Pressure Sores

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Staging

National Pressure Ulcer Advisory Panel (NPUAP)

- Founded in 1987
- Independent Non-Profit Organization
- Multidisciplinary Professional team
- Establish policy for the prevention and management of pressure ulcers
Staging

Stage I

- Nonblanchable erythema
- Intact Skin
Staging

Stage II

• Partial thickness tissue loss
• Does not extend beyond the dermis
• Skin tears, tape burns, masceration, excoriations are NOT stage II ulcers
Stage II Ulcer
Staging

Stage III
- Full thickness tissue loss
- Does not extend beyond fascia
- Depth varies
Staging

Stage IV

- Full thickness tissue loss
- Extends beyond fascia
- Depth varies
Staging

Deep Tissue Injury
- Intact skin
- Dark Purple or blue discoloration
- As opposed to stage I, rapidly advances to a deep lesion even with optimal management
Staging

Unstaggable

- Full thickness lesion that is filled with necrotic debris and/or covered by eschar
- Wound depth cannot be determined without debridement
Reverse Staging

Reverse Staging Not Recommended

- Ulcers do not heal in a stepwise fashion
- The healing process does not replace lost fat muscle or tendon
Therefore a stage IV lesion remains a stage IV
Pathogenesis
Factors that promote development

• Pressure
• Malnutrition
• Infection/Bioburden
• Necrosis
• Moisture
Pathogenesis Pressure

- In excess of 32mmHg restricts arteriolar flow
- Lying on standard hospital mattress = >150mmHg on bony prominences
- Sitting on hard bottom chair = >500mmHg on bony prominences
Pathogenesis Pressure

• Early porcine studies:
  Pressure in excess of 70mm Hg over a 2 hr period of time lead to irreversible tissue ischemia.
Pathogenesis
Malnutrition

- Animals with poor protein stores heal slowly.
- Protein supplements aid in prevention of pressure sores in “at risk” patients.
- Voluntary intake is more effective than tube feeding in promoting healing of pressure sores.
Pathogenesis
Infection vs Bacterial Bioburden

Infection:

$10^5$ colony forming units per gram of tissue...
Pathogenesis
Infection vs Bioburden

Infected ???
Pathogenesis
Necrosis

Necrotic tissue: Solid >> Liquid
- Impairs attachment of fibroblasts and granulation tissue
- Promotes development of infection/bioburden
- Promotes tissue death
Treatment

“You can put anything on the pressure sore but the patient.”

Anonymous
Principles of Wound Care

- Treat pain
- Relieve Pressure
- Address bacterial load
- Remove necrotic debris
- Maintain proper wound moisture
Treatment
Pain relief

• Common
• Can be managed thru non-pharmacologic and pharmacologic means
• Could be manifested by tachypnea, tachycardia, agitation, delirium
Treatment
Relieve Pressure

TURNING

• Standard Q 2 Hours
• Very little data supports this practice
Pressure Relief Mattresses

**STATIC**
- Overlays or mattresses
- Contain gel, foam, air or water
- Distribute local pressure over a wider body surface area

**DYNAMIC**
- Overlays or mattresses
- Power source alternates air or fluid current to distribute pressure
Low Air Loss
Pressure Relief Mattresses

- For high risk patients, specialized foam mattresses are more effective than standard mattresses.
- Low air loss better than foam mattresses in nursing homes.
- Air fluidized better than low air loss in acute care settings.
Treatment
Bioburden

• Impairs healing
• Critical concentration of pathogen is unknown
• Lack of systemic symptoms
Treatment
Topical Options

• Synthetic antimicrobials
• Dakins Solution
• Acetic Acid
• Sugar
• Buttermilk
Treatment
Debridement

- Sharp
- Mechanical
- Autolytic
- Enzymatic
- Biological
Debridement

Sharp
Debridement

MECHANICAL / WET TO DRY
Debridement
Debridement
autolytic
Debridement

Enzymatic
Biological Debridement

- sterile larvae. *Lucilia sericata*. Greenbottle Fly
- Larvae digest necrotic tissue and bacteria
- Useful in hard to reach wounds
- Patients usually reluctant to submit to procedure
Treatment
The Heel Ulcer

• Heel ulcers with dry eschar do not need to be debrided
• Monitor for edema fluctuance or drainage
Treatment
The Venous Stasis Wound
The Venous Stasis Wound

- Minimize Edema
- Remove excessive moisture
  - Sponge Dressings
  - Alginates
  - Unna boot
# Treatment
## Dressings

<table>
<thead>
<tr>
<th>Major Dressing Categories</th>
<th>Key Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alginates (sheets and fillers)</td>
<td>Soaks up excess moisture</td>
</tr>
<tr>
<td>Foams (sheets and fillers)</td>
<td>Soaks up excess moisture</td>
</tr>
<tr>
<td>Gauzes (woven and nonwoven)</td>
<td>Obliterates dead space</td>
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<tr>
<td>Hydrocolloids (e.g. Duoderm)</td>
<td>Retains moisture. Autolytic debridement</td>
</tr>
<tr>
<td>Hydrogels (sheets and fillers)</td>
<td>Retains moisture. Autolytic debridement</td>
</tr>
<tr>
<td>Transparent films</td>
<td>Retains moisture. Autolytic debridement</td>
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</tbody>
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Surgery and Pressure Ulcers

- Majority are healed without the aid of surgery
- Direct closure, skin grafts, skin flaps, musculocutaneous flaps
- PRO: Allows for quick resolution
- CON: Perioperative risk, wound must be clean and free of infection, recurrence rate can be as high as 60%
Growth Factors

- Becaplermin
- Platelet derived growth factor
- Chemotaxis to fibroblasts
- Wound must be clean and free of infection
- Cost: $642.00 for 15 gram tube
- Cancer ???
Vacuum Assisted Closure
The Wound Vac

- Promotes wound closure
- Removes necrotic debris
- Controls bacterial overload
- ? Improves blood supply
- Avoid use in untreated infections, underlying cancer, fistula to organ or body cavity
Wound VAC
Hyperbaric Oxygen

- No studies specifically geared toward pressure ulcers
- Serious adverse events include seizures and risk for pneumothorax