Case Study: Pressure Ulcers

Haley Herbst
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Outline

- Patient Profile
- Pressure Ulcer Background
- PU Stages
- Current Research
- Patient Application
- PES
- Conclusion
Patient Profile

- 75 year old
- Caucasian female
- Widowed
- Former Registered Dietitian
- LTC 6-7 years
  - Readmitted 10/03/12 after hospital stay w/ pyelonephritis
- Anthropometrics
  - 61"
  - 146#
  - BMI: 27.7; overweight
Patient Profile

- Dx: Stage II PU
- Hx: HTN, dyslipidemia, DM, morbid obesity, chronic GERD, aortic stenosis, left ventricular hypertrophy, dementia with progressive psychotic features, COPD, CHF, oral motor dysphagia
- Diet
  - Pureed, nectar thick liq
  - ProStat
  - Large protein serving TID
Pressure Ulcer

- Defined as a localized injury or damage to the skin and/or underlying tissue. They usually occur over a boney prominence, such as hips, heels, sacrum, buttocks or coccyx, caused by pressure, shear, friction, or a combination of these factors.
Prevalence

- 80% increase in pressure-ulcer related hospitalizations from 1993-2006.
- Prevalent in all settings
  - 2.3-28% cases in long term care
  - 18% in acute care
  - 0-29% in home care
- 1-3 million people in US with pressure ulcers
  - 60,000 will die from complications of PU

(AHRQ, 2008)
Expenses

- 13-14 day PU related hospitalization
  - $16-755 - $20,430
- Estimated future costs for US healthcare facilities as high as $15.6 billion each year
- Prevention and treatment imperative for reduced costs

(Russo et al., 2008)
Pathophysiology

- Result of
  - Pressure
  - Shear force
  - Friction
- Blood vessel occlusion
  - Ischemia, tissue necrosis
- Classified by National Pressure Ulcer Advisory Panel
  - Stage I-IV, unstagable, deep tissue injury
Deep Tissue Injury

- Purple or maroon localized area of discolored intact skin or blood-filled blister due to underlying soft tissue from pressure or shear.
Stage I

- Skin is intact with non-blanchable redness of a localized area usually over a bony prominence.
Stage II

- Partial thickness loss of dermis presenting as a shallow open ulcer with red/pink wound bed, without slough or bruising. Or may present as an intact or open/ruptured serum-filled blister.
Stage III

- Full thickness tissue loss with possible subcutaneous fat visible, but no bone, tendon or muscle exposed. Slough may be present and may include undermining or tunneling.
Stage IV

- Full thickness tissue loss with exposed bone, tendon, or muscle with possible slough present on some parts of wound bed. Often has undermining and tunneling. Osteomyelitis possible.
Unstagable

- Full thickness tissue loss with base of ulcer covered by slough and/or eschar in wound bed. Depth cannot be determined until slough or eschar is removed.
Risk for PU Development

- Advanced age
- Immobility
- Stress/Infection
- Compromised nutritional status
  - Unintentional weight loss, malnutrition, PEM, low BMI, reduced food intake, impaired ability to eat
- Braden Scale for Predicting Pressure Ulcer Risk
Nutritional Intervention

- Energy
- Protein
- Fluid
- Vitamin C
- Vitamin A
- Zinc
- Arginine
Research: Nutritional Intervention

- **Control group:** 30 patients
- **Intervention group:** 30 patients
  - Basal Energy Expenditure × 1.1 × 1.3-1.5
  - **Racol formula**
    - 4.38 g protein, 2.23 g fat, 15.62 g CHO per 100 mL
    - 1:3 ratio, 125 mcg Cu, 0.64 mg Zn
- **Stage III-IV PU**
- **12 week duration**

(Takehiko et al., 2011)
Research: Nutritional Intervention

- Control group
  - Mean kcal administered: 29.1 kcal/kg
  - Mean protein administered: 1.24 g/kg

- Intervention group
  - Mean kcal administered: 37.9 kcal/kg
  - Mean protein administered: 1.62 g/kg

(Takehiko et al., 2011)
Research: Nutritional Intervention

- Larger PU receive greater benefits than smaller PU (p<0.001)

(Takehiko et al., 2011)
Research: Nutritional Supplementation

- 245 long term care residents
- Stage II (25%), Stage III (26%), Stage IV (38%)
- Daily ONS for 9 weeks
  - 200 ml: 250 kcal, 20 g pro, 3 g arginine, 250 mg vitamin C, 38 mg vitamin E, 9 mg zinc
  - TID
- Average intake: 2.3 ± 0.56 servings/day
  - 575 kcal, 46 g pro, 6.9 g arginine, 575 mg vitamin C, 87 mg vitamin E, 21 mg zinc

(Heyman et al., 2008)
Research: Nutritional Supplementation

- **3 weeks**
  - Reduction: $1580 \pm 3743 \text{ mm}^2$ to $1103 \pm 2999 \text{ mm}^2$ ($p<0.0001$)

- **9 weeks**
  - Reduction: $1580 \pm 3743 \text{ mm}^2$ to $743 \pm 1809 \text{ mm}^2$ ($p<0.0001$)
  - Reduction of 53% compared with baseline

(Heyman et al., 2008)
Research: Nutritional Supplementation

Fig 2. An example of a grade III pressure ulcer in a patient at baseline (a), visit 2 (b) and visit 3 (c)

Fig 3. An example of a grade IV pressure ulcer in a patient at baseline (a), visit 2 (b) and visit 3 (c)

(Heyman et al., 2008)
Research: Nutritional Supplementation

- **Vitamin C**
  - Hydroxylation of proline and lysine for collagen synthesis
  - Prevent oxidative cell damage
- **Zinc**
  - Collagen formation, protein synthesis, cell growth
- **Arginine**
  - Conditionally essential during stress
  - Promote protein synthesis

(Heyman et al., 2008)
Research: Arginine Supplementation

- 34 spinal cord injury patients; Stage II-IV PU
  - 20 consumed supplement until full healing, 14 ceased before full healing
- Supplement: 500 kcal, 18 g pro, 9 g arginine, 500 mg vitamin C, 30 mg zinc.

(Chapman et al., 2011)
Research: Arginine Supplementation

- 2.5 fold greater rate of healing
  - 8.5 ± 1.1 weeks vs. 20.9 ± 7.0 weeks
  - p<0.04

- Compared to medical literature
  - Stage III: 6.5 ± 0.8 weeks vs. 18.2 weeks
  - Stage IV: 11.4 ± 2.0 weeks vs. 21 weeks
  - p<0.001

(Chapman et al., 2011)
## Nutrition Recommendations

<table>
<thead>
<tr>
<th></th>
<th>At-risk Prevention</th>
<th>STAGE I</th>
<th>STAGE II</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total Calories</strong></td>
<td>25-30 kcal/kg, weekly wts, liberalize diet, pro/kcal supp.</td>
<td>≥25 kcal/kg</td>
<td>30-35 kcal/kg</td>
</tr>
<tr>
<td><strong>Protein</strong></td>
<td>1.0-1.2 g/kg</td>
<td>1.25-1.50 g/kg</td>
<td></td>
</tr>
<tr>
<td><strong>Fluid</strong></td>
<td>≥30 ml/kg</td>
<td>≥30 ml/kg</td>
<td></td>
</tr>
<tr>
<td><strong>MVI</strong></td>
<td>1 MVI w/ mineral</td>
<td>1 MVI w/ mineral</td>
<td></td>
</tr>
<tr>
<td><strong>Vitamin C</strong></td>
<td>250 mg/day</td>
<td>500 mg/day</td>
<td></td>
</tr>
<tr>
<td><strong>Zinc</strong></td>
<td></td>
<td></td>
<td>220 mg ZnSO4/day x 10 days</td>
</tr>
<tr>
<td><strong>Vitamin A</strong></td>
<td></td>
<td></td>
<td>10,000 IU/day x 10 days</td>
</tr>
</tbody>
</table>
# Nutrition Recommendations

<table>
<thead>
<tr>
<th></th>
<th>STAGE III</th>
<th>STAGE IV</th>
<th>Max Level</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total Calories</strong></td>
<td>30-35 kcal/kg</td>
<td>30-35 kcal/kg</td>
<td>40 kcal/kg</td>
</tr>
<tr>
<td><strong>Protein</strong></td>
<td>1.5-1.8 g/kg</td>
<td>1.5-2.0 g/kg</td>
<td>Adjusted dependent on pt.</td>
</tr>
<tr>
<td><strong>Fluid</strong></td>
<td>30-35 ml/kg</td>
<td>30-35 ml/kg</td>
<td>As tolerated</td>
</tr>
<tr>
<td><strong>MVI</strong></td>
<td>1 MVI w/ mineral</td>
<td>1 MVI w/mineral</td>
<td>1 MVI w/mineral BID</td>
</tr>
<tr>
<td><strong>Vitamin C</strong></td>
<td>500 mg/day BID</td>
<td>500 mg/day BID</td>
<td>Ongoing not harmful</td>
</tr>
<tr>
<td><strong>Zinc</strong></td>
<td>220 mg ZnSO4/day x 10 days</td>
<td>220 mg ZnSO4/day x 10 days</td>
<td>Discontinue after 10 days</td>
</tr>
<tr>
<td><strong>Vitamin A</strong></td>
<td>10,000 IU/day x 10 days</td>
<td>10,000 IU/day x 10 days</td>
<td>Discontinue after 10 days</td>
</tr>
<tr>
<td><strong>Arginine</strong></td>
<td>14 g/day</td>
<td>14 g/day</td>
<td>No UL determined yet</td>
</tr>
<tr>
<td><strong>Glutamine</strong></td>
<td>14 g/day</td>
<td>14 g/day</td>
<td>0.57 g/kg/day</td>
</tr>
<tr>
<td><strong>HMB</strong></td>
<td>2.4 g/day</td>
<td>2.4 g/day</td>
<td>No UL determined yet</td>
</tr>
</tbody>
</table>
Patient Profile

- Female, Caucasian
- Widowed, former Registered Dietitian
- DOB: 9/5/1937; 75 years old
- Nursing home resident past 6-7 years
Patient Profile

- **Readmitted: 10/3/2012**
  - Hospital stay w/ pyelonephritis: 9/27 - 10/2
- **Dx: Stage II PU on coccyx**
  - Bedfast, chronic HTN (50 years), dyslipidemia (50 years), Type 2 Diabetes Mellitus (>20 years), morbid obesity (40 years), obstructive sleep apnea (35 years), osteoarthritis (40 years), chronic GERD, aortic stenosis, left ventricular hypertrophy, iron-deficiency anemia, dementia with progressive psychotic features (>7 years), COPD, CHF, oral motor dysphagia
Patient Profile

• **Anthropometrics**
  - Ht: 61”
  - Wt: 146#; 66.4 kg
  - BMI: 27.7
  - IBW: 105#; 47.7 kg
  - Unintentional wt. loss >7.5% in <91 days
    - 8.2% weight change in 62 days: 159# to 146#
Patient Profile

- **LTC Diet**
  - Pureed, nectar thick liquids, NAS, LCS
  - Standard diet:
    - 2100-2300 kcal
    - 70-80 g protein
    - 2000 ml fluid
Patient Profile

- Labs: 10/12/2012
  - Alb 1.9 L
  - RBC 2.93 L
  - Hgb 8.6 L
Diagnosis & PES

- **Dx:** Stage II PU at coccyx
- **PES**
  - Increased nutrient needs related to wound healing promotion as evidenced by stage II pressure ulcer at coccyx.
Estimated Needs

- **Estimated Needs**
  - 1990-2250 kcal (30-35 kcal/kg)
  - 81-97 g protein (1.25-.1.50 g/kg)
  - 1900 ml fluid (30 ml/kg)
Intervention

- **Nutritional Intervention**
  - Pro-Stat 30 cc
  - Large meat portion with meal TID
  - 500 mg vitamin C q day (since May 2012)
  - Niferex 150 mg BID

- **11/19 - RD recommended:**
  - Vitamin A 10,000 IU q day x 10 days
  - Zinc 220 mg q day x 10 days

- **Diet regimen will provide**
  - 2200-2300 kcal
  - 109-119 g protein
  - 2000 ml fluid
<table>
<thead>
<tr>
<th>Date</th>
<th>Healing Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>10/22</td>
<td>Stage II – 3.2 x 3, red, scant exudate</td>
</tr>
<tr>
<td>10/29</td>
<td>Stage II – 2 x 2, red, scant exudate</td>
</tr>
<tr>
<td>11/5</td>
<td>Stage II – 2 x 2, red</td>
</tr>
<tr>
<td>11/13</td>
<td>Stage II – 0.5 x 0.5, pink</td>
</tr>
<tr>
<td>11/20</td>
<td>Stage II – 0.5 x 0.5, pink</td>
</tr>
<tr>
<td>11/27</td>
<td>Healed</td>
</tr>
</tbody>
</table>
Conclusion

- MVI, vitamin A, and zinc was not given
- Increased energy and protein, vitamin C essential
- Niferex – oxygen to wound to repair and build new, healthy tissue
- Personal recommendation for increased healing rate:
  - 1 multivitamin w/ minerals
  - 500 mg vitamin C
  - 220 mg ZnSO4 x 10 days
  - 10,000 IU vitamin A x 10 days
  - Protein supplement, large portion meat


Questions?