A REVIEW OF PRESSURE ULCERS
VIGILANCE, ASSESSMENT, PREVENTION AND TREATMENT

Brijesh Patadia, MD*

Eliot Mostow, MD, MPH
PRESENTATION OVERVIEW

- Introduction of Subject
- Statistics
- Pressure Sore Staging
- Pictures
- Pathophysiology
- Causes
- Assessment Tools
- Other Areas of Assessment
- Associated Factors
- Hospital Stay
PRESENTATION OVERVIEW

- Prevention of Pressure Ulcers – Guideline Discussion
- Treatment of Pressure Ulcers – Guideline Discussion
- Mattresses
- Support Surfaces
- Mattress Pictures
- Conclusions
- Conclusions of Interest
- Questions
- References

"You're not allowed to use the sprinkler system to keep your audience awake."

Courtesy www.tedgoff.com
Begin with the end in mind!

- Steven Covey
- One of “7 habits of highly effective people”
Pressure ulcer Prevention & Treatment

- Pressure relief
  - Mattress, pillows, orthotics, shoes
- Moist wound healing
- Infection control
- Skin Champions Program!
Grading Decubitus Ulcers

- Grade I: red but intact skin
- Grade II: epidermis or minor dermis
- Grade III: into subcutaneous fat
- Grade IV: into fat, muscle, and bone; often w/ osteomyelitis present
CONCLUSIONS

● Weaknesses of Guidelines
  – Not all guidelines are multidisciplinary-focused
    ● The development of a team approach delivers the best care to the patient from all aspects of the medical field
  – Target population in studies focused on adults
    ● There is still a need to assess the risk of pressure ulcer formation in young adults and children where the etiology of sores is different
CONCLUSIONS

- **Weaknesses of Guidelines**
  - **Methodologies between studies**
    - Inclusion-exclusion criteria, data extraction and analysis were not standardized between studies
  - **Implementation**
    - Most studies did not address how such guidelines would be administrated at the respective institutions (Langemo)
    - Overall, the ever important question that was least addressed was that of COST!!
CONCLUSIONS

● Guideline Attributes
  – Staging
    ● Provides a standardized staging format for pressure ulcers
    ● Helps hospital staff better classify ulcers and increase rates of recovery/prevention
  – Prevention/Treatment Guidelines
    ● Ability to effectively manage ulcer to reduce morbidity and mortality
    ● Reduce healthcare cost and augment patient outcomes
CONCLUSIONS

● Guideline Attributes
  – Appropriateness of care
    ● Based on increased staging, the level of care should increase
    ● The increased burden of Stage III and IV ulcers requires a team approach and appropriate monitoring to increase success rates
  – Beds
    ● Certain types of beds should be used at certain ulcer stages and characteristics
    ● Choosing the right bed early means saving money later
CONCLUSION OF INTEREST…

● One study in New York surveyed on their knowledge of pressure ulcer knowledge and clinical confidence
  – 42 geriatric fellows from Internal Medicine, Family Medicine
  – The fellows were asked via survey about
    ● Preparedness in treating pressure ulcers
    ● Knowledge of pressure ulcers, guidelines, and complications
  – Fellows felt adequately prepared to lead and teach about pressure ulcers on a Likert scale
    ● Adequate preparation in for choosing wound care products, directing nurses and other healthcare providers, and teaching
    ● Fellows were exposed to expert opinions from attendings, and taught students
    ● Being prepared to treat pressure ulcers scored highest on the Likert scale
      – The physicians felt comfortable enough in their fellowship to warrant treatment
CONCLUSION OF INTEREST...

- Most survey participants recognized risk factors, but fewer recognized the Braden Scale assessment tool (Odierna)

● Interesting finding, even though only one study
  - Shows that even fellows have difficulty identifying treatment options in pressure ulcers
  - Though treatment was scored highest, the Braden Scale, a validated and widely-used screening tool, was under-recognized
  - A BIG deal for residents!!
    ● Ability to recognize pressure ulcers, explore treatment options, and scales
    ● Increased healthcare costs when pressure ulcers go untreated
    ● Realize the use of a validated scale to help treat a fairly common problem in certain inpatient populations
    ● Ability to teach treatment options as an attending
Pressure Ulcers

- Known as sores/decubitus ulcers
- Localized injury to skin or underlying tissue
- Usually occurs at bony prominences
- Results from
  - Pressure
  - Shear
  - Friction (NPUAP)
- Other factors
  - Some of which will be discussed later!

www.npaup.org
Right groin:
Recurrent ulcers in skin folds...this one deeper and not responding to multiple treatments, most recently mesalt

Hidradenitis suppurativa

Obesity
90 yr old woman with enlarging ulcer

Multiple wound care visits over 6-9 months

Question raised by attendant of “abuse”

Basal cell carcinoma
Take Home Messages

- Measure progress
- Moist wound healing
- Prevent iatrogenic problems
  - Infections
  - Allergy
- Identify important diagnoses
  - Malignancies
  - PG
  - Vasculitis
  - Infections
  - Hidradenitis
  - Comorbidities
- Take care of normal skin and other skin problems!
Take Home Messages

- Etiology → Etiologies
  - Be a champion / Find a champion
- “Sharpen the saw” (Covey)
  - Seven Habits of Highly Effective People
  - Join AAWC
  - Go to a national wound meeting!
In 2003 there were 455,000 pressure sore-associated hospital stays – a 63% increase in 11 years.

Patients 65 years and older accounted for 72.3% of all hospitalizations during which pressure sores were noted.

Hospitalizations primarily for the treatment of pressure sores lasted nearly 13 days (Russo).

Costs for pressure ulcer treatment range between 400,000 to 700,000 dollars annually (Diamond).
Pressure Ulcers

- Ulcers can be staged based on depth and invasion of epidermis, dermis, and underlying fascia
- Ulcer stages range from Stage I-IV
- Some ulcers cannot be staged based on characteristics
  - Eschar formation
PRESSURE SORE STAGING

- Stage I
  - Intact skin with non-blanchable redness of a localized area usually over a bony prominence. Darkly pigmented skin may not have visible blanching; its color may differ from the surrounding area.
  - The area may be painful, firm, soft, warmer or cooler as compared to adjacent tissue. Stage I may be difficult to detect in individuals with dark skin tones.
STAGE I PRESSURE ULCER
Stage II

- **Partial thickness loss of dermis** presenting as a shallow open ulcer with a red pink wound bed, without slough. May also present as an intact or open/ruptured serum-filled blister.

- Presents as a shiny or dry shallow ulcer without slough or bruising. (Bruising indicates deeper tissue injury.)
STAGE II PRESSURE ULCER
Stage III

- Full thickness tissue loss. Subcutaneous fat may be visible but bone, tendon or muscle are not exposed. Slough may be present but does not obscure the depth of tissue loss.

- The depth of a stage III pressure ulcer varies by anatomical location. The bridge of the nose, ear, occiput and malleolus do not have subcutaneous tissue and stage III ulcers can be shallow. In contrast, areas of significant adiposity can develop extremely deep stage III pressure ulcers.
STAGE III PRESSURE ULCER
STAGE IV PRESSURE ULCER

- **Stage IV**
  - Full thickness tissue loss with exposed bone, tendon or muscle. Slough or eschar may be present on some parts of the wound bed.
  - The depth of a stage IV pressure ulcer varies by anatomical location. The bridge of the nose, ear, occiput and malleolus do not have subcutaneous tissue and these ulcers can be shallow. Stage IV ulcers can extend into muscle and/or supporting structures (e.g., fascia, tendon or joint capsule) making osteomyelitis possible. Exposed bone/tendon is visible or directly palpable.
STAGE IV PRESSURE ULCER
UNSTAGEABLE PRESSURE ULCER

● Unstageable
  - Full thickness tissue loss in which the base of the ulcer is covered by slough (yellow, tan, gray, green or brown) and/or eschar (tan, brown or black) in the wound bed.
  - Until enough slough and/or eschar is removed to expose the base of the wound, the true depth, and therefore stage, cannot be determined.

● (Pictorials courtesy of NPUAP)
UNSTAGEABLE PRESSURE ULCER

*Please see reference 3.
PRESSURE ULCER CAUSATION

Pressure ulcers can be staged & addressed!

- What is the actual cause of these ulcers in the average acute care hospital?
- What parts of the body are most susceptible to ulceration?
- Is there a difference between the areas of ulceration in adults versus children?
- A discussion on the pathophysiological aspects of ulcer formation
PRESSURE ULCER CAUSATION

- **Tearing**
  - Skin can tear simply from movement; sloughing of epidermis can occur as patients are moved to prevent pressure ulcers

- **Shearing**
  - Movement of skin in opposing directions can cause skin to ulcerate. Skin breakdown occurs between the skin-bed (surface) interface. (Ayello)

http://www.ldhpmed.com/images/DU_shearing.gif
CAUSATION

- Ulcers are typically found over
  - Bony prominences
  - Sacrum
  - Heels
  - Ischial tuberosity
  - Greater trochanter

- Infants and younger children load pressure differently
  - Greater prevalence of occipital pressure ulcers in that age group (Parish)

www.nursingquality.org
PATHOPHYSIOLOGY

- **Pressure and Pain Loss**
  - Unpadded beds can cause sustained localized pressure in soft tissues leading to loss of skin integrity and ischemia
  - Loss of pain receptors can cause a patient to subject his skin to shearing and tearing forces causing skin sloughing

- **Friction**
  - Repeated rubbing on bed sheets can irritate superficial lesions
  - Damp surfaces (from incontinence/improper temperature regulation) can cause adherent skin, friction, and shearing

- **Infection**
  - Superficial lesions become a nidus for infection, causing worsening lesions

- **Microthrombi**
  - Uninterrupted pressures cause stretching of skin and thus blood vessels, resulting in thrombi and skin ischemia
  - Enclosed circular areas of ischemic skin causes compressed and dehydrated subcutaneous tissue that can subsequently become necrotic (Parish)
HOSPITALIZATIONS IN WHICH PRESSURE ULCERS ARE PRESENT

- Statistics from the H-CUP (Healthcare Cost and Utilization Project) about ulcers
  - From inpatient population from acute care hospitals across the United States
  - Reported in 2003
  - Following table shows hospitalizations in order in which pressure ulcers were present

- These statistics are problematic and important
  - These statistics are from the United States
  - Includes teaching hospitals across country
  - Some reported issues are no longer reimbursable!!
TOP 10 MOST COMMON PRINCIPLE REASONS FOR HOSPITALIZATIONS DURING WHICH PRESSURE SORES WERE ALSO PRESENT, 2003 (Russo).

<table>
<thead>
<tr>
<th>Rank</th>
<th>Principle Condition (CCS)</th>
<th>Number of Hospitalizations Related to Pressure Sores</th>
<th>% of Hospital Stays with Pressure Sores</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Septicemia (except in labor)</td>
<td>45,900</td>
<td>11.8</td>
</tr>
<tr>
<td>2</td>
<td>Pneumonia (except TB, STD related)</td>
<td>35,500</td>
<td>2.7</td>
</tr>
<tr>
<td>3</td>
<td>UTIs</td>
<td>27,000</td>
<td>5.5</td>
</tr>
<tr>
<td>4</td>
<td>Aspiration pneumonitis, (food/vomitus)</td>
<td>22,800</td>
<td>11.7</td>
</tr>
<tr>
<td>5</td>
<td>CHF, nonhypertensive</td>
<td>18,900</td>
<td>1.7</td>
</tr>
<tr>
<td>6</td>
<td>Rehabilitation care, fitting prostheses, adjustment of devices</td>
<td>17,500</td>
<td>3.8</td>
</tr>
<tr>
<td>7</td>
<td>Fluid and electrolyte disorders</td>
<td>14,400</td>
<td>2.5</td>
</tr>
<tr>
<td>8</td>
<td>Complication of devices, implant, grafts</td>
<td>13,800</td>
<td>2.3</td>
</tr>
<tr>
<td>9</td>
<td>Respiratory failure, insufficiency, arrest (adult)</td>
<td>11,600</td>
<td>4.8</td>
</tr>
<tr>
<td>10</td>
<td>Diabetes mellitus, with complications</td>
<td>10,700</td>
<td>2.2</td>
</tr>
<tr>
<td></td>
<td><strong>Total Hospitalizations for top 10 principle conditions</strong></td>
<td><strong>218,100</strong></td>
<td><strong>3.7</strong></td>
</tr>
</tbody>
</table>
WHAT TO DO, WHAT TO DO?!

- Considering the health burden and the amount of people suffering from pressure ulcers, are there **assessment tools** to prevent and analyze pressure ulcers?
- In addition are there **guidelines and standardized treatment options** for pressure ulcers that have shown to improve ulcer outcomes?
- What can the hospital do, in terms of beds and **pressure relieving devices**, to decrease the incidence of pressure ulcers?
ASSESSMENT TOOLS

- 2 major methods for evaluating pressure ulcers in the hospital setting (mostly by nursing staff)
  - Skin assessment tool
    - Allows for dated assessment of skin integrity and breakdown sites
    - Can be done daily
    - Useful in documenting outcomes of prevention/treatment methods
    - Elicits information about bony prominences where pressure ulcers are likely.
    - Provides a methodological tool for nursing staff to provide a standardized assessment tool for all patients (http://www.bradenscale.com/skinassess.htm)
    - Confounding factors may include improper documentation, inability to adequately examine body (spinal cord injury), or different interpretation of pressure ulcer staging
ASSESSMENT TOOLS

- 2 major methods, cont.
  - Braden scale
    - **Determined by six subscales** including sensory perception, moisture, activity, mobility, nutrition, and friction & shear
    - **Scores can range from 6 to 23**, where a higher number indicates a lower risk of pressure ulcer formation
    - 19 to 23, not at risk; 15 to 18, mild risk; 13 to 14, moderate risk; 10 to 12, high risk; 9 or lower, very high risk
    - **A lower score indicates lower mobility**, which increases risk of pressure ulcer formation
    - Studies since its inception have indicated a high validity and development of risk stratification (Braden)
<table>
<thead>
<tr>
<th>BRADEN SCALE FOR PREDICTING PRESSURE SORE RISK</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient's Name</td>
</tr>
<tr>
<td>Evaluators Name</td>
</tr>
<tr>
<td>Date of Assessment</td>
</tr>
<tr>
<td>SENSORY PERCEPTION</td>
</tr>
<tr>
<td>ability to respond meaningfully to pressure-related discomfort</td>
</tr>
<tr>
<td>1. Completely Limited Unresponsive (does not moan, flinch, or grasp) to painful stimuli, due to diminished level of consciousness or sedation. OR limited ability to feel pain over most of body</td>
</tr>
<tr>
<td>2. Very Limited Responds only to painful stimuli. Cannot communicate discomfort except by moaning or restlessness. OR has a sensory impairment which limits the ability to feel pain or discomfort over ¼ of body.</td>
</tr>
<tr>
<td>3. Slightly Limited Responds to verbal commands. Cannot always communicate discomfort or the need to be turned. OR has some sensory impairment which limits ability to feel pain or discomfort in 1 or 2 extremities.</td>
</tr>
<tr>
<td>4. No Impairment Responds to verbal commands. Has no sensory deficit which would limit ability to feel or voice pain or discomfort.</td>
</tr>
<tr>
<td>MOISTURE</td>
</tr>
<tr>
<td>degree to which skin is exposed to moisture</td>
</tr>
<tr>
<td>1. Constantly Moist Skin is kept moist almost constantly by perspiration, urine, etc. Dampness is detected every time patient is moved or turned.</td>
</tr>
<tr>
<td>2. Very Moist Skin is often, but not always moist. Linen must be changed at least once a shift.</td>
</tr>
<tr>
<td>3. Occasionally Moist Skin is occasionally moist, requiring an extra linen change approximately once a day.</td>
</tr>
<tr>
<td>4. Rarely Moist Skin is usually dry, linen only requires changing at routine intervals.</td>
</tr>
<tr>
<td>ACTIVITY</td>
</tr>
<tr>
<td>degree of physical activity</td>
</tr>
<tr>
<td>1. Bedfast Continued to bed.</td>
</tr>
<tr>
<td>2. Chairfast Ability to walk severely limited or non-existent. Cannot bear own weight and/or must be assisted into chair or wheelchair.</td>
</tr>
<tr>
<td>3. Walks Occasionally Walks occasionally during day, but for very short distances, with or without assistance. Spends majority of each shift in bed or chair.</td>
</tr>
<tr>
<td>4. Walks Frequently Walks outside room at least twice a day and inside room at least once every two hours during waking hours.</td>
</tr>
<tr>
<td>MOBILITY</td>
</tr>
<tr>
<td>ability to change and control body position</td>
</tr>
<tr>
<td>1. Completely Immobile Does not make even slight changes in body or extremity position without assistance.</td>
</tr>
<tr>
<td>2. Very Limited Makes occasional slight changes in body or extremity position but unable to make frequent or significant changes independently.</td>
</tr>
<tr>
<td>3. Slightly Limited Makes frequent though slight changes in body or extremity position independently.</td>
</tr>
<tr>
<td>4. No Limitation Makes major and frequent changes in position without assistance.</td>
</tr>
<tr>
<td>NUTRITION</td>
</tr>
<tr>
<td>usual food intake pattern</td>
</tr>
<tr>
<td>1. Very Poor Never eats a complete meal. Rarely eats more than ¼ of any food offered. Eats 2 servings or less of protein (meat or dairy products) per day. Takes fluids poorly. Does not take a liquid dietary supplement OR is NPO and/or maintained on clear liquids or IVs for more than 5 days.</td>
</tr>
<tr>
<td>2. Probably Inadequate Rarely eats a complete meal and generally eats only about ¼ of any food offered. Protein intake includes only 3 servings of meat or dairy products per day. Occasionally will take a dietary supplement OR receives less than optimum amount of liquid diet or tube feeding.</td>
</tr>
<tr>
<td>3. Adequate Eats over half of most meals. Eats a total of 4 servings of protein (meat, dairy products per day. Occasionally will refuse a meal, but will usually take a supplement when offered OR is on a tube feeding or TPN regimen which probably meets most of nutritional needs.</td>
</tr>
<tr>
<td>FRICITION &amp; SHEAR</td>
</tr>
<tr>
<td>1. Problem Modest to maximum assistance in moving. Complete lifting without sliding against sheets is impossible. Frequently slides down in bed or chair, requiring frequent repositioning with maximum assistance. Spasticity, contractures or agitation leads to almost constant friction.</td>
</tr>
<tr>
<td>2. Potential Problem Moves feebly in and out of bed or chair. Requires minimum assistance. During a move skin probably slides to some extent against sheets, chair, restraints or other devices. Maintains relatively good position in chair or bed most of the time but occasionally slides.</td>
</tr>
<tr>
<td>3. No Apparent Problem Moves feebly and independently and has sufficient muscle strength to lift up completely during move. Maintains good position in bed or chair.</td>
</tr>
</tbody>
</table>

http://www.bradenscale.com/skinassess.htm
OTHER ASSESSMENTS

- Keep in mind risk stratification for those patients suffering from immobility, diabetes mellitus, or sores prior to admission to care facility

- Institute for Healthcare Improvement recommendations (Ayello)
  - Pressure ulcer survey on admission
    - Helps to monitor for changes in lesions using the Braden Scale.
  - Reassess risk for ulcer formation daily
    - The use of standardized assessment forms helps to show changes over hospital stay
    - Informs care staff if pressure ulcer formation occurs
  - Inspection of skin daily
    - As above, helps monitor changes in skin integrity.

- These assessments become increasingly important as pressure ulcers have an increased healthcare burden and hospitals are no longer reimbursed for sore formation “in house.” (CMS)
As of October 2008, Medicare will no longer cover treatment costs for pressure ulcer formation (CMS)
  - The focus of hospitals had been on treatment and not prevention
  - This changes the focus for hospital employees on assessment and preventive measures instead on simply treatment
    - What are the responsibilities of the house staff to prevent pressure ulcers?
    - Now that reimbursement does not occur, where will the money come from?
  - CMS has stopped reimbursing for other conditions (hospital-acquired UTIs) since last year
    - What does this mean for the standard of care in the United States?
    - What does it mean for healthcare costs if these conditions, when they occur, must be covered by the care facility?
FACTORS ASSOCIATED WITH PRESSURE ULCERS

- One study found that there are factors associated with the pressure ulcers in adults
  - **Age**
    - Without deficits in sensory perception, increased age was correlated with an increased rate in pressure ulcers
  - **Male gender**
    - It was found that in patients with a nutritional deficit, males had a higher rate of pressure ulcers than female patients
  - **Sensory deficits**
    - These patients had a higher rate of pressure ulcers
    - Those patients with deficits were equal in both the ulcer and ulcer-free groups, except for those aged 70-80 and 80-90.
    - Sensory deficits and pressure ulcers did not correlate with age (pressure ulcers can occur in patients with sensory deficits regardless of age)
    - Important aspect – must treat patients with sensory deficits
FACTORS ASSOCIATED WITH PRESSURE ULCERS

- **Study (cont.)**
  - **Moisture**
    - Increased risk of pressure ulcers by a factor of ten
    - When sensory deficits were combined with moisture, pressure ulcer risk increased 34x
  - **Fecal/Urinary Incontinence**
    - Increased risk of pressure ulcer formation
  - **Mobility**
    - No significant increase (though other studies have correlated decreased mobility with increased pressure ulcer risk)
  - **Nutrition**
    - With nutritional deficit, twice as likely to develop pressure as a male versus female
  - **Friction/Shear**
    - Increased risk with increased shear forces, friction from bed and bed sheets (Fisher)
LENGTH OF HOSPITAL STAY

- Morbidity of pressure ulcers increased the hospital stay by nearly **4.5 days** independent of any other factor
- Leading units in which pressure ulcers were, in order, General Medicine, Cardiology, and Orthopedics
- **While Stage I pressure ulcers did not add days to the length of stay, Stage IV ulcers caused a significant increase in admission duration** (Graves)
PREVENTION MEASURES

- Skin inspections
  - As before, these should occur regularly, whether there is ulceration, recovery, or intact skin
  - Special attention should be paid to bony prominences at least daily
  - Assess and monitor pressure ulcers at each dressing change and reassess weekly

- Assess the patient’s **nutritional status** on admission and monitor for malnutrition (i.e. serum pre-albumin, albumin)

- Individuals with pressure ulcers should **not be placed on foam mattresses**!
  - Regular foam does not distribute patient weight uniformly and may worsen/cause pressure ulcers
PREVENTION MEASURES

● Prevention
  - Do not elevate head of bed above 30 degrees if medical condition will allow it
    ● Added elevation will caused increased stress on the sacrum
  - Reposition chair-bound patients every 15 minutes if possible and two hours for bed-bound patients
  - Relieve heal pressure with pillows and pressure-relieving beds (more on that later)
  - Established bowel and bladder program with incontinent patients
    ● Clean and dry skin after each incontinent episode
  - Incontinence skin barriers to prevent infection
  - Maintain adequate nutrition as allowed by patient condition and needs
A Word on Nutritional Status

- Protein is needed for the formation of granulation tissue
- Attempt to achieve a weight close to ideal to avoid malnutrition
- Remember to obtain albumin and pre-albumin levels
  - Pre-albumin – recent protein consumption
  - Albumin – long-term protein consumption
- Encourage nutritional support for the malnourished patient
  - Do not forget about re-feeding syndrome
  - Obtain information about content of nutritional supplement
- Attempt to meet nutritional needs as quickly as possible in the malnourished patient to decrease the risk of pressure ulcers and overall mortality
  - Parenteral nutrition is appropriate when a patient is unable to eat
PREVENTION MEASURES

- **Pressure Redistributing Devices**
  - Devices should reduce the pressure load on bony prominences or any one part of the body
  - Mattress should be complaint to patient’s body (immersion theory)
  - At risk patients should not be placed on foam mattresses
  - High risk patients should be placed on alternating pressure mattresses or pressure redistributing devices
  - Repositioning should still occur in the above pressure relieving devices
  - Relieving devices should not be undermined by the use of chair-sitting
PREVENTION MEASURES

- Positioning
  - Repositioning should also be according to the results of the skin examination with “at risk” patients
  - Repositioning should also take into account the patient’s condition including medical condition, comfort, and injury
  - Manual handling devices should be used properly as to avoid shearing and tearing of skin (movement devices)
  - After movement, slings and sleeves should be removed for the aforementioned reasons
TREATMENT MEASURES

● Wounds/Ulcers
  - **Cleanse the wound** with each dressing change with a noncytotoxic cleanser to minimize trauma to wound
  - Consider **high-pressure irrigation** to moving sloughing and necrotic tissue
  - **Debride** the ulcer of devitalized tissue
  - Do not debride dry, black eschar that are nontender, nonfluctuant, or nonerythematous
    - Eschar formation will attempt to keep bacterial infections at bay; its debridement may cause formation infectious nidus
  - Perform wound care using **topical dressings**
  - Choose dressings that provide a moist wound environment, keeping periwound skin dry, control exudates, and eliminate dead space
TREATMENT MEASURES

- Infection
  - **Reassess** the wound during dressing changes for skin deterioration
  - Obtain a **quantitative culture** or tissue biopsy if high levels of bacteria are suspected around the wound site (non-healing)
  - Use **topical antibiotics** selectively to avoid resistance
  - Use systemic antibiotics if bacteremia, sepsis, advancing cellulitis, or osteomyelitis is present
  - Evaluate the need for surgery in Stage III ulcers if the wound is refractive to treatment
  - Implement measures to control pain
  - Monitor patients with infection, Stage III ulcers vigilantly for recurrence of pressure ulcers/sores
TREATMENT MEASURES

● Decreased tissue perfusion and oxygenation leading to necrotic tissue requires debridement
  – Surgical/sharp debridement
  – Mechanical debridement
    ● Wet-to-dry dressings, wound irrigation, whirlpool techniques
  – Enzymatic debridement
    ● Exogenous enzymes that remove necrotic tissue
  – Autolytic debridement
    ● Moist interactive dressings that allow natural wound fluids and enzymes to soften and liquefy slough epidermis and promote granulation

● Dressings
  – Keep the wound moist to promote healing
TREATMENT MEASURES

- Surgery
  - Topical antibiotic agents must be used prior to surgical considerations
  - Final invasive choice for refractory pressure sores
  - Necrotic tissue must be debrided
  - Post-surgical padding must be placed in the wound so that another pressure point is not created
  - Removal of the bony prominences at the site of the pressure ulcer is indicated to alleviate pressure points and tissue necrosis
  - Surgery is not indicated in elderly patients, those with fatal comorbidities, or those for whom palliative local wound care is more appropriate (Parish, AHRQ, Whitney)
MATTER OF MATTRESSES

- Support surface characteristics
  - Peak pressure measurement (greatest)
  - Pressure gradient (change/distance)
  - Immersion (amount of patient-bed interface)
  - Envelopment (deformation qualities of surface)
  - Shear (opposing motion of skin)
  - Friction (skin to surface, skin to bed sheet)
  - Temperature (susceptibility to injury?)
  - Moisture (ability for absorption)
  - Moisture vapor transmission rate (distance/SA)
MATTER OF MATTRESSES

- **Elastic foam**
  - Good resistance to pressure and low interface pressure (optimal)

- **Air-fluidized**
  - Increased immersion, less pressure on bony prominences
  - Must be pressurized constantly to avoid free-flow of body fluids

- **Low-air-loss**
  - Air can pass through cover material, decreasing moisture build-up
  - Pressurized air pumped in to provide loading resistance

- **Viscoelastic foam**
  - Open-cell foam, temperature sensitive
  - Increased temperature yields softer foam to decrease load, self-contouring

- **Fluid-filled**
  - Air, water, or synthetic silicon-derived fluids
  - Flotation – high immersion, increased surface area of weight distribution (Brienza)
WOE IS ME, WHAT MATTRESS?

- **Group 1**
  - No electricity required, includes foam, gel, and water mattresses or overlays
  - **Meant for pressure ulcer prevention**

- **Group 2**
  - Dynamic powered surfaces and advanced non-powered surfaces
  - Powered by electricity or pump
  - Inflation/deflation to alternate pressure surfaces
  - **Indicated for Stage III, IV sores**

- **Group 3**
  - Air-fluidized beds, high-air-loss systems with ceramic silicone beads that become fluidized as warm pressurized air is forced through the beads
  - Fluid feels always constant relief of pressure surfaces
  - **Indicated for Stage III, IV ulcers not improving with Group 2 mattresses** (Maklebust, Lyder)
MATTRESS MATTERS

- Hill-Rom Acucair
- Pressure, shear, friction, moisture reduction
- Stage I and II pressure ulcers w/ excessive moisture

Picture Courtesy of Hill-Rom.com
MATTRESS MATTERS

- Hill-Rom Flexicair
- Low-air-loss mattress
- Prevention and treatment for patients with pressure ulcer
- Relief surface

Picture Courtesy of Hill-Rom.com
MATTRESS MATTERS

- Hill-Rom Clinitron
- Air-fluidized therapy
- Burns, Stage III, IV ulcers, flaps, grafts
- Minimize friction and shear
- Relief surface (Kay)

Picture Courtesy of Hill-Rom.com
In matters of choosing mattresses

- Is it reasonable to move a patient from one bed to another of ulcer stage increases?
  - Cost effectiveness
  - Patient stability
  - Ease of patient movement?
- Will this save the healthcare system money?
  - Patient risk versus costs
    - Moving the patient may decrease the duration of pressure ulcers, but how much will it cost?
    - Without moving the patient, can you effectively treat the patient with a pressure stage-mattress disparity?
CONCLUSIONS

- Weaknesses of Guidelines
  - Not all guidelines are multidisciplinary-focused
    - The development of a team approach delivers the best care to the patient from all aspects of the medical field
  - Target population in studies focused on adults
    - There is still a need to assess the risk of pressure ulcer formation in young adults and children where the etiology of sores is different
  - Methodologies between studies
    - Inclusion-exclusion criteria, data extraction and analysis were not standardized between studies
  - Implementation
    - Most studies did not address how such guidelines would be administrated at the respective institutions (Langemo)
    - Overall, the ever important question that was least addressed was that of COST!!
CONCLUSIONS

- Guideline Attributes
  - Staging
    - Provides a standardized staging format for pressure ulcers
    - Helps hospital staff better classify ulcers and increase rates of recovery/prevention
  - Prevention/Treatment Guidelines
    - Ability to effectively manage ulcer to reduce morbidity and mortality
    - Reduce healthcare cost and augment patient outcomes
  - Appropriateness of care
    - Based on increased staging, the level of care should increase
    - The increased burden of Stage III and IV ulcers requires a team approach and appropriate monitoring to increase success rates
  - Beds
    - Certain types of beds should be used at certain ulcer stages and characteristics
    - Choosing the right bed early means saving money later
CONCLUSION OF INTEREST...

- One study in New York surveyed on their knowledge of pressure ulcer knowledge and clinical confidence
  - 42 geriatric fellows from Internal Medicine, Family Medicine
  - The fellows were asked via survey about
    - Preparedness in treating pressure ulcers
    - Knowledge of pressure ulcers, guidelines, and complications
  - Fellows felt adequately prepared to lead and teach about pressure ulcers on a Likert scale
    - Adequate preparation in for choosing wound care products, directing nurses and other healthcare providers, and teaching
    - Fellows were exposed to expert opinions from attendings, and taught students
    - Being prepared to treat pressure ulcers scored highest on the Likert scale
      - The physicians felt comfortable enough in their fellowship to warrant treatment
CONCLUSION OF INTEREST…

- Most survey participants recognized risk factors, but fewer recognized the Braden Scale assessment tool (Odierna)

● Interesting finding, even though only one study
  - Shows that even fellows have difficulty identifying treatment options in pressure ulcers
  - Though treatment was scored highest, the Braden Scale, a validated and widely-used screening tool, was under-recognized
  - A BIG deal for residents!!
    ● Ability to recognize pressure ulcers, explore treatment options, and scales
    ● Increased healthcare costs when pressure ulcers go untreated
    ● Realize the use of a validated scale to help treat a fairly common problem in certain inpatient populations
    ● Ability to teach treatment options as an attending
REFERENCES

11. http://www.bradenscale.com/skinassess.htm. Used with permission from Dr. Barbara Braden & Dr. Nancy Bergstrom, Prevention Plus; Omaha, NE.
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- (12) http://www.bradenscale.com/skinassess.htm. Used with permission from Dr. Barbara Braden & Dr. Nancy Bergstrom, Prevention Plus; Omaha, NE.
- (16) Mattress matters section courtesy of Kay D, Cottingham TE. A Retrospective Study Examining the Time to Pressure Ulcer Development in Hospitalized Patients Experiencing Hip Fracture or Hip/Knee Arthroscopy. Akron General Medical Center, Akron, OH 2008.
- (19) Pressure Ulcer Staging and pictorials from the National Pressure Ulcer Advisory Panel (NPUAP) website with permission.
QUESTIONS???
THE END!