Using Forensics to Get More out of Your Root Cause Analysis

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Today's Overview

1. Use a forensic process to identify when and where a pressure injury started
2. Describe commonly misidentified anatomical areas when locating pressure injuries
3. Determine the value of photographs

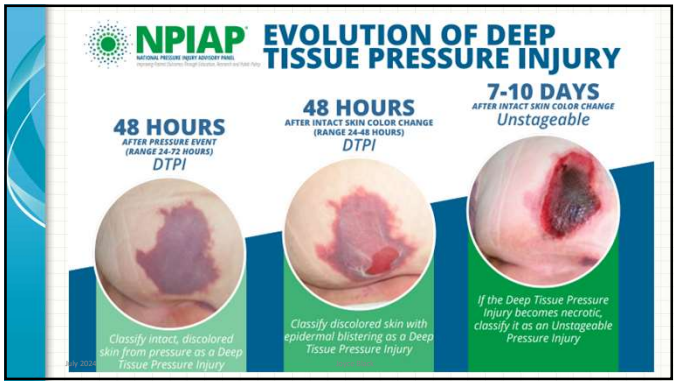
What is Forensics?

- Comes from the Latin word for "knowledge"
- Today, closely linked to the scientific method of solving problems
- Grounded in scientific principles to study a problem
  - Facts are facts

Ambroise Paré's surgical work laid the groundwork for the development of forensic techniques in the following centuries.

Using Forensics to Determine the Time of the Start of the Pressure Injury

- If inspection/palpation of the PI is:
  - Nonblanchable redness – less than 12 hours old
  - Nonblanchable purple or maroon --- 48 hours old
  - Superficial tissue loss or fluid filled blister --- 12-24 hours old
  - Blood blister – 48 hours old (perhaps more)
  - Blistering over a dark wound bed ---- 72-96 hours old
    - Often called a skin tear or a stage 2
  - Necrotic – at least 72 hours old
    - Time can increase if pressure is offloaded



Why is Timing So Important?

- With the timing, you can determine where the patient was at the time the pressure injury started
- You can also determine what was going on at that time
- Sometimes
  - The patient was not in your facility
  - The patient was undergoing a procedure which did not allow movement
    - Cardiac cath for example

Could my timing be off?

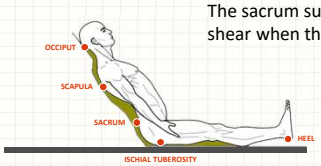
- Yes, my timing is biologically correct
- But consider, because you are looking at records
  - When is the skin assessment done?
    - Weekly? Daily?
    - Who does them?
    - What training does that person have?
  - Could there be a delay due to dark pigmentation of the skin?
  - Could the body part be hard to see?
    - Obesity? Deep within a skin fold? Under a medical device?

Location of the Pressure Injury

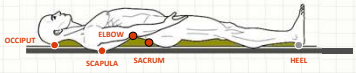
- An accurate description of the pressure injury will tell you what position the patient was in when the pressure injury first started
  - If the pressure event was a single period of time, the edges of the wound will be distinct
    - OR acquired, under a medical device, on the heel
  - If the pressure and especially shear occurred over time, the edges will be more ragged
    - Sacrum is the most common
    - Buttocks also common, mostly from friction and shear

Why the Sacrum?

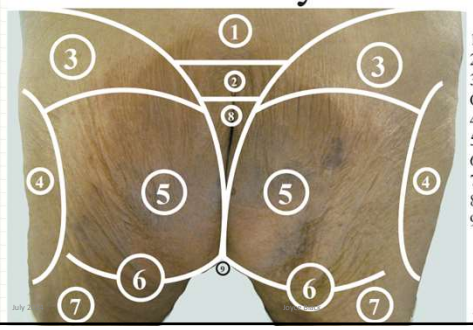
The sacrum sustains the pressure and shear when the head of bed is up



The buttocks sustain the pressure when the patient is flat



Surface Anatomy of the Buttocks

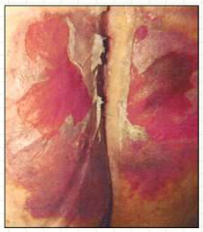


1. Sacrum
2. Coccyx
3. Posterior Iliac Crest
4. Trochanter
5. Gluteal Region
6. Ischium
7. Posterior Thigh
8. Gluteal Cleft
9. Perineal Area

Berke/Morris 2015 ©

Pressure Injury When the HOB is Flat

- The pressure is applied to the buttocks equally
  - Unless the patient is very thin
- When are patients completely flat?
  - During surgery
  - During radiology (CT, MRI, IR)
  - Sometimes in transport
  - During rapid transfusion for hemorrhage
    - In Trendelenburg



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Pressure Injury When HOB is 30 degrees

- When head is up 30 degrees
  - Skin is thin over sacrum and pressure and shear are placed on skin overlying sacrum
- This is the most common location for PI because almost all patients are positioned with HOB elevated at 30 degrees
  - Why?
    - Ventilator associated pneumonia precautions
    - Aspiration precautions
    - To watch TV
    - To see and talk to family
    - Habit when placing patient in bed

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When HOB is elevated to 45 degrees

- Pressure and shear move down the buttocks onto the flesh of the buttocks of gluteal tissues
  - In the unconscious patient, 45 degrees is the highest (and therefore worst) position with the greatest injury to the buttocks
  - This is one of the most commonly misidentified areas of pressure injury
    - Very commonly still labeled as sacrum
  - If photographs are used, they are a great asset to determine what actually happened
    - Patients with Do not Intubate orders or post Extubation are placed in high Fowlers
      - When maintained for several hours, these wounds develop

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When HOB is elevated to 90 degrees

- When sitting erect, the weight of the torso is on the ischial tuberosities (bones at the bottom of the pelvis)
  - Most commonly seen in patients with paraplegics with fused spinal cord injury
    - Many other chairbound patients do not sit that erect, they slouch
- Often misidentified as a lower buttock wound

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When patient is Contractured

- Pressure is applied to the trochanter
  - Very thinly padded prominence
  - Common to see wounds between the knees
- Fairly easy forensics because few patients sleep upright on their sides

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Let's stay in the buttocks for a moment

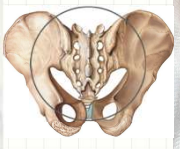
- Wounds from moisture
- Moisture (urine, stool and sweat) do not cause pressure injury but the fluid weakens the skin and decreases tolerance for pressure and shear
- Pressure injury has a distinct edge
- Wounds from fluid are located where fluid runs and have irregular edges

Chronic Friction Injuries

- Repeated skin damage from sliding
  - Seen in w/c dependent patients
- Mechanism of injury is not fully described but skin feels thick like callous
  - These are not pressure injuries
  - Berke, WOCN, 2016

Appearance of the Pressure Injury

- Generally, takes on the appearance of underlying bone
  - The sacral and pelvic bones are butterfly shaped



Pressure Injury on the Heels

- Occur in patients who are supine
- Very high risk patients make these wounds appear rapidly
  - Arterial disease reduces ability to reperfuse
    - Including vasopressors in ICU
  - Neuropathy reduces ability to sense
  - Orthopedic surgery/injury reduces ability to move leg
  - Devices on the leg reduces blood flow to heel
    - Elastic stockings, splints, casts, boots that cover the heel

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Other injuries on the heel and leg

Diabetic foot ulcers occur on the walking surfaces of the foot in an ambulatory diabetic. *Diabetics get pressure injury.*

Arterial ulcers occur on the lower leg in patients with advanced arterial disease, no hair, thick nails, no pulses. Often start as simple injury and become necrotic quickly. *These patients get pressure injury.*

Venous leg ulcers occur on the lower third of the leg. The wounds are shallow and irregular. The leg is often dark and scaly and swollen.

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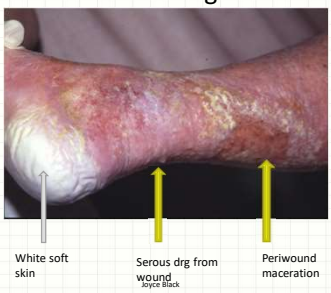
What is not a pressure injury on the heel --- Maceration from wet dressings



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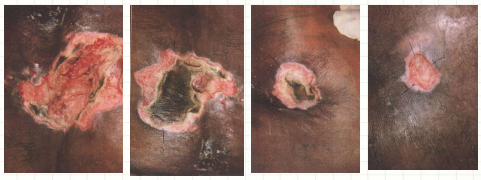
Photographs are Your Friend



Week 1 Week 3 Week 6 Week 12

Photographs

- Provide much more than the medical record
  - Record often has limited options for location of PI
  - Wound bed is not just 3 types of tissue
- When photographing
  - Get enough anatomy that the body part is obvious
  - Take the picture from the same angle each time
  - Do not move the tissue to alter anatomy
    - Difficult to tell that the photo is of an ischial ulcer!

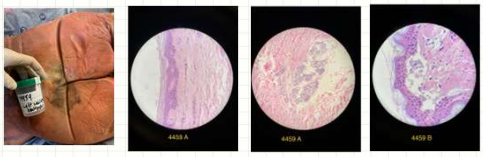
Skin Changes in the Dying Patient

- Subset of pressure injury
  - Develops quickly, usually on the sacrum or coccyx
  - Shaped like a pear or butterfly or horseshoe
  - Appears like an abrasion, blister or dark area
  - Rapidly becomes full thickness
  - 55.7% of patients with KTU died within 6 weeks

Kennedy KL. The prevalence of pressure ulcers in an intermediate care facility. Decubitus 1989;2(2):44-5.

From the November NPIAP Conference

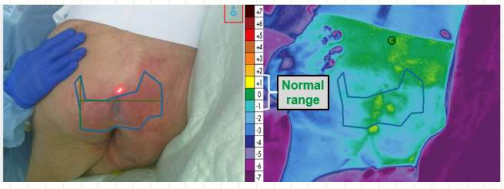
- Panelists shown image and asked to diagnose the skin change
- Pertinent patient history
  - 79-year-old female
  - PMH: Dementia, diabetes insipidus, chronic PEG tube, CKD
  - HPI: confusion and hypoxia admitted for severe sepsis and acute hypoxic respiratory failure
  - Wound examined on 9/2
  - Died the next day



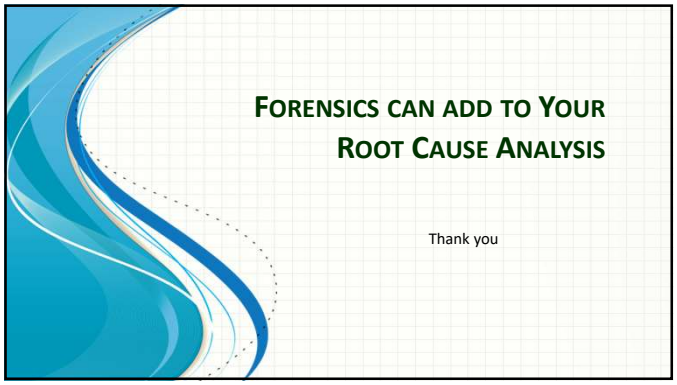
Biopsy of Post-Mortem Skin with EOL Skin Change

Skin specimens from body donors in sacral- coccyx area of discoloration

Thermographic Image of Skin Color Change



First discoloration on 1/17, date of death 1/18.


FORENSICS CAN ADD TO YOUR
ROOT CAUSE ANALYSIS
Thank you