

PRESSURE INJURIES ARE NOT HEALING... WHAT NEXT?

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Learning Objectives

- Understand the three pillars to pressure injury healing
- Review interdisciplinary discussion points and wound markers to identify when nutrition might be the issue
- Demonstrate how this could be applied to your clinical practice

Wound Healing Phases

Vascular Response

- Exists in both acute and, at one time in, chronic wounds
 - Carbohydrates & fat address increased energy needs to support inflammatory response, early cellular activity



This skin tear is clotting and trying to remove cellular debris

Wound Healing Phases

Proliferative Phase

- Early development of cells to heal the wound
 - Fibroblast predominates
- Carbohydrates also stimulate secretion of hormones and growth factors, including insulin that is helpful in the anabolic processes of the proliferative phase
- Proteins facilitate the progression from the inflammatory to the proliferative phase
 - Protein-energy deficiency may also decrease fibroblast activity, delaying angiogenesis and reducing collagen formation



This total knee incision is acutely inflamed and healing

Wound Healing Phases

- ❑ Scar formation and epithelial healing
- ❑ Not significant uptick in protein and energy needs
 - ▣ Vitamin A and C may delay this phase



This skin tear is healing with minimal scar at 10 days.

Wound Healing Phases

Chronic Inflammatory Phase

- The most common reason for wound healing delays
 - Biofilm and infection upregulate inflammation
- Protein and energy requirements of chronic wound patients may rise considerably



Wound Healing Phases

Proliferation with Contraction and Epithelialization

- Sacral wounds have no adipose tissue, so contraction is profound
 - Reulceration is common



Do pressure injuries start as acute wounds?

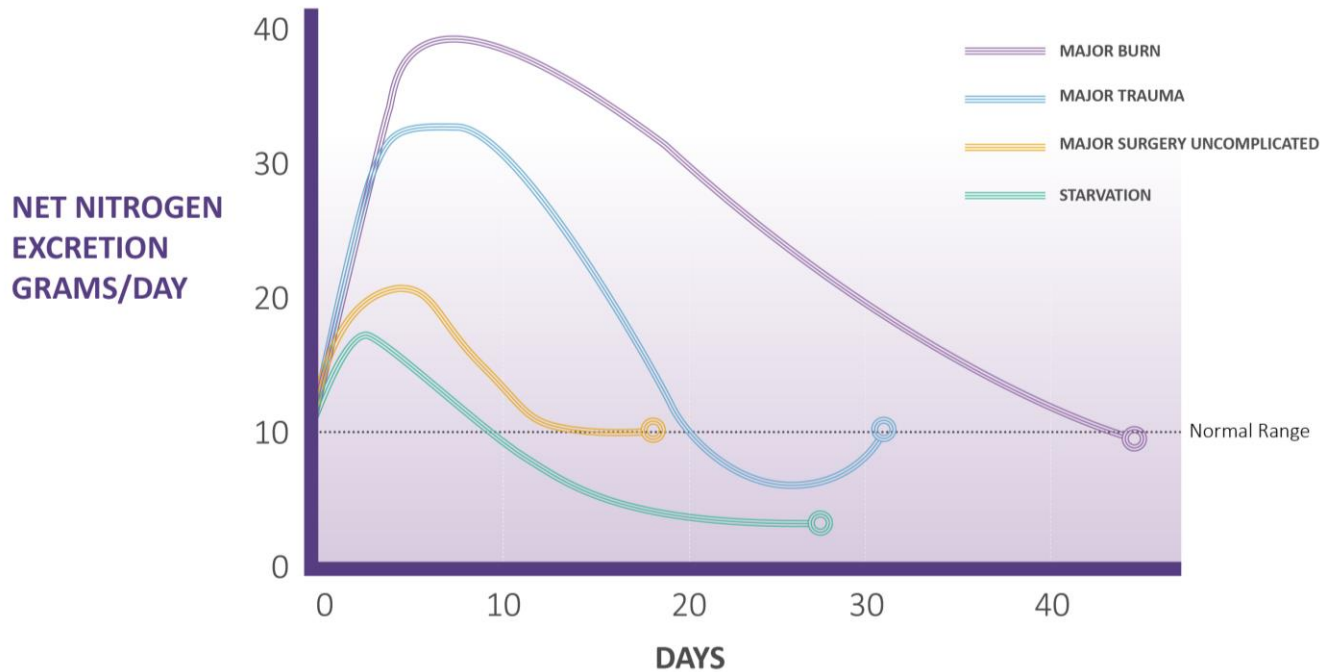
Is a stage 1 PI an acute wound?

- Probably, in that it is generally reversible without harm
- But it does not bleed, so acute wound healing may not begin



Stage 1 PI post one-hour operation in a 28-year-old

Catabolism - measured as nitrogen excretion



The loss of urinary nitrogen indicates a loss of body protein equivalent to 1-2 lbs of muscle a day. And the loss persists

Stage 3, 4, Unstageable and DTPI

Become chronic wounds quickly because they cannot heal rapidly



The 3-legged Stool of Healing

- ❑ Just like a 3-legged stool that tips over when one leg is missing, wound fail to heal without
- ❑ Addressing the etiology
- ❑ Nourishing the patient
- ❑ Protecting the wound from external harm
- ❑ Wounds become chronically inflamed

Controlling the cause

- ▣ Keeping pressure off the sacral or ischial PI
 - Turning side to side in bed
 - Limited sitting while in a chair
 - Repositioning hourly
 - Chair cushions
 - Progressive mobility – pro and con

Protecting the Wound From External Harm

- The major focus of wound care providers
- Many, many dressings on the market
- Basic dressing needs
 - Superficial skin wound/Stage 2 = non-adhesive foam
 - Full thickness with slough = Cadexomer iodine and Collagenase
 - Full thickness with eschar = debridement, packing with hydrofiber, cover with moisture resistance dressing
- Reduce biofilm in wound with acidic irrigants

Improving Nutritional Intake

- Hospital nutrition is often poor
 - Study of 6 years of data (N = 9959)
 - 32% of patients ate 25% of their meal or less on study day 2
 - Increased mortality for those who did not eat 25%
 - Hazard ratio = 3.24
- Lots of reasons

Braden scale for nurses

- Scored from 4 excellent to 1 poor

Nutritional Risk Screening

- Many of these screening tools
- In hospital setting 3 items predicted PI best
 - Have you eaten in the last week?
 - Has there been loss of weight in the last week?
 - Is BMI under 20?
 - Add- Is the patient critically ill?

Where do nurses miss the mark?

- ❑ Multiple days of NPO
- ❑ Nurses not scoring patients correctly on Braden
 - ▣ Often examine patient as a whole and infer nutrition
- ❑ Albumin and prealbumin used as serum markers
- ❑ Guesstimates of actual oral intake
- ❑ Missing weights
- ❑ Oral supplements missed
- ❑ Hours of missed tube feeding not replaced

Where do nutritionists miss the mark?

- ❑ Underestimate of BEE and stress factors for illness or wounds
 - ▣ Significant proteinaceous drainage from wounds
- ❑ Not liberalizing the diet for patients who are not eating
- ❑ Relying on information in the chart
- ❑ Not following up with nonresponsive MDs

Case Example

- 30-year-old morbidly obese man admitted 4/12 in heart failure with volume overload
 - ▣ Intubated for acute hypoxic respiratory failure (PaO₂ 84, PaCO₂ 57)
 - ▣ 5'11", 204 Kg, BMI 57, on Hill-Rom Progressa bed
 - ▣ Day after admission
 - Tube fed – Jevity 1.2 at 50/hr with 6 packets of ProStat Max (Na 138)
 - Without Propofol, provides 1920 kcal, 133 g protein and 972 ml water
 - Weight increased by 10 Kg , decreased by 5 Kg with diuresis next 48 hours
 - Estimations for nutritional needs from RD
 - IBW 78.2 Kg, 274% of IBW

Considerations for critical illness + obesity per ASPEN guidelines for permissive underfeeding:

Estimated calorie needs: 2350-3000 Kcal/day based on 11-14 Kcals/kg actual weight/d

Estimated protein needs: 156-196 grams protein/day based on 2-2.5 g/kg IBW/d.

Estimated fluid needs: per MD

Hospital week 1

- ❑ Pneumonia from COVID ruled out
- ❑ Cardiac arrest (PEA) x 3 with return of spontaneous rhythm
- ❑ AKI placed on dialysis
- ❑ Heart failure with pulmonary hypertension
- ❑ Tracheostomy

Braden Scale
Sensory 2
Moisture 4
Mobility 1
Activity 1
Nutrition 2
Friction/Shear 1

Hospital week 2

- DTPi discovered on 4/23
 - ▣ Blistered places onset around 4/20
 - ▣ Obesity extends that time a bit
- Nutrition
 - ▣ Two Cal HN at 35/hr with & ProStat Daily
 - 2240 kcals and 147 gm protein
 - Permissive underfeeding per ASPEN
- Fecal containment system placed for loose stool
- Moved to a bariatric bed



Week 3: Nutrition Care

- Weight 214 Kg BMI 65
- Trying oral feeds
- Wound debrided



Nutritional Follow Up

- Estimated calorie needs 1980-2375
- Estimated protein needs 132-172
- Currently on Nepro at 40/hr plus 6 prostat/day
- Weight 186.6 Kg (204 on Admission), BMI 57.40
- Tried oral feeding for 3 days, then aspirated
- Feeding changed to Two Cal HN with 7 ProStat
 - 2240 kcals, 147 gm protein

Wound Failing to Heal

- ❑ Necrotic tissue developing
- ❑ Wound expanding
- ❑ Multiple debridements
- ❑ Nutrition remained at 2240 kcals, 147 gm protein



What legs are missing?

- ❑ Offloading – over reliance on bed to turn patient
- ❑ Dressings – several packings and antibiotics
- ❑ Nutrition?
 - ▣ What was his true caloric need?
 - ▣ How can it be computed?

Harris Benedict

Basal Energy Expenditure: Harris-Benedict Equation

Estimate basal energy expenditure using the Harris-Benedict equations.

☒ Male ☐ Female

Input Height ☒ cm ☐ in

Input Weight ☒ kg ☐ lb

Input Age ☒ yrs ☐ mos

Stress Factor

Activity Factor ☒ Bedrest ☐ Ambulating

B.E.E. = kcal/d

Caloric Requirement = kcal/d

Resting metabolic rates (RMRs):

- Adipose tissue (19 kJ/kg/day) = low
- Skeletal muscle (54 kJ/kg/day)
- Liver (837 kJ/kg/day)
- Brain (1004 kJ/kg/day)
- Heart & Kidneys (1841 kJ/kg/day)

Harris-Benedict in 1919:

- Overestimate basal energy requirements in healthy normal-weight persons up to 15% as compared with REE measured by IC
- Normal-weight and obese persons combined have found an overestimation of 5%–13% by the Harris and Benedict equations

Indirect Calorimetry

- ❑ Indirect calorimetry provides one of the most sensitive, accurate, and noninvasive measurements of Energy Expenditure
 - Even in the obese
- ❑ Best done on ventilated patients
 - Can be done with a hood

What is the preferred future?

Interdisciplinary discussion points and
wound markers to identify when
nutrition might be the issue

When Wounds Are Not Healing

Examine the 3 legs

- Is the patient off the pressure injury?
 - If not, can the bed be upgraded?
 - Is a chair cushion needed?
- Is blood flow getting to the wound?

Topical Care

- Is the wound infected?
- Does it need debridement?

When Wounds Are Not Healing

Examine Nutrition

- If the wound bed is pale tissue
 - Lack of arterial flow
 - Lack of nutrient
- If the wound has stalled
 - Could be lack of protein or prolonged tissue unhealed
- Is the nutritional estimation correct?
- Are the nutrients being consumed?

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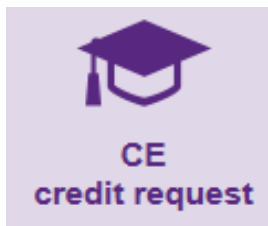
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