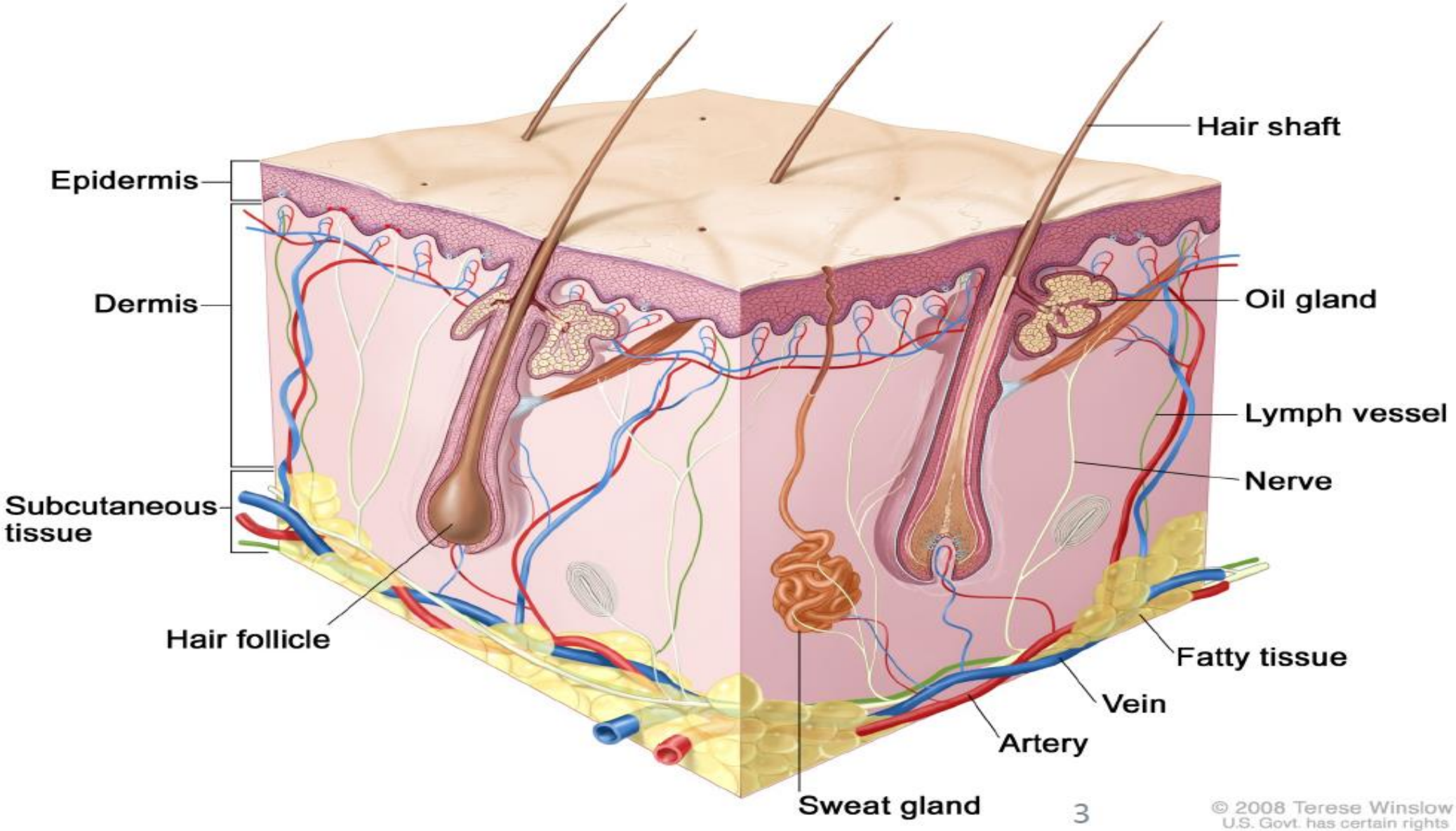
Anatomy of the Skin

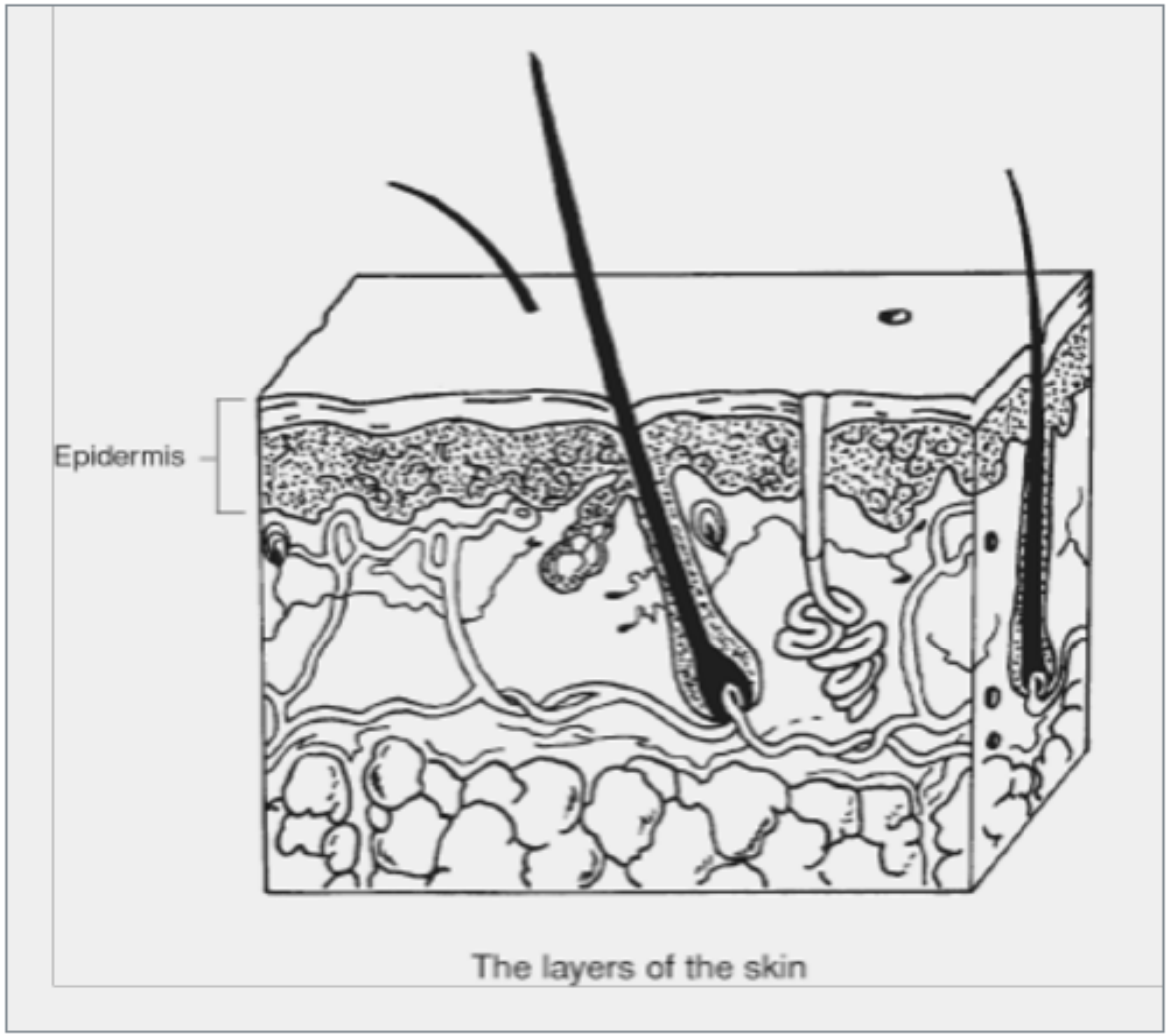


Skin

- Largest organ of the body
- Covers approximately 18 sq. feet & weighs up to 12 pounds (up to 15% of total body weight)
- Receives approximately 1/3 of circulating blood volume
- Normal skin temperature is 92°
- Can be nourished via perfusion and topically

Epidermis

- Visible layer of the skin
- Divided into 4-5 defined stratified layers – containing keratinocytes
- Outermost layer is called "stratum corneum"
- No blood vessels
- Nourishment originates from small blood vessels in the dermis
- Up to 1.5 mm thick



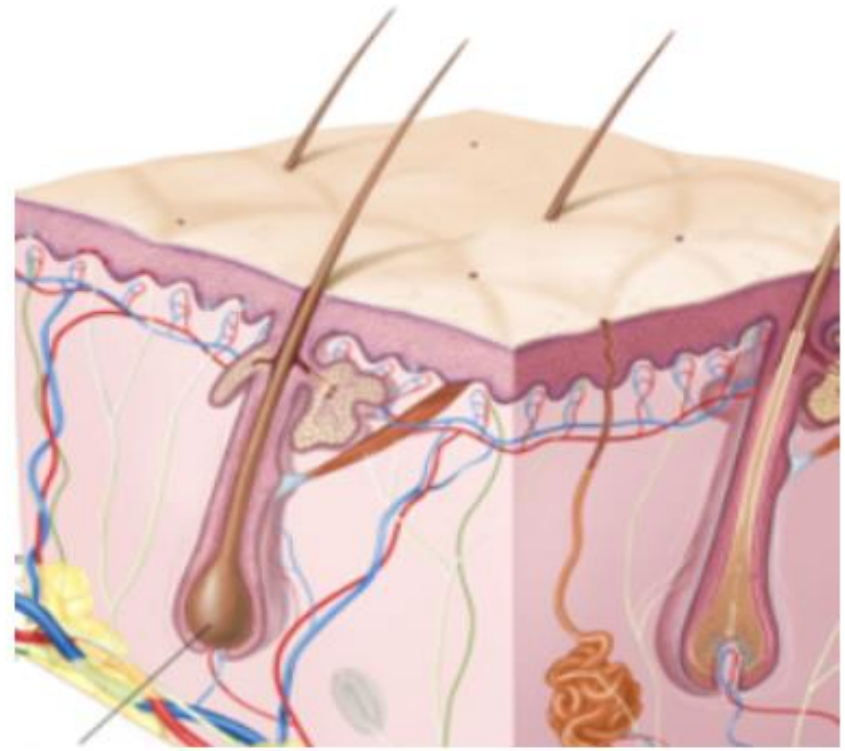
The layers of the skin

Stratum Corneum

- Consists of 15-20 layers or corneocytes (“dead” skin cells)
- Corneocytes held together by lipids
- Joined together by protein links called desmosomes
- Creates a “brick and mortar” structure of skin
- A healthy stratum corneum provides the best line of defense against invasion

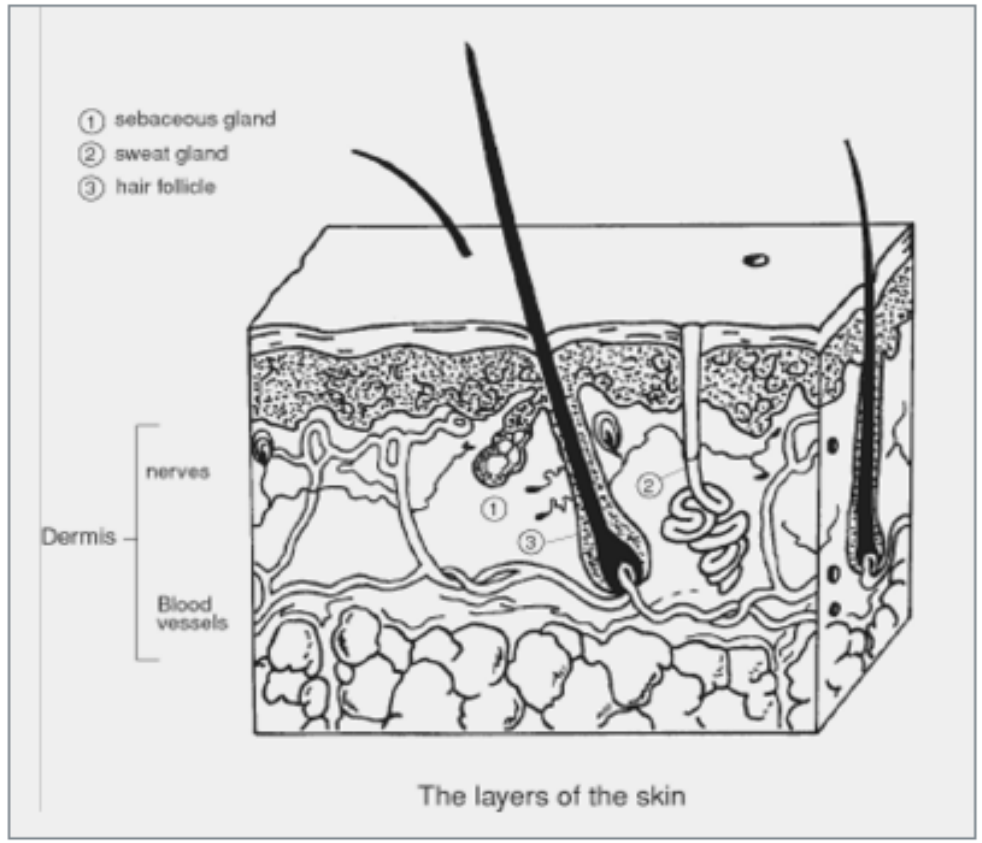
Basement Membrane / Dermal-Epidermal Junction

- Provides structural support
- Exchanges of fluid and cells between skin layers
- Rete ridges/pegs – epidermal downward, finger-like projections
- Dermal papillae – upward projections
- Fit together like "tongue and groove" wood to anchor the epidermis to the dermis



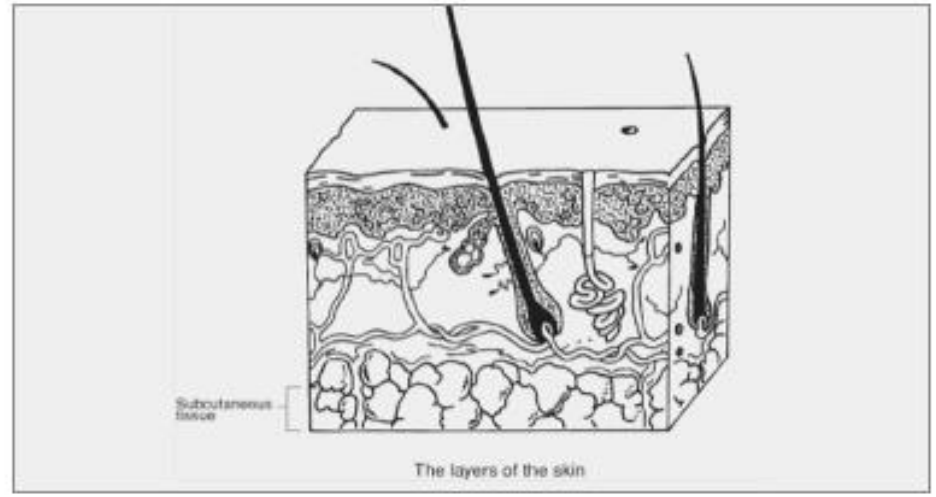
Dermis

- Mesh of collagen and elastin fibers
  - Provides strength, bulk, support, and elasticity
- Sweat and sebaceous glands
- Hair follicles
- Rich in nerve and blood supply



Subcutaneous Tissue - Hypodermis

- Layer of fat
- Providing cushioning, insulation, and support for other tissue
- Various in amount by body location
- Plays critical role in pressure redistribution



The layers of the skin

Photo Courtesy of Cindy Labish, MSN ,CWOCN

Protection

Protection against pathogens

- Sebaceous glands secrete sebum, low pH
- Presence of normal skin flora
- Skin's own immune system
  - Langerhans cells
  - Mast cells
  - Macrophages

Protection from UVR

- Skin pigmentation - melanocytes

What Causes Skin Damage?

- Pressure, Friction, Shear
- Moisture and over-hydration (e.g., MASD)
  - Altered skin pH
  - Pathogen susceptibility (bacterial, fungal, viral)
  - Incontinence – Characteristics of urine or stool
    - Volume and frequency
    - Urinary, fecal or both

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Pressure Versus Moisture

Pressure

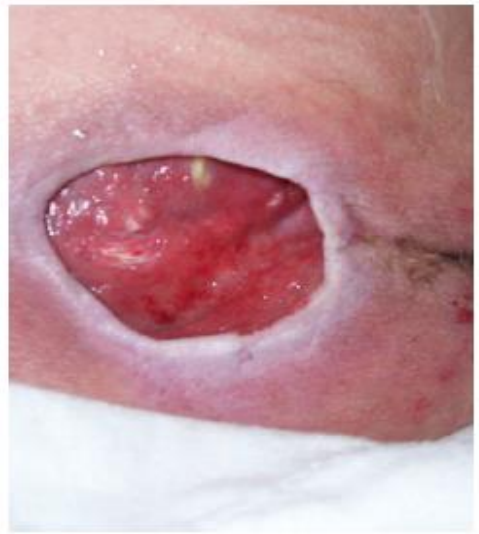
- **Etiology** - pressure in combination with shear, may be device related
- **Location** - usually over a bony prominence
- **Distribution** - localized area
- **Characteristics** - either partial or full thickness tissue damage

MASD

- **Etiology** - prolonged exposure to various sources of moisture
- **Location** - ”the skin,” anywhere moisture can accumulate
- **Distribution** - generalized skin damage over a broad area
- **Characteristics** - partial thickness skin damage resulting from inflammation and erosion of the skin

Why the Focus?

POA versus HAPI



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Pressure Injuries

The importance of accurate staging and documentation

- Financial Implications
- Patient Treatment Plans
- Cost and Supply Usage
- Hospital Reporting

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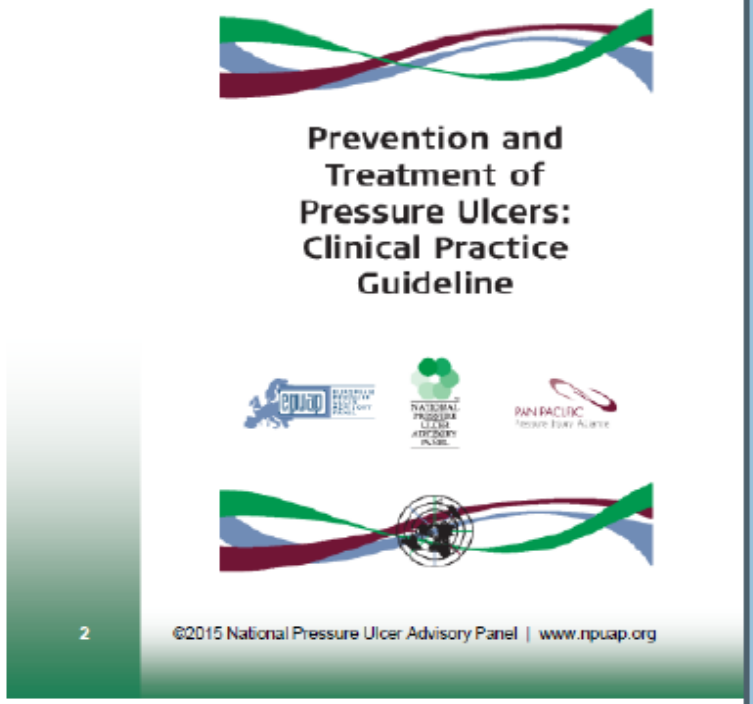
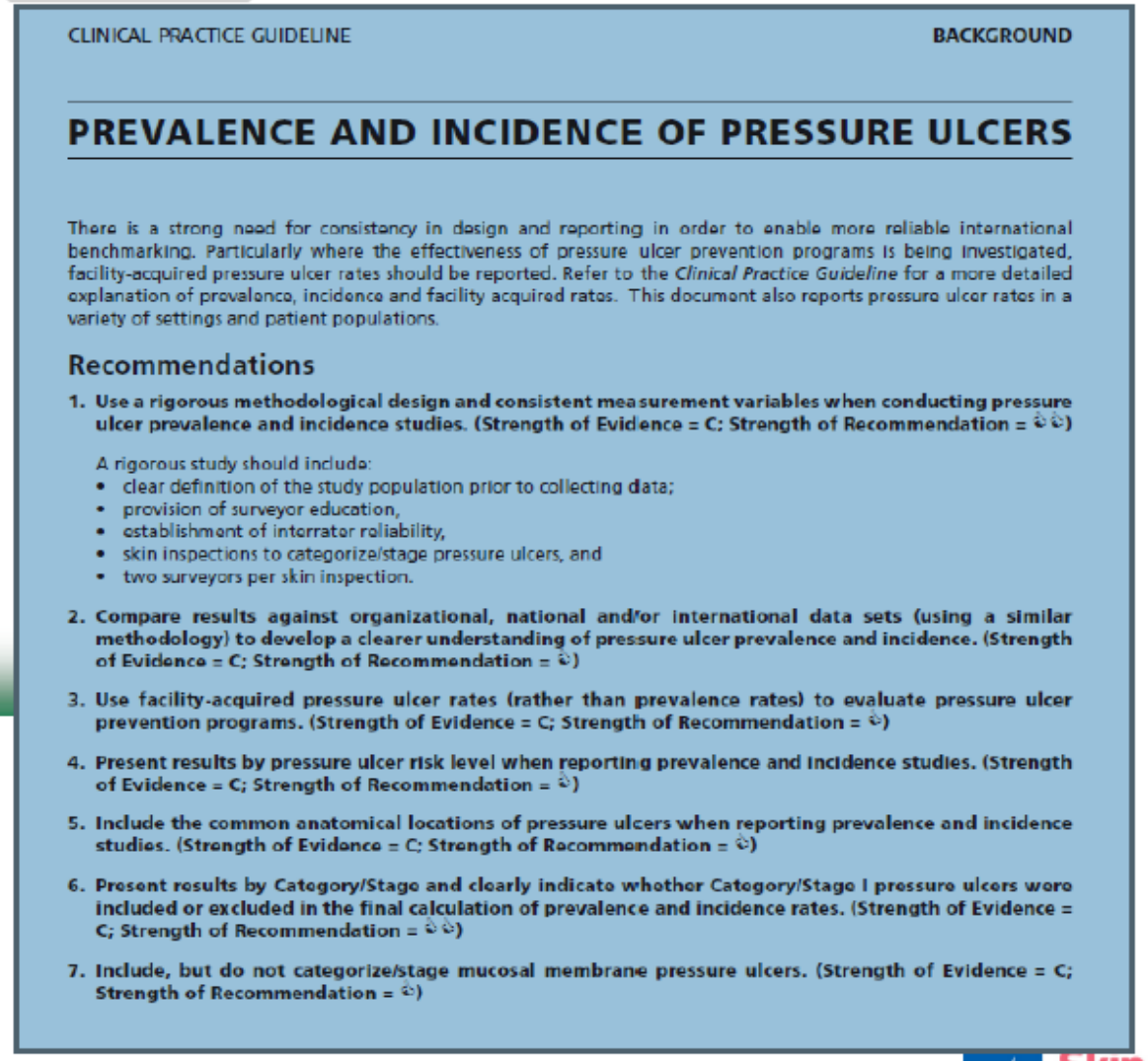
How Do We Know How We Are Doing?





CLINICAL PRACTICE GUIDELINE **BACKGROUND**

PREVALENCE AND INCIDENCE OF PRESSURE ULCERS

There is a strong need for consistency in design and reporting in order to enable more reliable international benchmarking. Particularly where the effectiveness of pressure ulcer prevention programs is being investigated, facility-acquired pressure ulcer rates should be reported. Refer to the *Clinical Practice Guideline* for a more detailed explanation of prevalence, incidence and facility acquired rates. This document also reports pressure ulcer rates in a variety of settings and patient populations.

Recommendations

1. **Use a rigorous methodological design and consistent measurement variables when conducting pressure ulcer prevalence and incidence studies. (Strength of Evidence = C; Strength of Recommendation = ⊕⊕)**

   A rigorous study should include:
   - clear definition of the study population prior to collecting data;
   - provision of surveyor education,
   - establishment of interrater reliability,
   - skin inspections to categorize/stage pressure ulcers, and
   - two surveyors per skin inspection.

2. **Compare results against organizational, national and/or international data sets (using a similar methodology) to develop a clearer understanding of pressure ulcer prevalence and incidence. (Strength of Evidence = C; Strength of Recommendation = ⊕)**

3. **Use facility-acquired pressure ulcer rates (rather than prevalence rates) to evaluate pressure ulcer prevention programs. (Strength of Evidence = C; Strength of Recommendation = ⊕)**

4. **Present results by pressure ulcer risk level when reporting prevalence and incidence studies. (Strength of Evidence = C; Strength of Recommendation = ⊕)**

5. **Include the common anatomical locations of pressure ulcers when reporting prevalence and incidence studies. (Strength of Evidence = C; Strength of Recommendation = ⊕)**

6. **Present results by Category/Stage and clearly indicate whether Category/Stage I pressure ulcers were included or excluded in the final calculation of prevalence and incidence rates. (Strength of Evidence = C; Strength of Recommendation = ⊕⊕)**

7. **Include, but do not categorize/stage mucosal membrane pressure ulcers. (Strength of Evidence = C; Strength of Recommendation = ⊕)**

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Prevalence/Incidence

Prevalence

"Percentage of people in a population who have a condition at a specified point in time"

Incidence

"Percentage of people in a population who develop a condition during a specified period of time" – this is your HAPI

Pressure Injury:

- A pressure injury is localized damage to the skin and/or underlying soft tissue usually over a bony prominence, or related to a medical or other device. The injury can present as intact skin or an open ulcer and may be painful. The injury occurs as a result of intense and/or prolonged pressure or pressure in combination with shear. The tolerance of soft tissue for pressure and shear may also be affected by microclimate, nutrition, perfusion, co-morbidities and condition of the soft tissue. NPUAP 2016

Understanding Pressure Injury Formation

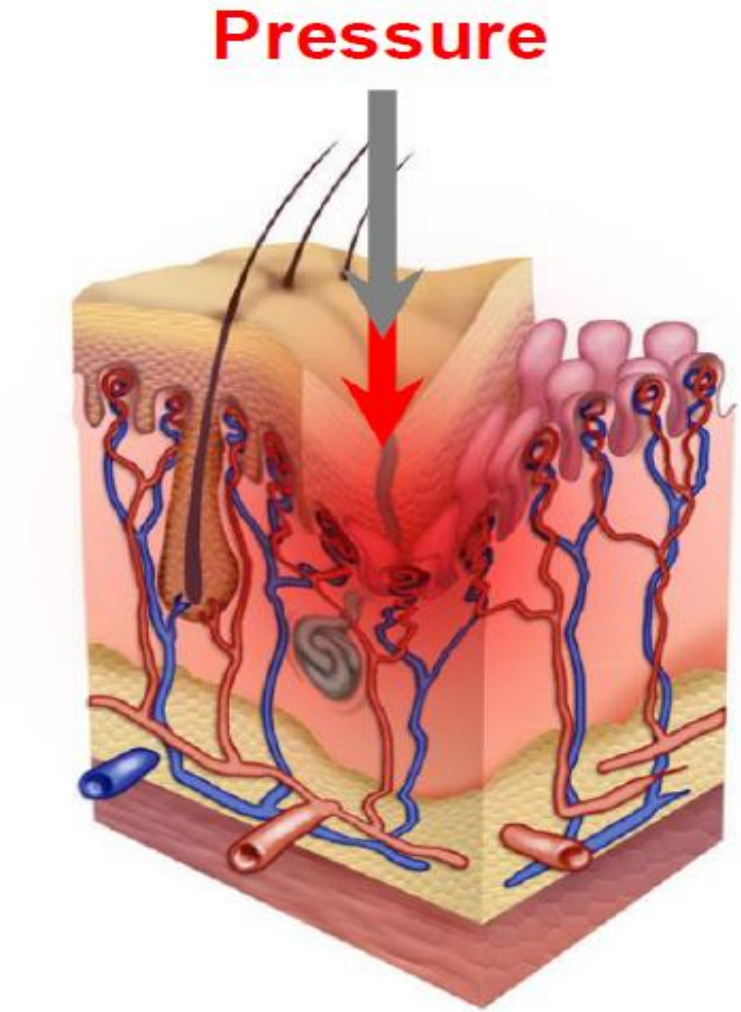
Forces applied to the skin as a result of contact with another surface

- **PRESSURE** – direct pressure over a bony prominence results in capillary closure, tissue deformation, and ischemia (lack of blood flow)
- **FRICTION** – the mechanical rubbing of the skin against a surface, e.g., dressing, bed linen, etc.
- **SHEAR** – strain on underlying tissue due to parallel and perpendicular forces working against each other
- **MICROCLIMATE** – Defined in terms of the skin temperature and humidity at the interface between skin and the support surface or the dressing

Pressure – Compression of Tissue

Compression of soft tissue leads to:

- Capillary damage
- Hypoxia/Anoxia
- Nutrient deprivation
- Decreased toxin removal
- Edema



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Pressure – Muscle Deformation

- Muscle is more susceptible to damage than skin
- Initial damage is caused by tissue load
- Ischemia causes further muscle damage

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Friction

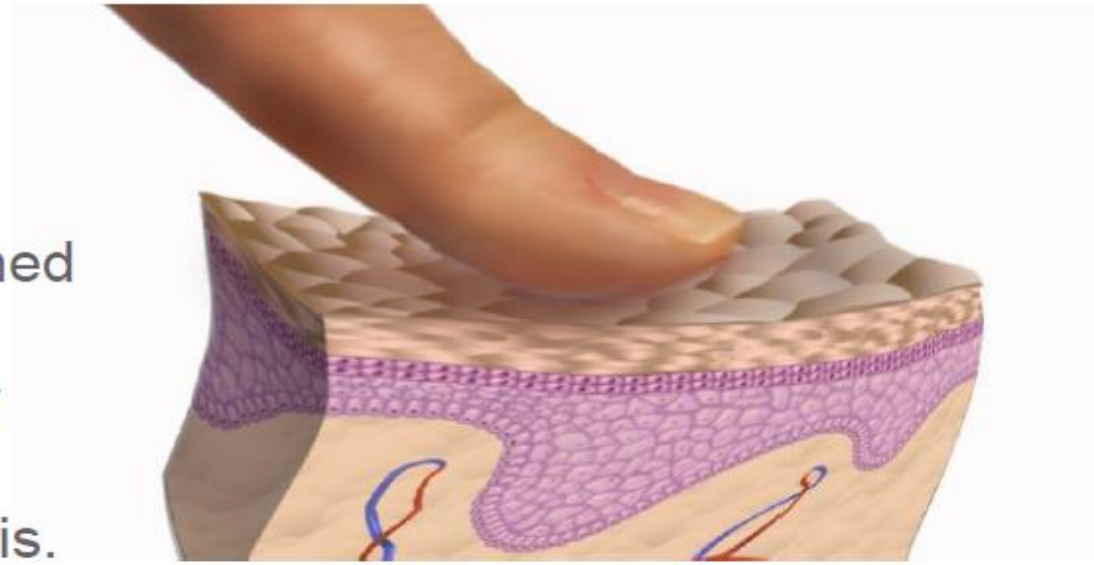
- Friction is the mechanical force exerted when skin is dragged across a coarse surface such as bed linens.
- A skin insult caused by friction looks like an abrasion or superficial laceration.
- Friction is not a primary factor in the development of pressure injuries but can contribute to an insult or stripping of the epidermal layer of the skin, creating an environment conducive to further insult.

Friction

- Friction is both a static and dynamic force
  - Static friction – force needed to initiate movement
  - Dynamic – force needed to continue sliding or moving
- Frictional forces are higher in the presence of excessive moisture
- An increase in frictional forces increases the potential for shear

Shear

- Shear is a mechanical force that acts on an area of skin in a direction parallel to the body's surface.
- The deeper fascia slides downward with the bone; the superficial fascia remains attached to the dermis. This insult and compromise to the blood supply creates ischemia and leads to cellular death and tissue necrosis.



Shear

- Shear force occurs only in the presence of friction.
- Shear injury will not be seen at the skin level because it happens beneath the skin.
- As friction increases, greater force is needed to cause sliding of the skin which creates more shear damage.
- Shear forces can aggravate tissue damage already caused by other sources, like pressure.

Microclimate as a Contributor to Pressure Injuries

- Temperature – As temperature of skin rises, the metabolic needs of the skin for oxygen and glucose rises
  - 10% increased need for each one degree
  - These substrates cannot be delivered if the skin is under reduced blood flow/ischemia from pressure
- Humidity – Increased moisture increases the friction coefficient – increased friction increases potential for shear

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Microclimate

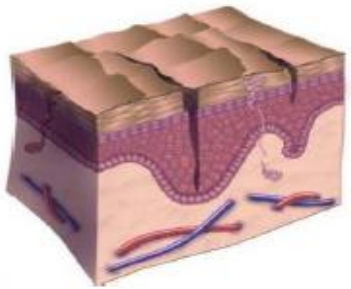
Temperature

- Ideal temperature promotes optimal skin health
- Increase in temperature increases metabolic demand of skin, increasing the risk of more damage

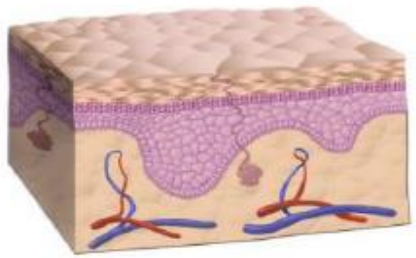
Humidity

- Moisture affects barrier function of the skin
- Dry, cracked skin increases risk of breakdown and friction forces
- Over-moist skin also increases risk of breakdown and friction forces

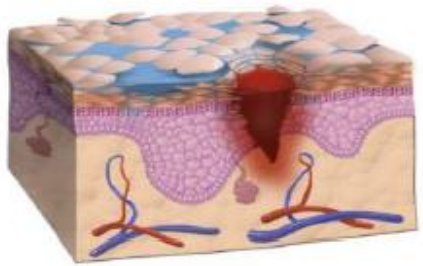
Dry skin



Optimal



Wet skin



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