blood flow from the wound?

Venous Stasis Ulcers

- Skin discoloration
- Hemosiderin deposition
- Stasis dermatitis
- Lipodermatosclerosis
- Loss of hair below the knee
- Shiny skin over the tibia

Stasis Dermatitis

- Red, swollen legs with no fever, no CBC changes, no easily identifiable etiology and a history of the same.
- Multiple hospitalizations and courses of antibiotics
- What makes you think of and treat it as cellulitis?

Diabetes: multifactorial risks

- Increased risk of infection
- Neuropathy (loss of protective sensation)
- Vascular effects
- Macrovascular (trifurcation disease- below the knee)
- Microvascular (affects medial layer to prevent vasodilatation)
- Charcot's joints, arch collapse
- ↓ Humeral response (decreased NO)

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Dressings:
The choice of a dressing is multifactorial

- Wound type
- Amount of and type of drainage
- Wound location
- Type of treatment needed
- Debridement vs healing vs protection

Rule #3

●

Is the wound healing because of what I'm doing or in spite of what I'm doing?

Systemic Factors

- COMORBIDITIES
- STRESS- PSYCHOSOCIAL OR PHYSICAL (ENVIRONMENTAL)
- PAIN
- OBESITY
- MALNUTRITION
- IMMUNE STATUS
- AGE

Local Factors

- BIO-BURDEN
- TISSUE PERFUSION
- MACRO/MICRO CIRCULATION
- ESCHAR & DESICCATION
- FOREIGN BODIES/SUTURES
- NECROTIC TISSUE AND DEBRIS

What's new in wound care?

<ul style="list-style-type: none"> ● <u>Theories</u> <ul style="list-style-type: none"> ● NO ● MMP's ● VEGF ● <u>Diagnostics</u> <ul style="list-style-type: none"> ● Digital Pressures ● TcPO2 ● Laser Doppler ● <u>Therapies</u> <ul style="list-style-type: none"> ● Electrical Stim ● Normothermia, UV, Pulsed Diathermy ● Neg Pressure (VAC) ● Cornotherapy ● Manuka honey 	<ul style="list-style-type: none"> ● <u>Treatments</u> <ul style="list-style-type: none"> ● Hyperbarics ● Dermagraft/Graft jacket/Integra ● Platelet rich plasma ● Apligraf ● Oasis ● <u>Pharmacotherapy</u> <ul style="list-style-type: none"> ● Pletal ● Trental ● Biogun (superoxide radical anions) ● Other medications
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The Many Faces of Venous Insufficiency

- Venous insufficiency comes in many shapes and sizes
- Management is essentially the same in all cases:
 - support the veins with compression
 - support the skin with moisture
 - decrease edema with compression and diuretic use

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**Venous Ulcer with
Stasis Dermatitis**



Edematous leg
with opening
of a surgical
wound—

Cellulitis?

**Traumatic Wound
Becomes a Venous Ulcer**



- Prominent
varicose veins
- LE edema
- Islands of
granulation
tissue with
copious fibrin

**Venous Ulcer and Chronic
Venous Congestion**



- Woody edema
- Stasis Dermatitis
- Shallow ulcer with
overhanging borders
- Granulation tissue at
base along with fibrin

**The End of the Road with
Chronic Edema-
Elephantiasis Nostras**



- Large heaped
plaques
- Grossly thickened
skin with
cobblestone
appearance
- Gross LE edema

**Garden Variety LE Edema
with Stasis Dermatitis**



- LE edema with
stasis change
- Evidence of
healed outbreaks
common
- Fungal super-
infections are
common

Hemosiderin Deposition



- This skin is more
likely to breakdown
- Increased likelihood
of skin sensitivity to
topical products
- Wounds develop
quickly and are slow
to heal

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Prolog to Management of Venous Stasis

- Wraps, dressings and topicals are of limited value relative to aggressive medical management

- In other words, if a pt's CHF or cellulitis aren't treated, a wrap or topical therapy can only be so effective

Management of Venous Stasis...Two Simple Steps

- Decrease Edema
 - Medical Management
 - Compression
 - Unna's Wraps
 - Profores/ 2 & 3 layered dressings
 - Circaids/Tribute/Reid/MedAssist
 - Compression stockings
- Wound Care for open wounds

Medical Management of Venous Disease

- Maximize BP and diuretic use
- Evaluate for CHF, renal and liver disease and treat aggressively
- Treat infection
- Assess arterial circulation – ABIs are a great way to start

Management of Venous Disease

- Treat early disease with TEDS/JOBES stockings
- Graduate to compression stockings (Start with 20-30mmHg and increase compression strength as needed)
- Keep skin moist with Vasoline and occasionally mix with Triamcinolone 0.1% to decrease inflammation
- Treat fungal infections

Management of Venous Disease

- When pts have breakouts or ulcers develop, switch to moist compression dressings (Unna Boots) or Profores

- Dressings should be changed weekly

- Recommend F/U in approx 3-4 days after initial application to ensure tolerance or dressings haven't slipped

Management of Venous Disease

- Some pts will require chronic Unna Boot/Profore therapy
- Others will achieve adequate control with compression stockings
- Some will require a combination/ alternation of therapeutic strategies

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One of biggest complaints-

Putting on the Stockings!!



Rarely covered by insurer



A Quick Re-Cap

- Keep it clean, keep it moist and remove barriers to healing
- Use topical enzymatic debriding ointments to reduce fibrin and slough
- Manage infection
- Enhance nutrition
- Encourage regular follow-up

SAMPLE CASE REPORTS

The Role of Hyperbarics



Hyperbarics and Wound Care

- Enhancement of tissue oxygenation: crucial to collagen production
- Enhancement of immune system function and response
- Stimulation of angiogenesis
- Stimulation of growth factors
- Down-regulation of inflammatory cytokines

HBOT and Wound Care

Use of HBOT is approved for use with:

- Chronic wounds
- Salvage of flaps and grafts
- For wounds where periwound oxygenation is below that needed for collagen production (<30mmHg in Non-diabetics and <40mmHg in diabetics). These values are assessed by TcPO2

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HBOT and Wound Care

- Necrotizing infections
- Compartment Syndrome
- Soft Tissue Radiation Injury
- Refractory Osteomyelitis
- Gas Gangrene
- Thermal Burns

HBOT and Wound Care

- HBOT CAN help with MICROVASCULAR compromise e.g., the diabetic foot ulcer
- HBOT CAN NOT help much with MACROVASCULAR disease...for large vessel disease see the surgeons and crank up the statins and BP meds

Final Reflections

- Assess etiology
 - Pressure
 - Venous
 - Arterial
 - Underlying skin disease or cancer

Final Reflections

- Treat confounding variables (TREAT THE WHOLE PATIENT)
 - Infection
 - Malnutrition
 - Diabetes
 - Circulation
 - Smoking
 - Poor hygiene or use of home remedies
 - Minimize pressure sources

Final Reflections

- If wounds are secondary to venous stasis – apply compression dressings
- If wounds are secondary to arterial insufficiency – consider vascular surgery evaluation for macrovascular disease and HBO for microvascular disease

Basic Wound Care Principles

- CONVERT A CHRONIC WOUND TO AN ACUTE WOUND
- KEEP WOUND HAPPY --
 - MOIST, CLEAN WOUND BED
 - HEALTHY, DRY SKIN
 - CHANGE DRESSING NO MORE THAN NEEDED
- CONTROL “FACTORS”
- MONITOR REGULARLY