Navigating the Treacherous Waters of Wound Care
Overcoming fear and emotion

- People fear going into deeper ocean water for fear of shark bites
- Reality is, most shark bites occur in wading water depth
- The likelihood of a shark bite pales in comparison to death in car crashes or even lightening strikes
- If we look at the data we get a better perspective
Competitive Surfing Injuries

Andrew Nathanson, MD, Shark Bird, MD, Leland Desso, DO, Kelly Tam-Sing, MD

Abstract

Background: Surfing is a sport that has been growing rapidly in popularity, yet little is known about surfing injuries.

Purpose: To calculate an accurate injury rate for competitive surfing and to describe the relative frequency, mechanisms, and risks factors for acute surfing injuries.

Study Design: Descriptive epidemiology study.

Methods: This prospective study of acute competitive surfing injuries was carried out at 32 professional and amateur surfing contests worldwide between 1999 and 2009. All acute injuries sustained during competition were recorded by on-site medical personnel. The wave size, type of set, and number of surfing heats were also recorded for each day. The total number of injuries was divided by the total number of athlete exposures to determine injury rates. A multiple logistic regression was used to determine risk factors for injury.

Results: There were 118 injuries documented, 89 of which occurred during competition. There were 15,675 athlete exposures, yielding an injury rate of 5.7 per 1000 athlete exposures, or 9 per 1000 hours of competitive surfing. There were 8.5 significant injuries per 1000 hours of competitive surfing. The risk of injury was 2.4 (95% confidence interval, 1.5-3.6) times greater when surfing in waves overhead or bigger relative to smaller waves and 2.6 (95% confidence interval, 1.3-5.2) times greater when surfing over a rock or reef bottom relative to a sandy bottom.
Surfing Injury Risk

- 2009 American Journal of Sports Medicine
- Surfing is safer than soccer
Overcome Emotion and Tradition

- Wound treatments should be based on Evidence and Data
- It’s difficult to overcome

“We’ve always done it that way”

“My aunt had a wound like that and it worked for them”

“That’s what the doctor in the Hospital prescribed”
Pillars of a successful wound care program

• Proper equipment and supplies
• Current wound practices based on up to date clinical evidence
• Well defined and organized wound care team
Wound Care Treatment Options

Shark Bird, MD, CMD, CWSP
Vohra Health Services
Objectives

• Name the categories of wound dressings
• Identify the needs of the wound
• Match dressing choice to the needs of the wound
• Choose a dressing that is both cost effective and meets the needs of the patient
Wound Treatment Options

- Driven by condition of wound bed and surrounding tissue.
- Treatments may be optimized to create an optimal healing environment, in an economical way.
- A given wound may have several appropriate treatment options.
- Treatment should be changed in non-healing wound after 2-4 weeks if no known cause for healing delay.
Basic Treatment Categories

Moisture donating

Moisture absorbing

Enzymatic

Hemostatic

Antimicrobial
Basic Treatment Categories

- Cavity filling
- Stimulatory
- Substrate providing
- Artificial membranes
Treatment Decisions

If there is odor - **Eliminate** it

If there is bleeding - **Stop** it

If there is infection - **Kill** it

If it is too dry - **Moisten** it

If it is too wet - **Absorb** it

If you have necrotic tissue - **Debride** it

If there is a cavity - **Fill** it

If there is bleeding - **Stop** it

If there is odor - **Eliminate** it
Examples of Various Categories

- Necrotic tissue removal: collagenase
- Absorptive: alginates, foams, and hydrofibers
- Moisture donating: hydrogels

Cavity filling: packings (iodaform), gauze, alginates, and silicones
Antimicrobials: Silvers (alginates and gels), Antibiotics, PHMB
Coagulants: Hemabate, QuickClot, and clotting powders
Odor reducing: Carbon based, charcoal, and Dakins
Frequency of Treatment

- When possible a single treatment is best
- Multiple products increases cost.
- Many treatments can be changed every other day or less (every three days, three times per week, or even weekly)
- Nursing time is part of treatment cost
Debridement Options

- **Autolytic**: Slowest, uses bodies own enzymes to slowly eat away necrotic tissue
- **Mechanical**: Physical removal of necrotic tissue, ie wet-to-dry, pulse levage, whirlpool, ect…
- **Enzymatic**: Chemical enzymes that debride away necrotic tissue over a period of days to weeks.
- **Surgical/Sharp debridement**
Surgical Sharp Debridement

- Removal of necrotic tissue with a curette or blade.
- Well documented effectiveness in healing and prevention of infection.
- Removal of senescent cells in the presence of little visible slough
- Repeated procedures necessary to achieve optimal effect.
- Performed by a trained clinician ( Physician or trained Nurse Practitioner).
- Reduces the need for expensive enzymatics.
Current Enzymatic Debriding Agents

• Collegenase (Santyl)
  – Obtained from bacteria
  – Selective debridement of tissue types
  – Viewed as working from wound base up

• Avoid use with heavy metals

• When possible, quicker removal of necrosis can be achieved via surgical debridement
## Inhibition of Sanityl

### Table 1: Influence of silver dressings on enzymatic activity of C. collagenase.

<table>
<thead>
<tr>
<th>No</th>
<th>Product</th>
<th>Inhibition (%)</th>
<th>Type</th>
<th>Manufacturer</th>
<th>Description</th>
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<tbody>
<tr>
<td>1</td>
<td>Silverlon</td>
<td>44.3</td>
<td>Silver dressing</td>
<td>Arge ntum Medical, LLC</td>
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<td>2</td>
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<td>3</td>
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</tbody>
</table>
# Inhibition of Sanityl

## Table 2: Influence of silver dressings on enzymatic activity of C. collagenase.

<table>
<thead>
<tr>
<th>No</th>
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<th>Inhibition (%)</th>
<th>Type</th>
<th>Manufacturer</th>
<th>Description</th>
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<td>26</td>
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<td>Numark Laboratories</td>
<td>BFI in talc powder base</td>
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</tbody>
</table>
Antimicrobials

- **Antibiotics:** Over-use may lead to resistant bugs
- **Silver:** Bacteriostatic, no known resistance, not an antibiotic, therefore no resistance develops, but patient sensitivity can
- Avoid treating cultures of biofilm
Bleeding Wounds

- Pressure will stop most bleeding, don’t rub
- Silver Nitrate cautery
- Monsel’s Soln.
- Quick Clot
Wound Cultures

• Avoid cultures in well healing wounds without signs of infection
• Gold standard is tissue biopsy after removal of necrotic tissue and slough
• Lavine technique when biopsy not possible
• Biopsy should be performed by trained clinician.
Cavity Filling

- Calcium Alginate (maxorb)
- Hydrofibers (aquacel)
- Iodaform
- Silvasorb Cavity
- Hydrogel impregnated gauze
Stimulatory Agents

- Collegen Dressings (Fibercol, Puracol, Cellerate)
- Growth Factors (Regranex, Oasis)
- Trypsin containing agents (Xenoderm, Granulex)
Tissue Dressings

- Apligraf
- Skin Grafts
- Skin Flaps
Older Treatments to Avoid

- On rare occasions these treatments may still be appropriate.
  - Wet to dry
  - Dakin’s Solution
  - Betadine, Iodine, etc...
Dressing Selection Summary

- Wound bed condition drives treatment choice.
- Removal of necrotic tissue prevents infection, reduces bioburden and stimulates new growth.
- Single product use, with attention to cost, is crucial in today's environment.
- Re-evaluate wounds frequently and consider changes if 24 weeks pass without improvement.
Remember

The most important part of wound treatment is to remove the cause. This is 90% of the treatment. Topical dressings only contribute about 5-10% toward healing.
Sailing
Sail Boat Story

• Intro to team members: Eduardo, Megan… (wound care team)
• Intro to boat: Maku Maki (right equipment)
• Intro to Captain: Ned Webster (effective leadership)
• Identification of goal: Get to the florida Keys (clearly identified purpose)
• Problems: storm on the Horizon. (Unexpected results)
• Innovation: formation of ideas and solutions
• Solution: fixing the sails: (solution to correct results)
• Unpacking: (After Action Review)
Key Member of the Wound Care Team

• CNA: (Spotter)
• Nurse, Floor Nurse: (Sails)
• DON: (First Mate)
• Wound Physician: (Helmsman)
• Maintenance: (Deck Hands)
Wound Types: Not Just Pressure

- Pressure Ulcers
- Arterial Ulcers
- Venous Ulcers
- Diabetic Neuropathic Ulcers
- Surgical Dehiscence
- Traumatic wounds
Anatomy of Skin

• Largest Organ of the Body
• Subject to injury and failure
• Layers of the Skin

- Epidermis
- Dermis
- Subcutaneous Fat
- Muscle and Fascia
Types of Wounds

- Pressure Injury
- Arterial Ulcers
- Venous Ulcers
- Diabetic Neuropathic Ulcers
- Surgical Wounds-Dehisance
Pressure Injury
Pressure Injury

- **Stage one** = Redness
- **Stage two** = Damage to epidermis and or dermis, but not subcutaneous.
- **Stage three** = Damage down into the subcutaneous tissue, but not to muscle and fascia
- **Stage four** = Damage through Subcutaneous to level of muscle and fascia
Stage 1 Pressure Injury

- Redness only
- Skin is intact
- Underlying damage may not be evident
- Early recognition is key
Stage 2 Pressure Injury

• Broken Skin
• Involves epidermis and/or dermis
• No slough or necrosis present
Stage 3 Pressure Injury

- More significant damage to skin
- Involves epidermis, dermis, and subcutaneous tissue
Stage 4 Pressure Injury

- Most severe damage to skin
- Involves all layers of skin down to muscle and fascia
Unstageable Pressure Injury

- Can not visualize wound bed
- Number not assigned until full damage is determined
Arterial Ulcers

- Non pressure related, interruption or blockage of blood flow
- Distal portion of the lower Extremity, ankle, top of foot, toes
- Wound bed dry and pale, minimal exudate
- Intermittent claudication, decreased pulses, pain on elevation, cool to touch, decreased capillary refill
Venous Ulcers

- Open layer of skin and or subcutaneous tissue
- Venous hypertension from compromised valves, partial or complete venous obstruction, muscle pump failure (paralysis)
- Pretibial area
- Wound bed moist and granulating, with minimal to copious exudate.
- Pain in dependent position. Often recurring.
Neuropathic Ulcers

- Peripheral neuropathy from Diabetes
- Ball of foot over metatarsal heads, top of toes
- Resembles arterial, frequently infected
- Dx of DM required, with impaired sensation, may have Charcot deformity.
Surgical Wounds

• Typical Post surgical wounds should be clean, well approximated, and little to no drainage
• If early on a breakdown occurs, notify the surgeon as continued care may still be within the global period
• **Signs of concern:** non-healing, increased erythema, increased or pus drainage, wound separation, increased pain