


Pressure Ulcers: The Power of Prevention and Early Intervention

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- As such, the material provided herein is not comprehensive for all legal and medical developments and may inadvertently contain errors or omissions. This review, we hope, will give a starting point for thinking about the way you practice wound care in that you begin to understand the need for thorough knowledge and careful documentation about the care of the residents. American Medical Technologies shall not be held liable for any situation that may result directly or indirectly from use or misuse of this information.

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Objectives

- Review skin anatomy/physiology and gerontodermatological changes
- Describe pathology associated with pressure ulcer formation
- Understand endogenous, exogenous, and iatrogenic risk factors associated with pressure ulcers
- Review components of thorough risk assessment
- Describe the importance of the wound microenvironment and wound bed preparation
- Describe appropriate interventions for pressure ulcer management
- Review key aspects of the F314 and wound documentation

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PRESSURE


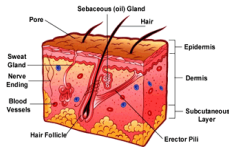
IT CAN TURN A LUMP OF COAL INTO A FLAWLESS DIAMOND- OR AN AVERAGE PERSON INTO A PERFECT BASKETCASE.

www.despair.com

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Did You Know?

- In a 150- pound person, the skin is comprised of 18 square feet and weighs about 12 pounds.
- In 1 square inch the skin contains:
 - 65 hairs
 - 100 sebaceous glands
 - 78 yards of nerves
 - 650 sweat glands
 - 19 yards of blood vessels
 - 9,500,000 cells
 - 1,300 nerve endings
 - 20,000 sensory cells
 - 32,000,000 bacteria

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Skin Trivia

- Skin is the largest human organ covering about 25 square feet.
- Skin makes up 15% of our body weight.
- Fetuses don't get fingerprints till 3 months.
- Humans shed and replace outer skin cells every 27 days.
- By the age of 70 an average person will have lost 105 lbs of skin.
- A fingernail or toenail takes about 6 months to grow from base to tip.
- We lose on average between 40-100 strands of hair a day.
- The average scalp has 100,000 hairs.
- Beards are the fastest growing hairs on the human body.

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Why Is This Important?

- Appreciate the skin you are in!
- Recognize what a dynamic organ the skin is throughout the life span
- Realize you have the ability to protect and maintain skin integrity for yourself and people under your care

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Functions of the Skin


- Dynamic organ continuously engaged in biological and biochemical activity
 - Protection
 - Temperature regulation
 - Fat and water storage
 - Vitamin D synthesis
 - Excretion of waste
 - Cosmesis
 - Touch/sensation

Trauma and skin damage lead to functional impairments

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Aging Skin: Gerontodermatological Changes

- Over the lifespan, skin becomes drier, less elastic, less perfused → vulnerable to damage from pressure, friction, shear, moisture, malnutrition, etc.



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Aging Skin: Gerontodermatological Changes

- Skin aging is a complex process
 - Most major changes occur in the dermis
- Two independent aging processes
 - Normal aging → slow, irreversible degeneration of tissue
 - Extrinsic aging → AKA photoaging due to exposure of the elements (primarily UV irradiation)

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Aging Skin: Gerontodermatological Changes

- Combination of normal aging and photoaging results in altered wound healing processes
 - Progressive loss of skin function
 - Increased vulnerability to the environment
 - Decreased homeostatic ability

Healing is delayed but is as effective as that of younger adults

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Aging Skin: Gerontodermatological Changes

- Replicative senescence →
 - Epithelial and fatty layers thinner
 - Collagen and elastic fibers shrink 1% per year
 - Sweat glands decrease in number and size
 - Skin vascularity decreases
 - Vessel walls thin
 - Atherosclerotic changes occur in small and large vessels

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Aging Skin: Gerontodermatological Changes

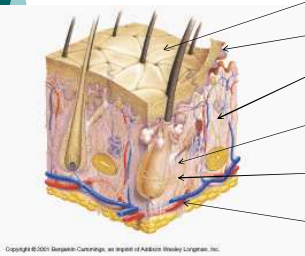
- With these changes
 - Oxygen-carbon dioxide exchange decreases
 - Tissue turnover slows
 - Increase occurrence of ecchymosis
 - Inflammatory response decreases
 - Tissue regeneration is slower which can delay healing and make tissue more susceptible to infection

All these factors can ultimately lead to skin breakdown!

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Gerontodermatological Changes Affecting Wound Healing



- Alterations in dermal structures
- Decreased surface contact at BMZ
- Keratinocytes decrease migration from basal layer by 50%
- Decrease in number and function of antigen-presenting cells
- Elastin in aged dermis presents with disordered morphology
- Marked reduction in cutaneous blood flow and dermal lymphatic drainage

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Identifying Threats To Skin Integrity

- Pressure, friction, shear
- Moisture
- Malnutrition, dehydration
- Immobility
- Cognition
- Medications (topical and systemic)
- Exogenous, endogenous, iatrogenic factors

These threats are more pronounced in older individuals...the majority of long-term-care residents

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Skin Assessment

- Understanding changes associated with aging skin
- Identifying threats to the skin
- Recognizing residents comorbidities and overall health status

All create a picture of the individuals skin health and risk of breakdown

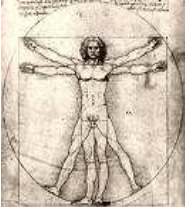
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Skin Assessment

- Thorough skin assessment is paramount
- *Prevention* is key
- Early intervention is critical

Why?



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To Prevent and Reduce These... Pressure Ulcers






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Pressure Ulcers

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Definition

- o "A pressure ulcer is localized injury to the skin and/or underlying tissue usually over a bony prominence, as a result of pressure, or pressure in combination with shear and/or friction." (NPUAP)

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Diagrams from: www.dick-ford.com

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Pressure Ulcer Considerations

- o The amount and duration of pressure and the severity of shearing forces influence pressure ulcer, herein PrU, formation
- o These forces combine causing a distortion of the capillary network, limiting blood flow
- o Additional compounding factors: nutritional deficiencies, immobility, decreased immunity, and excessive moisture

Shear force

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Diagrams from: www.dick-ford.com

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Pressure Ulcer Misconceptions

- All PrU begin in the nursing home
- All PrU develop because of poor clinical care
- All PrU are preventable*
- All PrU are caused by pressure only
- The use of specialty equipment will prevent PrU from developing



Pressure Ulcer Considerations

- What are the numbers?
- Prevalence and incidence
 - 15.5% overall prevalence (facilities of all types)
 - 10-18% acute care
 - 13.6-26.8% long-term care
 - Incidence has remained stable for past 15 years (positive trend as pts are older and sicker)
 - 0.4-38% acute care
 - 2.2-23.9% long-term care



Pressure Ulcer Considerations

- Total cost for caring for hospital acquired PrUs ~ \$2.2-3.6 billion/year
 - individual PrU costs range from \$5K- \$40K
- AHRQ
 - created clinical practice guidelines
- NPUAP
 - established pressure ulcer staging system
 - diagnosis of tissue depth based off of anatomical description of wound bed
 - *only pressure ulcers should be staged*
- Pressure, friction and shear are the mechanical forces that act on the skin to cause ischemia and necrosis

Pressure Ulcer Numbers

<http://www.medicalewstoday.com>
March 11, 2006



- 23.9% of residents in LTC develop PrU at some point
- In high risk residents, the prevalence is over 60%
- 9-13% of patients admitted to hospitals develop PrU
- 1.8 million people develop PrU annually
- 95% occur on lower part of the body; 36% on the sacrum; 30% on the heel
- 8% of all deaths in nursing homes are attributed to PrU
- 70% occur in people 70 years and older

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Pressure Ulcer Numbers

<http://www.medicalewstoday.com>
March 11, 2006

- > 17 million lawsuits related to PrU per year
 - Second most common claim after wrongful death and greater than falls or emotional distress
- Individual settlements range from \$50 K to \$4 million
- In 28 out of 30 plaintiff verdicts/settlements in PrU lawsuits, the average compensation was ~ \$1 million



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Friction and Shear Force

Friction

Mechanical force exerted on the skin when moved against any surface

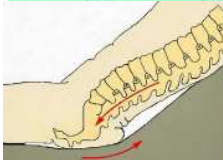
May result in a skin abrasion

Shear

A distortion of the tissue caused by two opposing parallel or horizontal forces

Friction + Gravity = Shear

Shear has its greatest effect on the deep tissues of the body



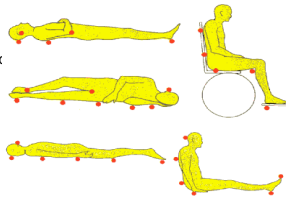
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Pressure Ulcers

o Anatomical sites at risk

- calcaneus
- greater trochanter
- ischial tuberosities
- sacrum
- medial/lateral malleol
- knee (all aspects)
- olecranon process
- scapulae
- occiput
- ears
- toes (tight sheets)
- thoracic vertebrae
- areas exposed to tubes, lines and/or external devices (casts, splints, etc)



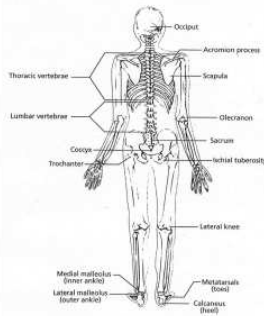
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COMMON SITES OF PRESSURE ULCERS

A pressure ulcer is defined as any tissue caused by extended pressure resulting in damage of underlying tissue. They are usually located over bony prominences.

PRESSURE POINTS OF BONY PROMINENCES



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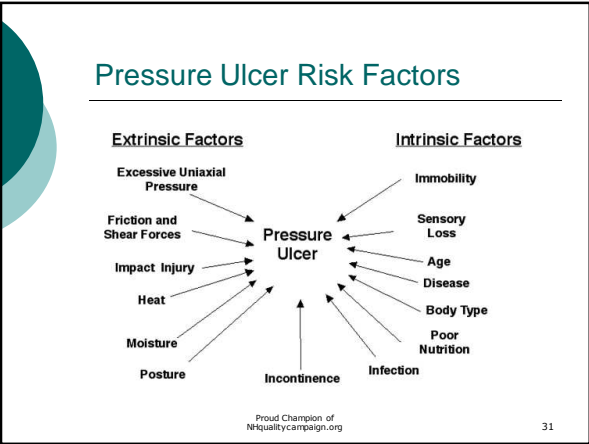
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Residents at Risk for Pressure Ulcers

- o mental impairment
- o altered cognition
- o malnutrition
- o incontinence
- o immunosuppression
- o corticosteroid history
- o fractures
- o diminished pain awareness
- o poor circulation
- o drugs that impair wound healing
- o diabetes
- o dehydration
- o bed rest/chronic immobility
- o intrinsic/extrinsic/iatrogenic factors
- o multisystem trauma
- o significant obesity or cachexia
- o co-morbid conditions
- o paralysis
- o resident refusal
- o previous PrU history*
- o altered blood pressure*


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Risk Assessment

- The implementation and consistent use of a risk assessment tool can reduce the incidence of pressure ulcers by ~60%*
- Utilized upon admission, weekly thereafter for four weeks, quarterly, and at discharge



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Prevention & Risk Assessment

- Braden Scale- professional standard for identifying risk factors
 - Sensory, activity, mobility, continence, nutrition, friction, shear
- MDS Risk Factors*- does not identify ALL risk factors
 - PrU present, bed mobility, bedfast, bowel incontinence, PVD, previous PrU, skin desensitized to pain/pressure, daily trunk restraint
- QM/QI Risk Factors- flag for high/low risk
 - Bed mobility, transfers, comatose, malnutrition
 - High risk
 - All other residents at most recent assessment
 - Low risk

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Risk Assessment Tools

- **Norton Scale:** oldest, developed in 1961; five subscales: physical condition, mental state, activity, mobility, and incontinence. Each rated 1-4, sum ranging 5-20; lower scores associated with increased risk.
- **Gosnell Scale:** based on further refinement of Norton. Same categories, yet changed general condition to nutrition and renamed incontinence to continence. Added skin appearance, medications, diet and fluid balance, and intervention categories. Reversed the scaling so that the lower the score the lower the risk, a score of 20 is the highest risk.
- **Braden Scale:** developed in 1987, composed of 6 subscales that reflect sensory perception, moisture, activity, mobility, nutrition, friction and shear. Scores range from 6-23 with lower scores indicating lower function and higher risk. Firm evidence base and solid research foundation for use.

Prevention and Risk Factors



Risk assessment is not
just a number!

Risk assessment identifies **specific factors** that place a resident at risk for the development of a PrU
Each risk factor must be addressed in the care plan with appropriate interventions
Remove, modify, and/or stabilize risk factors

Risk Assessment

- Prevention and early intervention of at-risk residents is essential
- Thorough systems review
- Observation and palpation of resident's skin



Skin Assessment Components

- **D**
- **E**
- **R**
- **M**
- **A**
- **T**
- **O**
- **L**
- **O**
- **G**
- **I**
- **C**
- **A**
- **L**

- Describe integrity
- Edema
- Review sensory status
- Moisture
- Atrophic changes
- Turgor/texture
- Observe nail composition/hair quality
- Look/feel color and temperature variations
- Observe skin folds
- Gerontodermatological changes
- Inquire about allergies and PMH
- Callus
- Assess vascular status
- Lesions (rashes, scars, bruising, hemosideran, nevi, etc.)

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Tissue Tolerance

- Tissue Tolerance “testing” has recently been mandated in several states by the State Surveyors
- The Guidelines do not indicate that Tissue Tolerance should be “tested” but that the routine skin assessment performed should include an evaluation of the ability of the skin to endure the effects of pressure without adverse effects

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Tissue Tolerance

- Definition:
 - The ability of the skin and its supporting structures to endure the effects of pressure without adverse effects
 - Every person's tissue tolerance is different
 - Some residents may tolerate an hour in the wheelchair without breakdown and others may not
- Skin inspection for tolerance
 - Inspect for any skin discoloration (note darker skin tones may not show any change in color)
 - Sensation (pain and itching)
 - Palpate for any changes in temperature (warm or cold) or consistency (firm or boggy)

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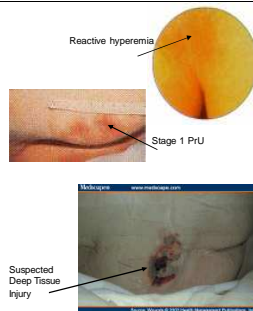
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Tissue Tolerance

- Note that after pressure is relieved from any area of the body a hyperemia (redness) response will appear from the blood flow going back to that area (again note darker skin tones may not present with this)
- If this response doesn't resolve right away, check again within 30-45 minutes to hour
 - If it is still discolored, then it is a Stage I ulcer
- This process will allow you to determine if the turning intervals are adequate for the individual resident


Proper Identification of Tissues

- There is a lot of ambiguity between reactive hyperemia, Stage 1, and early suspected DTI
- Early detection and identification is key followed by appropriate intervention, documentation and reassessment



Capillary Refill

- The key to differentiating between a Stage 1 PrU and DTI (where the blood supply to the skin has already been obliterated by pressure necrosis) is assessing capillary refill every 8 hours for the first 24 hours
 - If reddened skin maintains capillary perfusion, prognosis for recovery within 72 hours is good
 - If there is no capillary refill-no color change when fingertip pressure is applied to the skin-indicates poor prognosis and probable irreversible damage




A Few Words on Regulations...

F Tags and Guidelines

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CMS Tag Revision Project

Multi-year project 2000-2006

- Update interpretive guidelines in key regulatory Tags
 - Developed in early 1990's
 - Reflect current practice
- New investigational protocols and guidance for selection of severity of deficiencies
 - Determine if a decline is avoidable or unavoidable
 - Determine good practice
- Surveyor consistency
 - Investigational protocols are more specific
 - Scope and severity guidance are more detailed

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Based on Standards of Practice

- AHRQ Guidelines
 - ahrq.gov/clinic/cpgonline.htm
- AMDA Guidelines
 - amda.com/cmefirect/pressureulcers/index.cfm
- NPUAP
 - npuap.org/PDF/treatment_curriculum.pdf
- WOCN Guidelines
 - guideline.gov/summary/summary.aspx?ss=15&doc_id=3860&nbr=3071

CMS RAI User's Manual:
cms.hhs.gov/medicaid/mds20/man_form.asp

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Intent of this Requirement

- The F314 is limited exclusively to PrUs
- Other wounds (arterial, venous, diabetic, etc.) are grouped under F309, the regulation for Quality of Care
 - Critical for physicians to accurately perform a differential diagnosis of chronic wounds
 - Recommend review of accepted definitions to prevent confusion between surveyors and clinical staff in terms of documentation

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Intent of this Requirement

- **Promote the prevention** of pressure ulcer development
- **Promote the healing** of pressure ulcers that are present (including prevention of infection to the extent possible)
- **Prevent development** of additional pressure ulcers

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Intent of this Requirement

- F309 Regulatory Standard
 - Used to cite:
 - Wounds that are non PrU
 - Residents at risk for PrU who do not have PrU
 - Pain management
 - Lack of appropriate action after a significant change in condition

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Documentation Issues Common Problems F309 & F314

- F309 failure to:
 - Assess risk factors until MDS completed
 - Develop care plan until after ulcers developed
 - Follow care plan
 - Reevaluate effectiveness of plan
- F314 failure to:
 - Routinely assess/monitor PrU
 - Routinely assess/monitor skin and feet for new ulcers
 - Perform wound care according to accepted standards of practice

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Potential Tag Investigations

- Survey & Certification Memo 05-20 →Independent but associated deficiency citations
 - F157 Notification of Changes
 - F272 Comprehensive Assessment
 - F315 Urinary Incontinence
 - F279 Comprehensive Care Plan
 - F280 Comprehensive Care Plan Revision
 - F281 Services Provided Meet Professional Standards
 - F309 Quality of Care
 - F353 Sufficient Staff
 - F385 Physician Supervision
 - F501 Medical Director

<http://www.cms.hhs.gov/SurveyCertificationGenInfo/downloads/SCIEtter05-20.pdf>

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F314 Interpretative Guidelines

Topics covered in the F314

- OVERVIEW
- PREVENTION
- ASSESSMENT
 - Subsections include:
 - Risk Factors
 - Pressure Points and Tissue Tolerance
 - Under-Nutrition and Hydration Deficits
 - Moisture and Its Impact
- INTERVENTIONS
 - Subsections include:
 - Resident Choice
 - Advance Directive (Addresses facility responsibility to reflect residents' wishes; provision of supportive services and care not prohibited under the AD and DNR orders)
 - Repositioning
 - Support Surfaces and Pressure Redistribution
- MONITORING

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F314 Interpretative Guidelines

Topics covered in the F314 continued:

- ASSESSMENT AND TREATMENT OF PRESSURE ULCERS
- TYPES OF ULCERS
- ULCER CHARACTERISTICS
- STAGES OF PRESSURE ULCERS
 - System consistent with the MDS/RAI
 - The definitions used are from the National Pressure Ulcer Advisory Panel [NPUAP]
- THE HEALING PRESSURE ULCER
 - Includes description of PUSH tool but states need for current MDS which requires reverse staging until the MDS is revised
- INFECTIONS RELATED TO PRESSURE ULCERS
- PAIN
- DRESSINGS AND TREATMENTS

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F314 Investigative Protocol

- Is to be used for all sampled residents having -- or at risk for developing -- a pressure ulcer
- Includes instructions to surveyors for:
 - Observation (care plans, wound care)
 - Resident/Staff Interviews
 - Record Review (assessment, care plan, revision of care plan)
 - Interviews with Health Care Practitioners / Professionals
- DETERMINATION OF COMPLIANCE
 - Subsections are synopsis of the Regulation, Criteria for Compliance, Non-compliance for F-314, Potential Tags for Additional Investigation
- DEFICIENCY CATEGORIZATION (Part V, Appendix P)
 - Outlines three key elements for severity determination for F314:
 - Presence of harm/negative outcome's or potential for negative outcomes because of lack of appropriate treatment and care
 - Degree of harm (actual or potential) related to the noncompliance
 - Immediacy of correction required

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F314 Investigative Protocol


- DHFS Guidance to Surveyors for Pressure Ulcers Webinar (hosted by Vicki Griffin)
- <http://media1.wi.gov/DHFS/Viewer/Viewers/Viewer320TL.aspx?mode=Default&peid=4a5ff257-05a2-4ccd-a4f9-70c3ba9bd079&pid=43fa99e9-d4d7-4326-8b97-c44bdec69d31&playerType=WM7#>

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CMS: Unavoidable Pressure Ulcers

- Resident developed a pressure ulcer even though the facility:
 - Evaluated the resident's clinical condition and risk factors
 - Defined and implemented interventions that are consistent with resident needs, goals, and recognized standards of practice
 - Monitored and evaluated the impact of the interventions
 - Revised interventions as appropriate



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Indicators of Compliance

- For a resident who developed a PrU **after admission**, the facility is in **compliance** if staff have:
 - Recognized and assessed factors placing the resident at risk for developing a PrU
 - Conditions, causes/problems, needs, behaviors
 - Defined and implemented interventions for PrU prevention in accordance with resident needs, goals and recognized standards of practice
 - Monitored and evaluated the resident's response to preventive efforts
 - Revised the approaches as appropriate

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Indicators of Compliance

- For a resident who was **admitted with a PrU**, who has a **PrU that is not healing**, or who is at **risk of developing subsequent PrUs**, the facility is in **compliance** if the staff have:
 - Recognized and assessed factors placing the resident at risk of developing a new PrU or experiencing a non-healing or delayed healing of a current PrU
 - Defined and implemented interventions for PrU prevention and treatment in accordance with resident needs, goals, and recognized standards of practice
 - Addressed the potential for infection
 - Monitored and evaluated the resident's response to preventive efforts and treatment interventions
 - Revised approaches as necessary

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Indicators of Non-compliance

- **Non-compliance** for F314 may include (but is not limited to) one or more of the following, including **failure** to:
 - Accurately or consistently assess a resident's skin integrity on admission and as indicated thereafter
 - Identify and address risk factors for developing a PrU, or explain adequately why they could not or should not do so
 - Implement preventive interventions in accord with the resident's needs and current standards of practice
 - Provide clinical justification for the unavoidable development or non-healing/delayed healing or deterioration of a PrU

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Indicators of Non-compliance continued

- Provide appropriate interventions, care, and treatment to an existing PrU to minimize infections and promote healing
- Implement interventions for existing ulcers
- Notify the physician of the resident's condition or changes in the resident's ulcer(s)
- Adequately implement pertinent infection management practices in relation to wound care
- Identify or know how to apply relevant policies and procedures for PrU prevention and treatment


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Compliance Vs. Non-compliance

- The single most important factor (other than providing appropriate care) is-

DOCUMENTATION!




- If it was not documented, it did not happen...
- Wound documentation should be **OBJECTIVE & DESCRIPTIVE**

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Assessment



- CMS considers a PrU to be a sentinel event in a resident of a long-term-care facility who had been assessed as being at low risk for a PrU
- According to CMS, the only residents who are at high risk are those who have impaired transfer or bed mobility, are comatose, malnourished; any other resident is at low risk.

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Assessment


- Identify and document risk factors
- Identify pre-existing signs (skin trauma, DTI)
- Assess and document pain
- Include the Resident Assessment Instrument (RAI)
- Identify the resident with:
 - multi-system organ failure
 - end-of-life condition
 - refusal of care and treatment
- Address factors that have been identified as having an impact on the development, treatment and/or healing of pressure ulcers

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Clinical Presentation of Pressure Ulcers

- **Red flag!**
 - **Blanchable** erythema
 - Variations in skin color
 - Edema and increased tissue temp
 - If pressure relieved, skin can return to normal in 24 hours. If not, damage ensues.



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NPUAP: February 2007

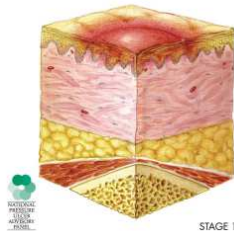
- "The National Pressure Ulcer Advisory Panel has redefined the definition of a pressure ulcer and the stages of pressure ulcers, including the original 4 stages and adding 2 stages on deep tissue injury and unstageable pressure ulcers."
- NPUAP Pressure Ulcer definition:
 - "A pressure ulcer is localized injury to the skin and/or underlying tissue usually over a bony prominence, as a result of pressure, or pressure in combination with shear and/or friction."
 - "A number of contributing or confounding factors are also associated with pressure ulcers; the significance of these factors is yet to be elucidated."

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Clinical Presentation of Pressure Ulcers

- Stage I
 - Intact skin with non-blanchable redness of a localized area usually over a bony prominence. Darkly pigmented skin may not have visible blanching; its color may differ from the surrounding area.
 - The area may be painful, firm, soft, warmer or cooler as compared to adjacent tissue. May be difficult to detect in individuals with dark skin tones. May indicate "at risk" persons (a heralding sign of risk).

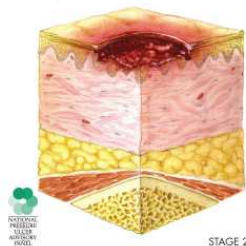


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Clinical Presentation of Pressure Ulcers

- Stage II
 - Partial thickness loss of dermis presenting as a shallow open ulcer with a red pink wound bed, without slough. May also present as an intact or open/ruptured serum-filled blister.
 - Presents as a shiny or dry shallow ulcer without slough or bruising.* This stage should not be used to describe skin tears, tape burns, perineal dermatitis, maceration or excoriation.
 - *Bruising indicates suspected deep tissue injury.



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Clinical Presentation of Tissue Types

Fibrin

Slough

Serous Filled Blister

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Clinical Presentation of Tissue Types

Slough: note it is thick and stringy. Often it is devitalized adipose tissue.

Fibrin: note how thin and firmly adhered it is to the wound base. Fibrin is the scaffolding for granulation tissue and it is NOT slough.

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Clinical Presentation of Pressure Ulcers

o Stage III

- Full thickness tissue loss. Subcutaneous fat may be visible but bone, tendon or muscle are not exposed. Slough may be present but does not obscure the depth of tissue loss. May include undermining and tunneling.
- The depth of a stage III pressure ulcer varies by anatomical location. The bridge of the nose, ear, occiput and malleolus do not have subcutaneous tissue and these ulcers can be shallow. In contrast, areas of significant adiposity can develop extremely deep stage III pressure ulcers. Bone/tendon is not visible or directly palpable.

STAGE 3

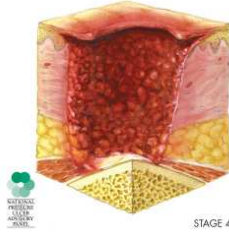
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Clinical Presentation of Pressure Ulcers

o Stage IV

- Full thickness tissue loss with exposed bone, tendon or muscle. Slough or eschar may be present on some parts of the wound bed. Often include undermining and tunneling.
- The depth of a stage IV pressure ulcer varies by anatomical location. The bridge of the nose, ear, occiput and malleolus do not have subcutaneous tissue and these ulcers can be shallow. Stage IV ulcers can extend into muscle and/or supporting structures (fascia, tendon, joint capsule) making osteomyelitis possible. Exposed bone/tendon is visible or directly palpable.



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Clinical Presentation of Pressure Ulcers

o Unstageable

- Full thickness tissue loss in which the base of the ulcer is covered by slough (yellow, tan, gray, green or brown) and/or eschar (tan, brown or black) in the wound bed.
- Until enough slough and/or eschar is removed to expose the base of the wound, the true depth, and therefore stage, cannot be determined. Stable (dry, adherent, intact without erythema or fluctuance) eschar on the heels serves as "the body's natural (biological) cover" and should not be removed.



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Suspected Deep Tissue Injury (DTI)



- Purple or maroon localized area of discolored intact skin or blood-filled blister due to damage of underlying soft tissue from pressure and/or shear. The area may be preceded by tissue that is painful, firm, mushy, boggy, warmer or cooler as compared to adjacent tissue.
- DTI may be difficult to detect in individuals with dark skin tones. Evolution may include a thin blister over a dark wound bed. The wound may further evolve and become covered by thin eschar. Evolution may be rapid exposing additional layers of tissue even with optimal treatment.

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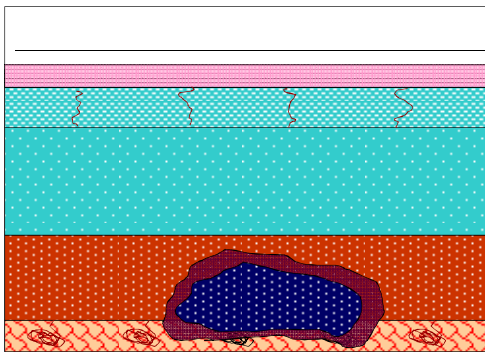
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Deep Tissue Injury (DTI)

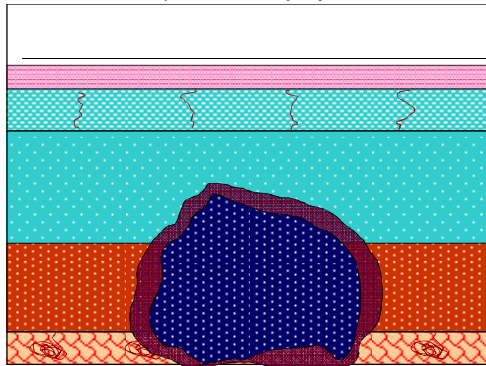


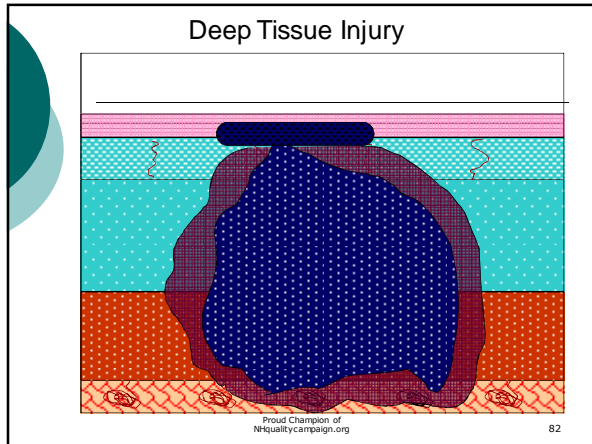
- Tissue injury that appears as dark discoloration, deep bruising, hematoma
- Borders are irregular and not well demarcated
- Typically acute formation
 - Long OR times
 - Falls
 - Splints
 - Single episode of pressure
- Damage to deeper structures has already occurred
- Skin may still be intact because of its higher resistance to hypoxia
- Herald sign of an impending stage III or IV

Deep Tissue Injury



Deep Tissue Injury





Progression of DTI

- Eschar formation – common at heels
- Necrosis and formation of full thickness wound
- Infection and abscess formation – usually requires surgical intervention
- DTI have potential for rapid deterioration

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DTI Progression

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Management / Treatment

- Complete and immediate pressure relief
- No massage to affected area
- Protect from other factors
 - i.e., incontinence, friction, shear
- May use dry dressing if desired but no topical until "declared"
- Monitor closely for deterioration
- Nutritional support

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What is different?

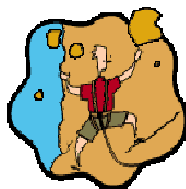


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Documenting DTI

- NPUAP revised staging system includes suspected DTI, however this is not an option on MDS 2.0
- DTI is generally "unstageable" as the wound base is not visible
- NPUAP recommends:
 - **"Pressure-related deep tissue injury under intact skin"** or
 - **"Deep tissue injury under intact skin"**
- Include risk factors, interventions, turning schedule, etc.



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Documenting DTI

- Key terms to describe what you see and feel
 - Blanching / non-blanching erythema
 - Ecchymosis
 - Fluctuance
 - Hemorrhagic
 - Induration
 - Evolving
 - Demarcation

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The 7-day Principle (Farid 2007)

- "For the purposes of deep pressure injuries that present as a demarcated red/purple area, clinicians can count back 7 days to pinpoint when the actual pressure damage occurred."
- Deep pressure injuries...
 - Demarcate 7 days from the early signs of redness
 - Spontaneous "skin slippage" occurs on days 9-11
 - Mature brown/black eschar forms on days 14-15

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Clinical Presentation of Pressure Ulcers


- Other PrU characteristics
 - Wound exudate varies in amount
 - PrU usually round and well defined, shape may be irregular depending upon pressure causing agent (catheter) and location (butterfly shape common at sacrum)
 - Periwound usually dry unless clinical signs of infection
 - Pain is variable
 - To facilitate healing, must eliminate mechanical trauma forces (pressure, friction, shear)

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Kennedy Ulcer AKA Terminal Ulcer

- Pressure ulcer that develops as a resident is dying
- Blood perfusion problem exacerbated by the dying process
- ~Shaped like a pear
- Usually on the sacrum
- Can be red, yellow or black
- Irregular borders
- Sudden onset




For more information, go to:
www.kennedyterminalulcer.com

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Limitations to Identifying and/or Staging Pressure Ulcers

- Stage I ulcers may be superficial, or they may be a sign of deeper tissue damage
- Stage I pressure ulcers are not always reliably assessed, especially in residents with darkly pigmented skin
- When eschar is present, a pressure ulcer cannot be accurately staged until the eschar is removed
- Stage II pressure ulcers do not present with necrotic tissue
- Never backstage a pressure ulcer**
 - "healing stage 4"
- It may be difficult to assess pressure ulcers in residents with casts or other orthopedic devices, so extra vigilance is required under these circumstances



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Documentation Issues

- Until the MDS is revised, reverse staging must be used for completion of the RAI
 - For example, if upon observation a healing Stage III ulcer has the appearance of a Stage II ulcer, it should be coded as a Stage II ulcer on the MDS
 - Correct staging and descriptions should be in the wound care/nursing notes
 - Healing Stage III ulcer recorded as Stage II on the MDS
- A PrU should progress toward healing in 2-4 weeks. If not, the reason for continuing the current treatment must be documented.

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Wound Identification

- o *If you see something, say something* (NYC MTA)
 and document it!!




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Wound Identification

- o Wound etiology
- o Location
- o Dimensions
- o Wound bed
- o Wound margins
- o Periwound
- o Exudate
- o Impediments to healing
- o Pain
- o Dressing
- o Current goal of therapy
- o Impression
- o Plan of care


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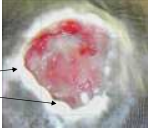
Wound Identification- wound margin



Note: rough appearance of wound margin



Note: rolled edges/epiboly



Maceration

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Wound Identification- periwound



Note: look at area immediately adjacent to the wound margin extending out a few centimeters circumferentially. Describe appearance of these tissues.

F314 & Documentation

- The F314 addresses the **minimum** requirements for documentation for a resident with a PrU
 - Protocol for assessment
 - Mandated daily monitoring
 - Mandated weekly or dressing change monitoring

Protocol for Assessment

- Differentiate type of ulcer (pressure related versus non-pressure related)
- Determine stage (if pressure) or depth of tissue involvement for non-pressure related ulcers (partial or full-thickness)
- Describe and monitor the ulcer's characteristics
- Monitor the progress toward healing and potential complications
- Determine if infection is present
- Assess, treat, and monitor pain
- Monitor dressings and interventions

Mandated Daily Monitoring

- Evaluation of ulcer if no dressing is present
- Evaluation of the status of the dressing, if present
 - Is it intact? Is there drainage? Is it leaking?
- Status of the peri-ulcer area
 - Area around the ulcer that can be observed without removing the dressing
- Presence of possible complications
 - Increased redness, swelling, drainage...
- Whether pain, if present, is being adequately controlled

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Mandated Weekly or Dressing Change Monitoring

- Size, depth, and the presence, location and extent of undermining or tunneling/sinus tract
- Exudate if present: type, color, amount, odor
- Pain if present: nature and frequency
- Wound bed: color and type of tissue
 - Evidence of healing or necrosis?
- Description of wound edges and periwound
 - Rolled edges, erythema, induration, maceration?

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Tools to Monitor Healing

- It is inappropriate to reverse stage pressure ulcers to describe/monitor healing
- Several tools have been developed and validated to assess the healing pressure ulcers
- Two most widely used:
 - Pressure Sore Status Tool (PSST)
 - Pressure Ulcer Scale for Healing (PUSH)

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PSST

- Comprised of 13 variables to provide a numerical indicator of the PrU status (healing or deteriorating)
- Scores range from 1 indicating tissue health (resolved) to 65 indicating wound degeneration
- Provides comprehensive ulcer assessment

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PSST Variables

○ Size (L x W)	○ Exudate type
○ Depth	○ Exudate amount
○ Edges	○ Periwound skin color
○ Undermining	○ Peripheral tissue edema
○ Necrotic tissue type	○ Peripheral tissue induration
○ Necrotic tissue amount	○ Granulation tissue epithelialization

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PUSH

- Comprised of 3 variables:
 - Surface area (L x W)
 - Exudate amount
 - Tissue appearance
- Score of 0 indicates PrU has resolved; highest score of 17 indicates wound degeneration
- Score is plotted on a PrU healing record and graph

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PUSH

- NPUAP is working with CMS to incorporate the PUSH tool in Resident Assessment Protocols to accompany the MDS in LTC facilities
- Only applicable to PrU

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What About the Wound Microenvironment?

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Wound Microenvironment

- Ideally, early identification and proper intervention will allow the wound to progress to full closure.
- However, the wound microenvironment is critically important to the overall health of the wound.



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The Bacterial Burden

Contamination

Colonization

Critical Colonization

Local Systemic → Infection

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Biofilms

- Biofilms are complex communities of bacteria
 - Embedded in self-secreted extracellular polysaccharide matrix
 - Develop protected microenvironments
 - Create increased resistance to antibiotics (50-1000 times more resistant)

Biofilm formation:

Attachment Colonization Growth

BVL FLUID

SURFACE

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Contamination, Colonization, & Infection

- All wounds are **contaminated**, but not all wounds are infected
 - Indicators of contamination
 - Presence of multiple organisms (<10,000 org/g)
 - Malodorous wound *prior* to cleansing
 - Nonpurulent drainage
 - Inflammation
 - Periwound erythema

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Contamination, Colonization, & Infection

- Indicators of **infection**
 - Previous list, plus...
 - Greater than 10,000 org/g tissue
 - Persistent odor
 - Increased leukocytosis
 - Wet gangrene
 - Purulent drainage
 - Cellulitis
 - Elevated body temperature
 - Pain (dolor)
 - Swelling (tumor)
 - Redness (rubor)
 - Inflammation
 - Heat (calor)

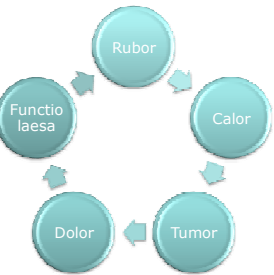


Infection = # of bacteria x virulence/host resistance

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Inflammation Vs. Infection



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Inflammation vs. Infection

Rubor

<p>Inflammation</p> <ul style="list-style-type: none"> ○ Well defined erythematous border 	<p>Infection</p> <ul style="list-style-type: none"> ○ Poorly defined border ○ Disproportionate amount of erythema ○ Possible proximally directed erythematous streaking
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Inflammation vs. Infection Calor

<p>Inflammation</p> <ul style="list-style-type: none"> ○ Localized increase temperature 	<p>Infection</p> <ul style="list-style-type: none"> ○ Magnified localized increased temperature ○ Warmth extends further from wound site ○ Possible systemic increase in body temperature
---	---

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Inflammation vs. Infection Tumor

<p>Inflammation</p> <ul style="list-style-type: none"> ○ Small amount of edema proportionate to wound 	<p>Infection</p> <ul style="list-style-type: none"> ○ Edema disproportionate to wound size ○ Periwound may be indurated
---	--

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Inflammation vs. Infection Dolor

<p>Inflammation</p> <ul style="list-style-type: none"> ○ Painful 	<p>Infection</p> <ul style="list-style-type: none"> ○ Increased level of pain
--	---

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Inflammation vs. Infection Funcio Laesa

<p>Inflammation</p> <ul style="list-style-type: none"> ○ Temporary decrease in function in affected area 	<p>Infection</p> <ul style="list-style-type: none"> ○ Feelings of malaise ○ Decreased energy ○ Tachycardia ○ Hypotension ○ Altered mental status ○ Altered function in affected area
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Inflammation vs. Infection Drainage

<p>Inflammation</p> <ul style="list-style-type: none"> ○ <u>Odor</u>: none unless necrosis ○ <u>Color</u>: serous or sanguinous ○ <u>Consistency</u>: thin, bloody ○ <u>Amount</u>: proportionate 	<p>Infection</p> <ul style="list-style-type: none"> ○ <u>Odor</u>: malodorous ○ <u>Color</u>: white, yellow, green, blue ○ <u>Consistency</u>: thick, viscous, purulent, creamy ○ <u>Amount</u>: copious, disproportionate
--	---

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Inflammation vs. Infection Wound Status

<p>Inflammation</p> <ul style="list-style-type: none"> ○ Pass through normal phases of wound healing if managed appropriately 	<p>Infection</p> <ul style="list-style-type: none"> ○ Exhibit plateau or decline in wound status
---	--

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Classic Signs/Symptoms of Infection

- Dolor (pain)
- Rubor (erythema)
- Calor (warmth)
- Edema/swelling
- Purulence
- Fever

Acute Wound Infection }
Chronic Wound Infection }

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Secondary Signs/Symptoms of Infection

- Delayed healing
- Change in wound bed color
- Friable granulation tissue
- Absent/abnormal granulation tissue
- Abnormal color
- Serous drainage
- Pain at wound site

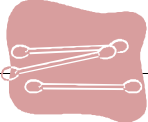
Critically colonized }
Bacterial burden }
Local wound infection }

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Wound Culture

- When is it appropriate?
 - If resident exhibits signs and symptoms of infection → obtain culture
 - When wound extends to bone or fails to heal, assess for signs of osteomyelitis
 - Grayson et al, demonstrated that a simple clinical test of probing to bone was predictive of osteomyelitis with a sensitivity of 66%, specificity of 85%, positive predictive value of 89%, and negative predictive value of 56%.



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Wound Culture

- Proper technique
 - Always clean the wound first
 - Levine technique
 - Replace swab in medium (send to lab)
 - Recommend calcium alginate or rayon culture, as these are biodegradable, in lieu of cotton tip

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Antimicrobial Therapy

Adapted from Sibbald et al 2001

- Critical Colonization
 - Increasing wound size
 - Increasing exudate
 - Friability, bright red
 - Increased odor

Topical
(Immunocompromised pt may
Require systemic)

- Deep Tissue Infection
 - Erythema, edema > 2 cm
 - Probes to bone
 - Pain
 - Tenderness
 - New areas of breakdown

Systemic
+/- Topical

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Antimicrobial Therapy

- Systemic antibiotics are not required for PrUs with only clinical signs of local infection.
- A period of 2 weeks is a reasonable trial with topical agents before considering systemic treatments or re-examining the treatment of the cause/ability of the ulcer to heal.

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NERDS & STONES Sibbald et al, 2006

Local signs to indicate superficial bacterial burden and deep tissue infection

- **NERDS**
 - Nonhealing
 - Exudate
 - Red friable tissue + bleeding
 - Debris
 - Smell
- Superficial: treat topically
- **STONES**
 - Size is bigger
 - Temperature increase
 - Os/Bone (probes/exposed)
 - New breakdown
 - Exudate
 - Erythema and/or edema
 - Smell
- Deep: treat systemically

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Topical Agents

- Products we put on or around the wound to protect the skin...what are they and how are they defined?

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Topical Agents: Skin Sealants and Moisture Barriers

These substances form a protective layer/coating over the skin, preventing water, topical agents, and wound/body fluids from causing skin breakdown.

- **Skin sealants:** generally alcohol based wipes used on intact periwound skin; make the skin surface tacky providing a better edge seal for adhesive dressings while simultaneously protecting the skin from the adhesive
- **Moisture barriers:** ointments or creams that contain petrolatum, dimethicone, and/or zinc oxide; primarily used to prevent rashes/breakdown in areas of incontinence; make the skin surface slightly oily precluding their use with adhesive wound dressings

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Topical Therapy

- Must address the three components of local wound care:
 - Debridement
 - Bacterial balance
 - Moisture balance

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Topical Therapy

- **Definitions:**
 - **Antimicrobial:** an agent that inhibits or kills microorganisms
 - **Antiseptic:** a substance that prevents or arrests the growth by preventing multiplication (bacteriostatic) or action of microorganisms, either by inhibiting their activity or by destroying or killing them (bactericidal).
 - **Antibiotic:** an organic chemical substance produced by a microorganism that has the capacity in diluted solutions to destroy or inhibit the growth of bacteria and other microorganisms
 - **Antibacterial:** an agent that destroys or stops bacterial growth
 - **Antifungal:** a wide variety of agents that inhibit or kill fungi

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Topical Antibacterials: Antibiotics

- Can be used when the surface component of the wound bed is out of bacterial balance.
 - Re-evaluate at frequent intervals (every 2 weeks)
 - If a response is not seen, consider resistant organisms or s/s that the deeper wound bed is out of balance

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Rules for Topical Agents

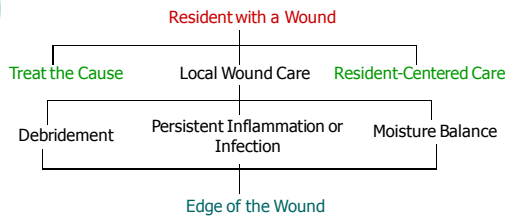
- Do not use agents that are used systemically because of the ability to develop resistant organisms
- Do not use agents that are common allergens (eg, neomycin)
- Do not use agents that have a high cellular toxicity in healable wounds (eg, povidone iodine, chlorhexidine, hydrogen peroxide)

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Preparing the Wound Bed

Adapted from Sibbald RG et al 2006



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Wound Care Products

- The first recorded use of an occlusive wound dressing → 1615 BC.
- Wounds were left open to the air to form a scab until Winter advocated the concept of moist wound healing in 1962, based of a pig model.
- In 1963, in a human experiment, Hinman and Maibach showed that occlusive dressings accelerate healing.

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Wound Care Products

- Over 6000+ products available
- Consider the following:
 - wound related factors (etiology, severity, environment, size, anatomic location, infection)
 - resident related factors (vascular status, medications, nutritional status)
 - dressing related factors (availability, durability, characteristics, "cost")



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Dressing Considerations

- What do you need the dressing to do?
 - Create or maintain moist wound bed
 - Provide for non traumatic removal
 - Create a bacterial barrier
 - Protect healthy cells
- Consider
 - Ulcer location
 - Cost and frequency of change
 - Is the dressing user-friendly

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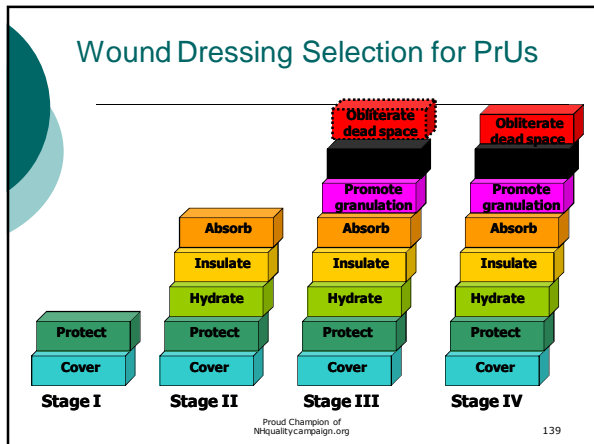
Dressing Considerations

Adapted from: Baranoski, 1999.

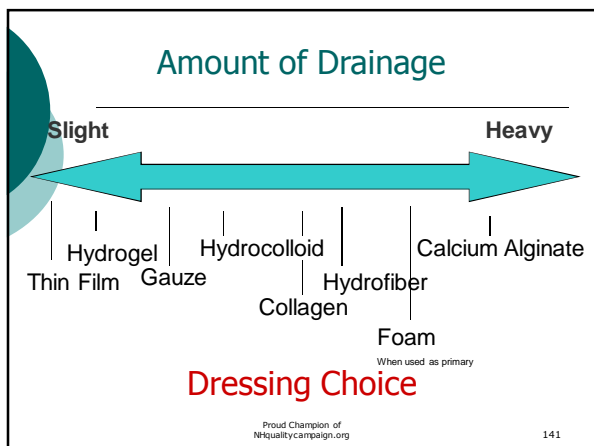
- **M**inimize trauma to wound bed
- **E**liminate dead space
- **A**ssess and manage exudate
- **S**upport the body's tissue defense system
- **U**se non-toxic wound cleansers
- **R**emove infection, debris, necrotic tissue
- **E**nvironment maintenance- thermal insulation and moist wound bed
- **S**urrounding tissue- protect from injury and bacteria

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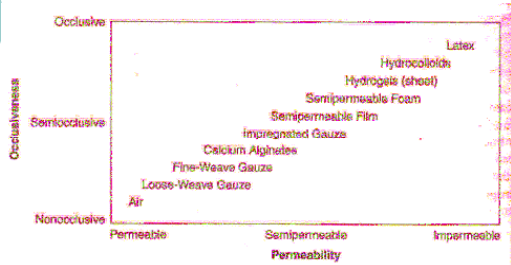
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- ### Dressing Categories
- Calcium Alginates
 - Transparent Films
 - Foams
 - Hydrogels
 - Hydrocolloids
 - Gauze Dressings
 - Collagens
 - Composite Dressings
 - "New" Technologies
- Proud Champion of NHqualitycampaign.org 140



Dressing Occlusive Continuum



A Few Words About Gauze...

- Moisture retentive dressings vs. Gauze
 - Studies have demonstrated that bacteria can pass through SIXTY-FOUR layers of dry gauze
 - The infection rate with gauze dressings was 3X higher than with moisture retentive dressings
 - Gauze dressings will NOT prevent bacterial contamination
 - Think about a wound's location....other methods for bacterial contamination?

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A Few Words About Gauze...

- Gauze dressing changes released greatest bacteria in colonized wounds
 - Decline of airborne bacteria, almost 30 minutes
 - Removal of moisture retentive... almost no bacteria released

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Gauze on this?



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Dressings & Thermoregulation

- **Normothermia**
 - 37°C is optimal for cellular functioning
- **Hypothermia**
 - causes vasoconstriction
 - decreases cellular activity
 - decreases collagen deposition
 - weakens host resistance to wound infection
- Most chronic wounds are hypothermic

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Dressings & Thermoregulation

- **Semi-occlusive** dressings = 33-35°C
- **Gauze** dressings = 25-27°C
- 4-6 hours for metabolic function to return to 'optimal levels' after each dressing change
- With dressing changes, wound bed temperatures have been measured at 21 degrees C
- With TID dressings (with gauze), temperature is decreased for 12-18 hours of the day

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A Few More Words About Gauze

Gauze is:

- An inert dressing
- A fibrous material
- Highly absorbent (dries the surface of the wound rapidly)
- Permeable to bacteria
- Adherent and traumatic
- Painful
- Unhelpful over hydrogels or alginates

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Real Cost of Wound Care


- The price of the dressing
- The labor cost of changing the dressing
- Ancillary supplies and services used in changing the dressing
- Cost of the duration of care

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Cost Analysis of Gauze

- Misconception that gauze is cheap
- Gauze can be more expensive to use than a dressing 10X the price of gauze...
resident Outcome



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Dressing and Treatment Caveats

Thomas, JAMDA Oct 2006

- Stage III, IV ulcers should be covered
- Determination of the need for a dressing for a Stage I, II ulcer is based upon individual practitioner's clinical judgment and facility protocols based upon current clinical standards of practice
- Current literature does not indicate significant advantages of any single specific product
- Current literature suggests that PrU dressing protocols may use clean technique rather than sterile
- Appropriate sterile technique may be needed for those wounds that have recently been surgically debrided or repaired

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Debridement Caveats

Thomas, JAMDA Oct 2006

- Variety of methods available
 - Mechanical, sharp, surgical, enzymatic, autolytic
 - Must be appropriate for the resident and clinical wound presentation
- Stable, dry, intact, and adherent eschar on the foot/heel should not be debrided unless signs/symptoms of local infection or instability
- Wet-to-dry dressings (a form of debridement) or irrigations may be appropriate in *limited* circumstances, but repeated use may damage healthy granulation tissue and may lead to excessive bleeding and increased pain
- A facility should be able to show that its treatment protocols are based upon current standards of practice and are in accord with the facility's policies and procedures as developed with the medical director's review and approval

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Now What Should You Consider?

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Managing Tissue Loads



Ideal pressure redistribution...

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Managing Tissue Loads

- o NPUAP definition of support surface: "A specialized device for pressure **redistribution** designed for management of tissue loads, micro-climate, and/or other therapeutic functions (i.e. any mattresses, integrated bed system, mattress replacement, overlay, or seat cushion, or seat cushion overlay)."

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Managing Tissue Loads

- o Support surfaces are one of the major ways to manage pressure, friction, and shear on tissues.
 - Used on beds, chairs, exam tables, surgical tables.
- o Should be combined with other interventions:
 - Positioning devices
 - Pressure relief for the heels
 - Side lying positions
 - Bed positioning
 - Lifting devices
 - Positioning schedule

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Managing Tissue Loads

- All part of a written plan...
 - Pillows or foam wedges used to separate bony prominences from direct contact with one another.
 - Raise heels off of bed- do not use donut type devices (float heels).
 - When side-lying avoid positioning directly on trochanter (30 degrees support with pillows).
 - Maintain head of bed at the lowest degree of elevation consistent with medical conditions and other restrictions (30 degrees). Limit amount of time head of bed is elevated.
 - Use lifting devices, trapeze or bed linen, to move- not drag- residents in bed who cannot assist during transfers or position changes.
- Other interventions:
 - Critical to address nutrition and moisture!!! Also, underlying disease processes.

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8 Accepted Positions

- Prone position with rotation of 30 degrees to right or left
- Supine position with 30 degrees of rotation to right or left
- Supine position with slight right or left sacral relief
- Supine position with the head of bed elevated 30 degrees or less and the feet blocked
- Supine position with the head of bed elevated 30 degrees or less and the knees flexed with the bed
 - The feet are blocked and knees flexed to prevent shear forces
 - In all positions, heels must be elevated


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Managing Tissue Loads

- **Ideal** support surface characteristics:

From: J McLean 1993

 - Reduces/relieves pressure under bony prominences
 - Control pressure gradient in tissue
 - Provides stability
 - No interference with weight shifts
 - No interference with transfers
 - Controls temperature at interface
 - Controls moisture at skin surface
 - Lightweight
 - Low cost
 - Durable
 - *No single product meets all of these ideal characteristics*



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Managing Tissue Loads- Review

- **Mattress overlays or replacements**
 - Foam, static air, alternating air, gel and water products, low-air loss
- **Total bed replacement**
 - Low-air loss therapy or air-fluidized/high-air-loss therapy

The following slides will briefly describe what these terms mean.

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Managing Tissue Loads

- **Foam**- differ in density, thickness or base height, indentation load deflection (firmness of foam), and modulus (compression resistance to support load of resident). Need to monitor effectiveness and moisture on individual basis.
 - Regular foam, 3 inches
 - Convoluted foam, 4 inches
- **Static air**- inflating device fills product with air. Check for bottoming out, by placing hand palm up under the overlay and directly below the resident's bony prominence. Device is inadequate if there is less than one inch of support. For mattress replacements, recommended height is not less than 5 inches. Usually have waterproof cover to reduce friction and shear.

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Managing Tissue Loads

- **Alternating air**- dynamic motion used to prevent constant pressure against skin and enhance blood flow. Overlay should be greater than 3 inches and mattress greater than 5 inches. The interconnected cells or tubules are inflated with an electric pump. Proper inflation is necessary for optimal effectiveness.
- **Gel and water**- heavy, yet require little maintenance and are easy to clean. Gel provides flotation and pressure reduction, can be combined with foam. Depth should not be less than 2 inches. Water products provide a lower interface pressure than standard hospital mattress. Should not be less than 3 inches. Can make resident procedures and transfers difficult. Precautions needed to prevent microorganism growth and a water heater is needed to maintain a comfortable temperature for the resident.

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Managing Tissue Loads

- **Low air-loss-** prevent capillary occlusion by providing an even distribution of weight over a number of cells or pillows, grouped by zones. Each zone is inflated with air based on resident's weight, height, and body distribution. Should have a minimum depth of 5 inches. Provides dry air flow that controls moisture and heat build up defraying maceration and friction. Mattresses do the same as the overlays but some have adjunctive therapies built in- percussion, pulsation, kinetic therapy. Not recommended for residents with cervical or skeletal traction. Products can be slippery and noisy.

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Managing Tissue Loads

- **Air fluidized-** originally developed for burn residents in the 1960s. Provides a medium that is more dense than water for residents to float on by pumping air through silicone-coated micro spheres separated from the resident by a monofilament sheet. residents float on the surface. These have the capability to control large amounts of bodily fluids. Not recommended for mobile residents, residents with pulmonary disease, or residents with an unstable spine. Continuous circulation of warm dry air may dehydrate the pt or desiccate the wound bed. Head of bed cannot be raised.

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NPUAP: Physical Concepts Related to Support Surfaces

<ul style="list-style-type: none"> ○ Friction (frictional force) ○ Coefficient of friction ○ Envelopment ○ Fatigue ○ Force ○ Immersion ○ Life expectancy 	<ul style="list-style-type: none"> ○ Mechanical load ○ Pressure ○ Pressure redistribution ○ Pressure reduction ○ Pressure relief ○ Shear (shear stress) ○ Shear strain
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NPUAP: Components of Support Surfaces

- Cell/bladder
- Viscoelastic foam
- Elastic foam
- Closed cell foam
- Gel
- Pad
- Viscous fluid
- Elastomer

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NPUAP: Features and Categories

<ul style="list-style-type: none"> ○ Features of Support Surfaces <ul style="list-style-type: none"> ● Air fluidized ● Alternating pressure ● Lateral rotation ● Zone ● Multi-Zoned 	<ul style="list-style-type: none"> ○ Categories of Support Surfaces <ul style="list-style-type: none"> ● *Reactive support surface ● **Active support surface ● Integrated bed system ● Non-powered ● Powered ● Overlay ● Mattress replacement
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Minimum Standards of Care: Support Surfaces

- **Group/Level 1** Pressure Reducing (Redistribution) Device
- (A resident would qualify for a Group/Level 1 support surface if he/she meets one or more of the following items listed below)
 - Resident is completely immobile, resident cannot make changes in body position without assistance
 - Resident has limited mobility, resident cannot indep make changes in body position signif to alleviate pressure
 - Resident has any stage PrU on trunk or pelvis, plus one of the following:
 - Impaired nutritional status
 - Incontinence
 - Altered sensory perception
 - Compromised circulatory status

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Minimum Standards of Care: Support Surfaces

- Group/Level 1
 - Non-powered devices





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Minimum Standards of Care: Support Surfaces

- Group/Level 2 Pressure Relieving (Redistribution) Device
- (A resident would qualify for a Group/Level 2 support surface if he/she meets one or more of the following items listed below)
 - Multiple stage 2 PrU on trunk or pelvis & resident has received comprehensive ulcer mgmnt for at least one month including use of level 1 device & ulcers have worsened or remained the same over past month
 - Large or multiple stage 3,4 PrU on trunk or pelvis
 - Recent myocutaneous flap or skin graft for PrU on trunk or pelvis (60 days) & resident has been on level 2 or 3 support surface immediately prior to a recent discharge from hospital or facility (30 days)

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Minimum Standards of Care: Support Surfaces

- Group/Level 2
 - Powered devices





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Minimum Standards of Care: Support Surfaces

- Group/Level 3 Pressure Relieving (Redistribution) Device
- (Must meet all criteria listed to qualify for Group/Level 3)
 - Can only be used if conservative tx has been tried first
 - Resident and caregiver educated on prevention/management of PrU
 - Assessment by physician, nurse, or PT at least weekly
 - Appropriate turning and positioning
 - Use of Grade/Level 2 support surface
 - Appropriate wound management
 - Appropriate management of incontinence, and
 - Nutritional assessment and intervention consistent with overall plan of care

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Minimum Standards of Care: Support Surfaces

- Group/Level 3
 - Air-fluidized bed

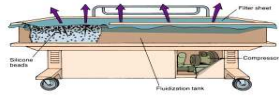


Figure 21-16 Air-Fluidized Bed

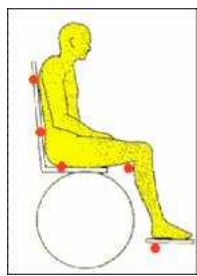
Note: failure to implement a conservative treatment plan prior to placing a resident on a level 3 support surface can lead to denial of the claim and/or civil or criminal measures against the entity filing the claim. Will be automatically denied for any resident with a coexisting pulmonary disease because lack of firm back support makes coughing ineffective and dry air inhalation thickens secretions.

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Wheelchair Considerations

- Two thirds of all pressure ulcers occur in the pelvic girdle
 - Due to an unequal distribution of weight over the support surface that occurs with prolonged sitting in the same position
- The most prevalent anatomical locations are:
 - Coccyx
 - Ischial tuberosities



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Wheelchair Considerations

- State survey guidelines specifically address this issue
- Reposition every hour
- Teach weight shift every 15 minutes if possible
 - If resident cannot do this on their own, stand resident for one minute every hour
- Postural alignment, sitting balance should be assessed

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Positioning a Seated Resident

- Have resident sit with his/her back erect against the back of the chair, thighs parallel to the floor, knees comfortably parted, and arms horizontal and supported by the arms of the chair
 - This posture distributes weight evenly over the available body surface area
- Feet should be kept flat on the floor to protect the heels from focused pressure and to distribute the weight of the legs over the largest available surface area- the soles
- Do not allow resident to slouch, which causes shear and friction and places undue pressure on the sacrum and coccyx

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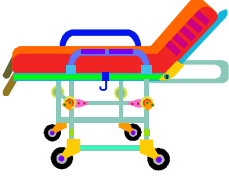
Positioning a Seated Resident

- Keep the thighs and arms parallel to ensure that weight is evenly distributed all along the thighs and forearms, instead of being focused on the ischial tuberosities and elbows
- Part the knees to keep knees and ankles from rubbing together

From: Expert LPN Guides, Wound Care, LWW, 2008
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Managing Tissue Loads

- o A few other considerations...



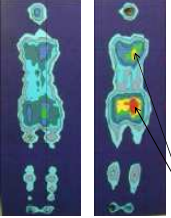
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Tissue Interface Pressure

Tissue interface pressure (IP) should not be confused with capillary closing pressure. Interface pressure describes the pressure applied to the epidermis by the surface supporting it.

- o Keeping the interface pressure below 32mmHg is a useful guideline but does not assure that flow in the capillaries will be uninterrupted
- o Interface pressure measurements do not necessarily reflect the actual pressure acting on the capillaries



Pressure mapping shows high pressure denoted in red and yellow. This can be used to determine how well a support surface redistributes pressure.



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Clinical Effectiveness

The efficacy of a surface to maintain tissue integrity depends primarily on its ability to:

- o Increase the support surface area
- o Reduce pressure, friction and shear
- o Reduce moisture retention
- o Reduce heat accumulation

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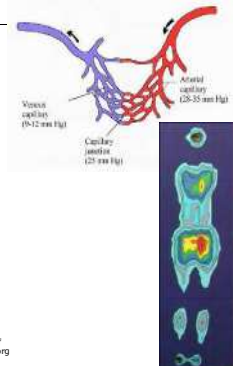
Clinical Effectiveness

Pressure Redistribution

- o Refers to the function or ability to distribute a load over a surface or contact area
- o Results in shifting pressure from one area to another and requires attention to all affected areas

Pressure reduction: Decrease of interface pressure, not necessarily below capillary closing pressure

Pressure relief: Reduction of interface pressure below capillary closure pressure



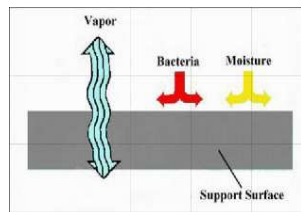
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Performance Parameters

A support surface material should:

- o Prevent maceration
- o Allow for moisture vapor transmission (MVTR)
- o Prevent bacteria and moisture penetration



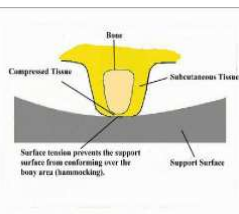
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Performance Parameters

Surface tension (the inability of the material to conform to a resident's body) can result in pressure that is three or four times greater than capillary closing pressure. To reduce this pressure the support surface material should:

- o Increase the contact points between the resident's body and the surface
- o Conform over bony area reducing adherence
- o Reduce surface tension (hammocking)



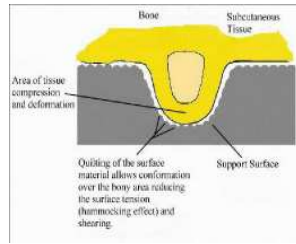
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Performance Parameters

“Quilting” of the surface material allows the support surface to conform to the resident’s body

- oThe surface material can move with the resident reducing the shearing effect
- oThe end result is the elimination of surface tension (hammocking)



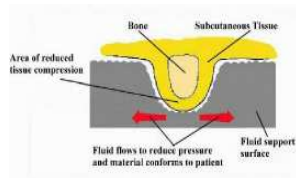
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Performance Parameters

Support systems designed using a fluid medium (air or liquid) reduce or eliminate the pressure caused by the material

- oThese mediums have a uniform density
- o“Memory” is not a factor with these systems
- oThey allow for greater body/surface contact (immersion) and weight distribution



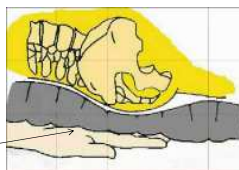
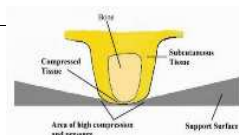
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Performance Parameters

A surface should support the resident and prevent “bottoming out”

- oBottoming out usually occurs over bony areas of the body
- oA healthcare provider should check to see that the resident’s support surface is not completely compressed when the resident’s weight is fully applied to the surface



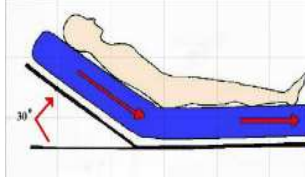
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Performance Parameters

Reduce Friction and Shear

- oAs a resident slides, friction and shear forces act to interrupt blood flow to the surrounding body tissues
- oKeeping the head of the bed at 30° or less helps prevent the resident from sliding
- oA loose cover over the support surface will prevent sliding



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Performance Parameters

oResident's restricted to bed → recumbent dependent

- Use devices to enable independent positioning, lifting, and transfers (e.g., trapeze, transfer board, bed rails)
- Reposition at least every 2 hours or sooner if at high risk for ulcer development
- Use pillows or foam wedges to avoid contact between bony prominences
- Use devices to totally relieve pressure on the heels and bony prominences of the feet
- Reduce shearing forces by maintaining the head of the bed at the lowest elevation consistent with medical conditions and restrictions
- A 30° elevation or lower is recommended
- Use lifting devices to avoid dragging residents during transfer and position changes
- Do not use donut type devices or products that localize pressure to other areas

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Reduce Heel Pressure

- oProvide total pressure relief to the heels

•Float the heels

- oHeel and elbow "protectors" and sheepskin are for *comfort only* and do not provide pressure relief
- oUtilize foam wedges or pillows to elevate heels
- oPrevent constriction of the foot by tight or heavy linen





Ensure straps do not cause pressure on the dorsal surface of the foot. Also monitor the great toe and little toe for breakdown against the edges of protectors of all types.

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Documentation


- Descriptive documentation is the key to evaluating the effectiveness of a skin and wound care plan
- Should reflect the wound across the healing continuum
- Documentation is the primary means of consistent communication amongst all staff

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Documentation Checklist

- Chief complaint
- History of present illness
- Past medical, social and family history
- Systems review
- Physical assessment
- Risk assessment tools
- Manual assessment tools
- Procedures performed
- Supplies and tests ordered
- Details of resident/caregiver education
- Care plan
- Discharge plan



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Documenting Pain

- Pain intensity (rating scale)
- Location
- Quality, patterns of radiation and character (residents own words when appropriate)
- Onset, duration, variations, patterns
- Alleviating and aggravating factors
- Present pain management regimen
- Pain management history
- Effects of pain
- resident's pain goal
- Physical exam

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Top 20 Strategies for Skin and Wound Documentation Adapted from: Wound Care Strategies, 2003.

1. Create comprehensive glossary
2. Use evidence-based clinical pathways and algorithms to ensure consistent care
3. Declare clinical strengths and weaknesses- develop plan to improve performance
4. Develop quality improvement plan
5. Discard all scrap paper and sticky notes

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Top 20 Strategies for Skin and Wound Documentation Adapted from: Wound Care Strategies, 2003.

6. Develop P&P
7. Document in consistent location in medical record
8. Document concurrently/immediately after resident visit for accuracy
9. Ensure timely and complete documentation
10. Establish complete documentation guidelines

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Top 20 Strategies for Skin and Wound Documentation Adapted from: Wound Care Strategies, 2003.

11. Investigate facility's/state's documentation requirements
12. Organize thoughts prior to documenting
13. Perform periodic documentation audits
14. Provide ongoing education to review documentation standards
15. Review all pertinent local coverage decision policies & accreditation goals/guidelines

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Top 20 Strategies for Skin and Wound Documentation Adapted from: Wound Care Strategies, 2003.

16. Review all pertinent Medicare coverage decisions
17. Understand power of documentation
18. Ensure appropriate medical record standards- understand who bears responsibility or clinical documentation in medical record
19. Validate competencies of all clinicians
20. Write legibly- if it is not legible, it did not happen

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Photo Documentation


- Powerful impact in a legal forum
- Visual confirmation of a written record
- Demonstration of a wound imported to the facility mitigates liability concerns
- Helps establish a pattern of change in the resident's record
- Wound images can preserve detail that can later prove a fact beyond reasonable doubt



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Photo Documentation

- Policies
 - Criteria about who can take the photograph
 - Method of validating individuals' competency to do photograph
 - Frequency of revalidation of competence
 - Frequency (serial photographs)
 - Type of equipment used
 - Means to assure that digital images are accurate and not modified
- Inclusion of the residents identification, ulcer location, date taken, measurement grid and visible parameters for comparison




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Pressure Ulcer Words of Wisdom

- Treat the *Whole* patient, not just the *Hole* in the patient!!! (Sussman)
- Each person is unique, therefore each wound and the person's response to care is unique
- Wound management is an art as much as a science

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Program Pearls



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Program Pearls


- Think Pink!
 - Create a system to readily identify at-risk residents or those who already have existing wounds
 - Once identified through risk assessment, place a pink heart or other pink identifier outside the resident/residents' door to increase awareness of skin management needs



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Program Pearls

- OSF St. Francis Medical Center in Peoria, IL
 - SOS campaign
 - Every two hours, Olympic-style theme music is piped over the audio system to remind staff it is time to reposition residents
 - In addition, each nurse and tech receives a page every two hours
 - "please turn your residents now"




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Program Pearls

- Genesis Medical Center in Davenport, IA
 - Prevention program called "TOE"
 - Turn, Overlay, Elevate
 - Turn the patient for prevention, overlay beds and chairs with specials surfaces, elevate bony prominences (heels)




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Program Pearls

- Owensboro Medical Health System in Kentucky
 - Initiated policy requiring all patients undergo a "four-eyed body check" on admission
 - Two nurses check the patient head to toe
 - Patients can refuse, but the refusal is documented in the medical record




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Program Pearls

- Wound rounds
 - Set the day and schedule
 - Identify key people
 - Be consistent
 - View it as a learning opportunity
 - Track outcomes




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Program Pearls

- Empowerment
 - A facility was having a difficult time with early identification and intervention for pressure ulcers
 - Little to no accountability
 - A reward system was Put into place
 - Note area on card → give to charge nurse → f/u



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Questions?

Thank you for your time and attention

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References

- o Falabella, Kirsner eds. Wound Healing. Taylor & Francis Group, 2005.
- o Kloth L, McCulloch J. Wound Healing Alternatives in Management 3rd Edition. CPR, 2002.
- o Niezgodna, Mendez-Eastman. The Effective Management of Pressure Ulcers. Adv Skin and WC 2006; 19(Suppl 1):3-15.
- o Ayello. 20 Years of Wound Care: Where We Have Been, Where We Are Going. Adv Skin and WC 2006; 19(1):28-33.
- o Bennett, L and Lee B. Pressure versus shear in pressure sore causation. In Lee, B (ed): Chronic Ulcers of the Skin. McGraw-Hill, New York, 1985, p 39.
- o Kosciak, et al. Evaluation of pressure as a factor in the production of ischial ulcers. Arch Phys Med Rehabil 1959; 39:623.
- o Orlando. Pressure Ulcers: Principles of measurement. In Reichel, W (ed): Clinical Aspects of Aging. Williams & Wilkins, Baltimore, 1983, pp 469-478.
- o www.wheelchairnet.org/.../DAH/PM.html/PPT.html
- o Ovington, L. Hanging wet to dry dressings out to dry. Adv Skin and WC 2002; 15(2):79-84.
- o Lawrence JC. Dressings and wound infection. Am J Surg; 1994;167:(Suppl 1A):215-245.
- o Lawrence JC, Lilly HA, Kidson A. Wound dressings and airborne dispersal of bacteria. Lancet 1992;339:807.

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References

- o Hess C. The art of skin and wound care documentation. Adv Skin Wound Care 2005; 18(1):43-53.
- o www.dick-ford/.../medicalillustrations.html
- o NPUAP press release "Pressure Ulcer Stages Revised by NPUAP" February 2007.
- o J McLean. Pressure reduction or pressure relief: making the right choice. J ET Nsg 1993; 20(5):211-215.
- o Farid K. Applying observations from forensic science to understanding the development of pressure ulcers. Ostomy Wound Management 2007;53(4):26-44.
- o Baranoski S, Ayello E. Wound Care Essentials: Practice Principles. Lippincott Williams & Wilkins, 2004.
- o SkillMasters Wound Care. Lippincott Williams & Wilkins, 2007.
- o <http://www.medicalnewstoday.com> March 11, 2006
- o Sibbald RG, Woo K, Ayello EA. Increased bacterial burden and infection: the story behind NERDS and STONES. Adv Skin Wound Care 2006;19:447-461.
- o Grayson M, Gibbons G, Balogh K, et al. Probing to bone in infected pedal ulcers: a clinical sign of underlying osteomyelitis in diabetic residents. JAMA. 1995;273:721-772.
- o Sibbald, G. Topical Antimicrobials. Ostomy Wound Management 2003;49(5A):14-18.

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References

- o Winter GD. Formation of the scab and the rate of epithelization of superficial wounds in the skin of the young domestic pig. Nature. 1962;193:293-294.
- o Hinman CD, Maibach H. Effect of air exposure and occlusion on experimental human skin wounds. Nature. 1963;200:377-378.
- o Braden BJ, Bergstrom N. Clinical utility of the Braden Scale for Predicting Pressure Sore Risk. Decubitus 1989;2(3):44-6, 50-1.
- o Thomas D. The New F-tag 314: Prevention and Management of Pressure Ulcers. JAMDA 2006.
- o Reddy M. Skin and wound care: Important considerations in the older adult. Adv Skin Wound Care 2008;21:424-36.
- o Websites:
www.ahrq.gov, www.npuap.org, www.epuap.org, www.amda.org,
www.medic.org, www.wocn.org, www.healthinaging.org,
www.woundheal.com
- o <http://media1.wi.gov/DHFS/Viewer/Viewers/Viewer320TL.aspx?mode=Default&pid=4a5f257-05a2-4ccd-a4f9-70c3ba9bd079&pid=43fa99e9-d4d7-4326-8b97-c44bdec69d31&playerType=WM7#>

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