Is Pressure the Only Cause of Pressure Ulcers?

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Disclosures

• Speakers Bureau
  – Celleration, Coloplast, Hill-Rom, KCI, Sage Products

• Consultant/Advisory Panel
  – Cardinal Health, Celleration, Coloplast, Hill-Rom, KCI, Sage Products
Objectives

- Describe the usual causes of pressure ulcers
- Distinguish pressure ulcers from pressure, ischemia, shear and microclimate
- Discuss the terminal ulcer.

Participant Poll

Do you currently use the Braden Scale for pressure ulcer evaluation at your facility?
The Size of the Problem

- 7-12% of acute care patients (Whittington/Van Gilder)
  - Higher in critical care
  - Higher in hip fracture patients
- Up to 24% in Long Term Care
  - Higher in bedridden patients
- Frequent source of litigation
- Frequent source of fines under F 314 tag

The Cost of Pressure Ulcers

- Actuarial analysis of claims data
  - 6,319,486 errors in 2008
  - Largest annual cost
    - Pressure ulcers = 394,699 cases
      - >90% were preventable
      - 3.858 million dollars to treat
    - Surgical site infection = 265,995 cases
      - >90% were preventable
      - 3,676 million dollars to treat
  - Total cost to treat all errors = 19.5 billion
    - 17 billion for medical costs to treat
    - 1.4 billion for increased mortality
    - 1.1 billion in lost productivity

Shreve, 2010
Pressure is a Force on Tissue

- When pressure is applied to tissues, the blood flow to the tissue stops
- If the blood flow is stopped long enough, tissue will die
- When pressure is removed, the skin that was deprived of blood is given extra blood and the tissue becomes red.
  - Called reactive hyperemia

Ischemia Versus Direct Cellular Injury

- Theory of Deep Tissue Injury
  - Cellular fractures with immediate death of the cells and release of the cellular components into the tissues
    - Leading to further injury
  - Surrounding cells that are not “fractured” are injured from ischemia
Ischemia

- The theory we have “grown up with”
- Pressure impairs tissue perfusion
- May be the cause of stage I becoming a II becoming a III becoming a IV

Shear is Also a Force Leading to Ulcers

- Shear forces are tangential (angular) to the tissues
  - Pressure is perpendicular
  - Seen in skin and deeper tissues as body slides along a surface
- Shear also creates undermining in ulcers
  - The upper edge of the ulcer stays on the bed while the body slides
Shear Ulcers

- This dyspneic patient slid down in bed
- These ulcers were superficial at first with a flared edge
  - Became necrotic near the end of life

Microclimate is the Newest Concept

- Skin temperature and humidity in the space between the bed and the skin increases risk of pressure ulcers
  - Relatively ignored until recently
Microclimate

• As temperature of skin rises, the metabolic needs of the skin for oxygen and glucose rises
  – 10% increased need for each 1 degree
  – *These substrates cannot be delivered if the skin is under pressure*

Non-Breathable Dressing
Traps Heat and Humidity

- Dressing Injury
- Candidiasis
- IAD
- Deep tissue injury
- Stool on the skin
- Zinc oxide
Low Air Loss: Control Microclimate?

Heat and humidity accumulate between the skin and the surface.

Low air loss cannot cool those areas unless the patient turns.

If LAL could control microclimate, we would have air hockey.

How Does Low Air Loss Help Him?

[Image of skin condition]
Who Are High Risk Patients?

- Sweat produced to cool the body
  - Obese patients
  - Febrile (fever) patients
- Sweat produced due to stress on the sympathetic nervous system
  - Low Blood Pressures (shock states)
  - Myocardial Infarction (heart attack)
  - Shortness of breath/breathlessness
  - Head injury/Brain bleeds
- Sweat produced due to lack of control
  - Neurological disease
  - Spinal cord injury
  - Stroke

Other Causes

- Friction
  - Creates heat and leads to blisters
- Undernutrition
  - Lack of padding to protect lower layers of tissue
  - Edema from low serum protein levels increases risk of skin injury and reduces perfusion
Kennedy Terminal Ulcer

- Rapidly developing ulcer appearing about 48 hours prior to death
- Etiology unknown
  - Low perfusion during which the skin cannot recover from usual pressures?
  - Skin infarction?
  - Variant of DTI?

Tolerance for Pressure

- Skin should tolerate some pressure
  - Tolerance based upon
    - Skin health
      - Age, thin skin, cortisone use
    - Amount of padding
      - Fat not present on bony prominences
    - Native blood supply to the skin
      - Peripheral vascular disease
      - Shock treated with medications that shunt blood from skin
    - Swelling in the skin
      - Edema prevents oxygen and nutrients from reaching cells
    - Prior injury to the skin
      - Healed pressure ulcers, old scars
      - Existing pressure ulcers
Pressure Ulcer Prevention

• Keys are to understand where the risk is coming from
  – Direct cellular injury seen in DTI
    • Examine the patient profiles
      – Coming from ER? OR? ICU?
      – Improve mattresses on carts, OR tables and ICU beds
  – Ischemic changes
    • Examine turning schedules
    • Consider age of mattresses
  – Shear
    • Protect skin from shear injury with dressings

• Microclimate
  – Superficial ulcers that are hard to heal
  – Use Low Air Loss Beds in combination with turning

• Malnutrition
  – Consider alternate methods for feeding early
  – Get family involved and made aware of refusals to eat
Understanding the science of pressure ulcer formation allows us to target risk strategies.