



***Advancing Safe Skin  
Across the Care Continuum***

***The Intersection of Pressure Ulcer Prevention,  
Treatment, and Technology***

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# Disclosure

Dr. Ayello is a paid consultant for Hill-Rom.

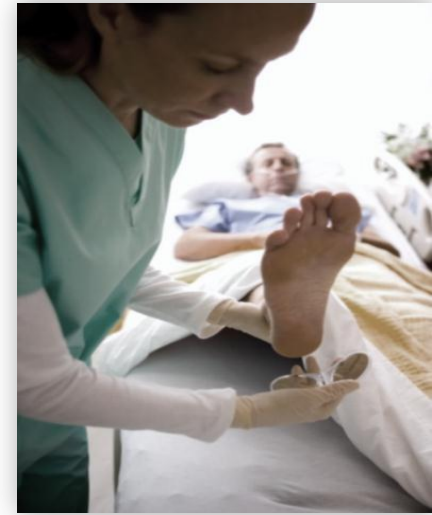
# OBJECTIVES

Participants will:

- Review the **impact** of Pressure Ulcers: Prevalence, Incidence, Cost, Quality of Life
- Discuss **Critical Components** of successful pressure ulcer prevention and treatment **plans of care**
- Recognize the **Science of Support Surface design**, and impact on support surface performance
- Identify key Resources & Tools, Barriers and Solutions to implement a **successful pressure ulcer prevention program**

# PRESSURE ULCER DEFINITION

- “**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.**”<sup>1</sup>



*Note: Friction has been removed from the definition.*<sup>1,2</sup>

“A number of **contributing** or **confounding** factors are also associated with pressure ulcers; the **significance** of these factors is **yet to be elucidated.**”<sup>1</sup>

—“Pressure ulcer” is the preferred term over decubitus ulcer and bedsore, because it relates to the acute cause of the problem. However, the older terms are still found in literature.

1. National Pressure Ulcer Advisory Panel and European Pressure Ulcer Advisory Panel. Pressure ulcer prevention & treatment Clinical Practice Guideline. Washington DC: National Pressure Ulcer Advisory Panel; 2009.

2. Friction induced skin injuries- Are they pressure ulcers? A National Pressure Ulcer Advisory Panel White Paper. November 20, 2012. Available at [www.npuap.org](http://www.npuap.org)

# INCIDENCE AND PREVALENCE DEFINITIONS

- **Incidence**

- “Proportion of individuals in a population at-risk that **develop** pressure ulcers over a specified period of time”<sup>1</sup>

- **Prevalence**

- “Proportion of individuals in a population who **have** a pressure ulcer at a **specified point in time**”<sup>1</sup>

- **Hospital or Facility-Acquired (FA) Prevalence**

- Number of patients with pressure ulcers at a **specific time not documented or present at admission** divided by the total number of patients or residents<sup>3</sup>

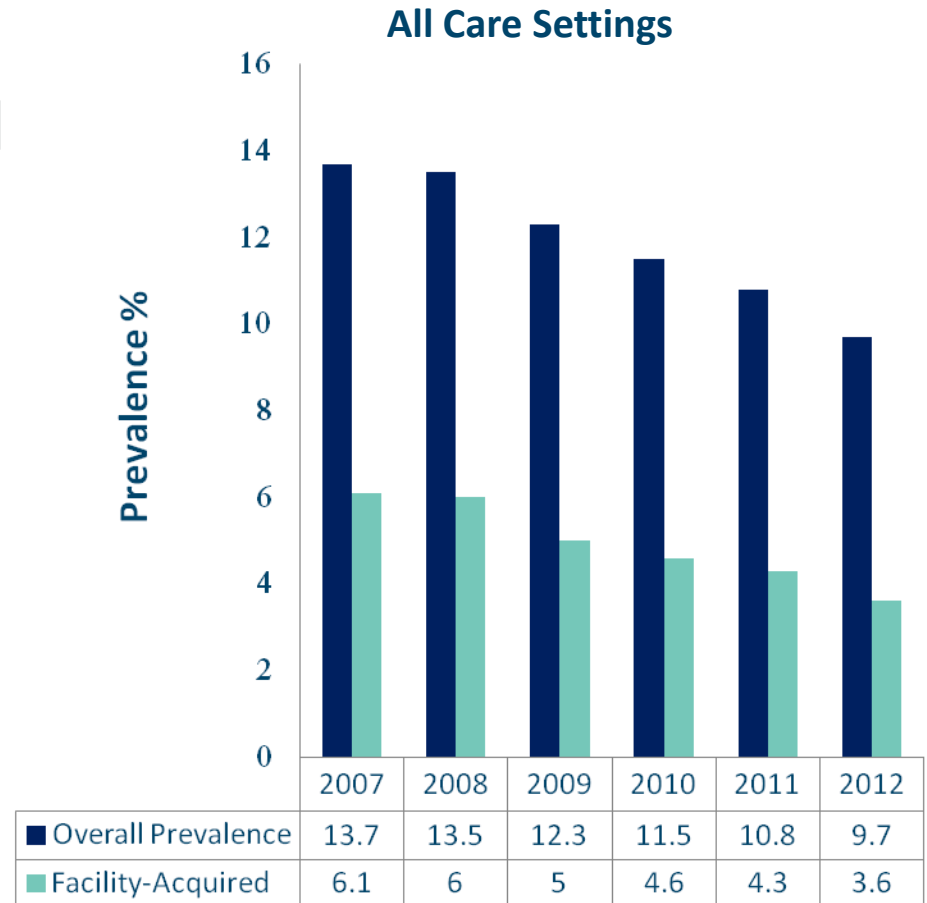
1. National Pressure Ulcer Advisory Panel and European Pressure Ulcer Advisory Panel. Pressure ulcer prevention & treatment Clinical Practice Guideline. Washington DC: National Pressure Ulcer Advisory Panel; 2009.

3 Hill-Rom IPUP 2012 Survey

# USA PRESSURE ULCER PREVALENCE IN ALL CARE SETTINGS

Overall and facility-acquired prevalence continue to decrease over time, but:

- **1 in 10** patients *have* pressure ulcers<sup>3</sup>
- **1 in 25** patients *will develop* a pressure ulcer post admission<sup>3</sup>

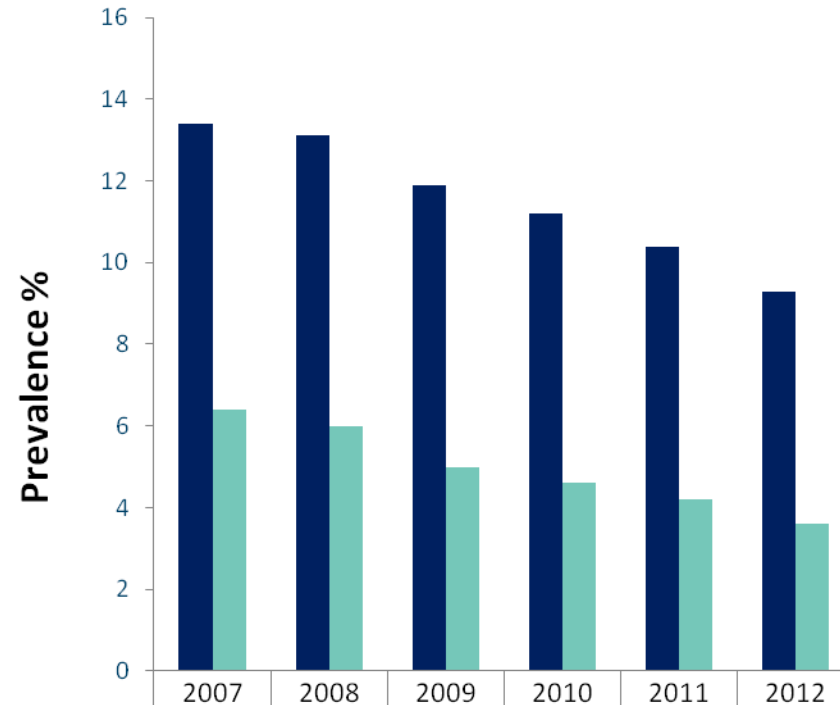


# ACUTE CARE - USA PRESSURE ULCER PREVALENCE

In Acute Care continued decreasing trends over the last 5 years with **31% decrease** in overall prevalence and **44% decrease** in FA prevalence but ...

- **1 in 10** Acute Care patients have pressure ulcers<sup>3</sup>
- **1 in 25** Acute Care patients will develop a pressure ulcer upon admission<sup>3</sup>

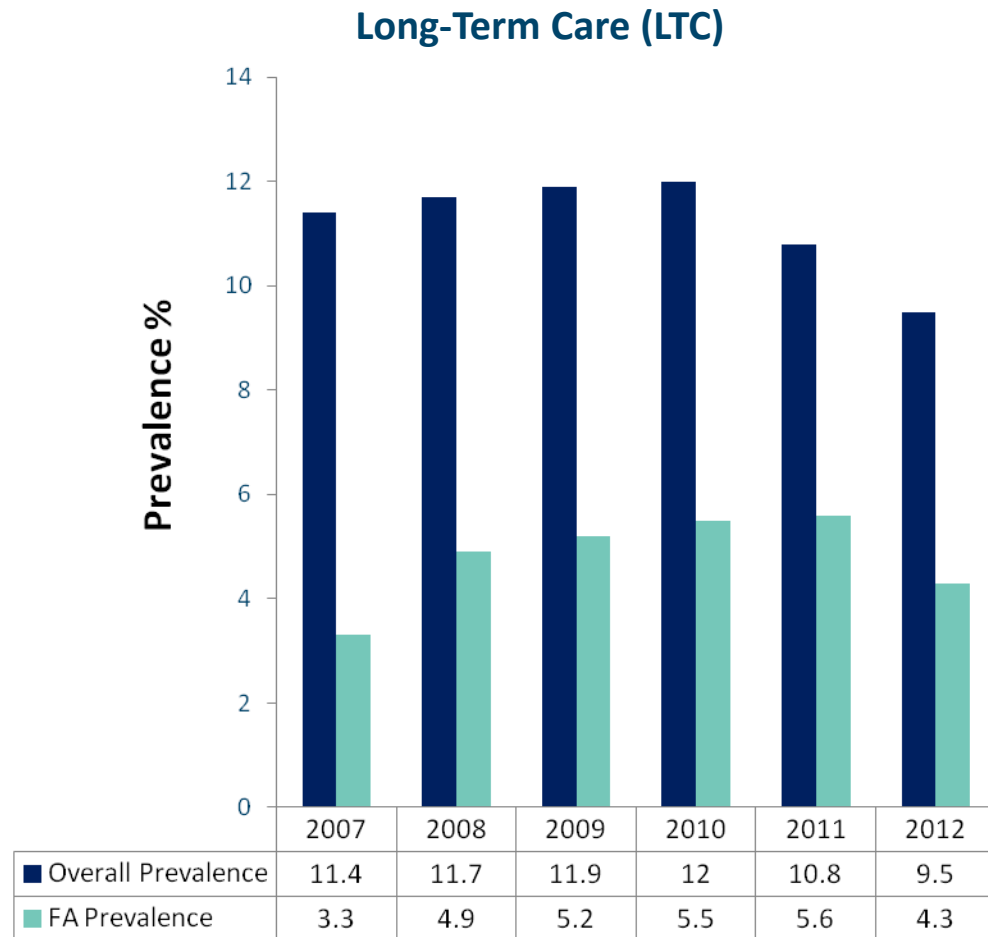
Acute Care



Overall Prevalence	13.4	13.1	11.9	11.2	10.4	9.3
FA Prevalence	6.4	6	5	4.6	4.2	3.6

# LONG-TERM CARE- USA PRESSURE ULCER PREVALENCE

Long-Term Care shows **variability** of rates over the last 6 years with decreasing overall and FA prevalence in 2012.<sup>3</sup>



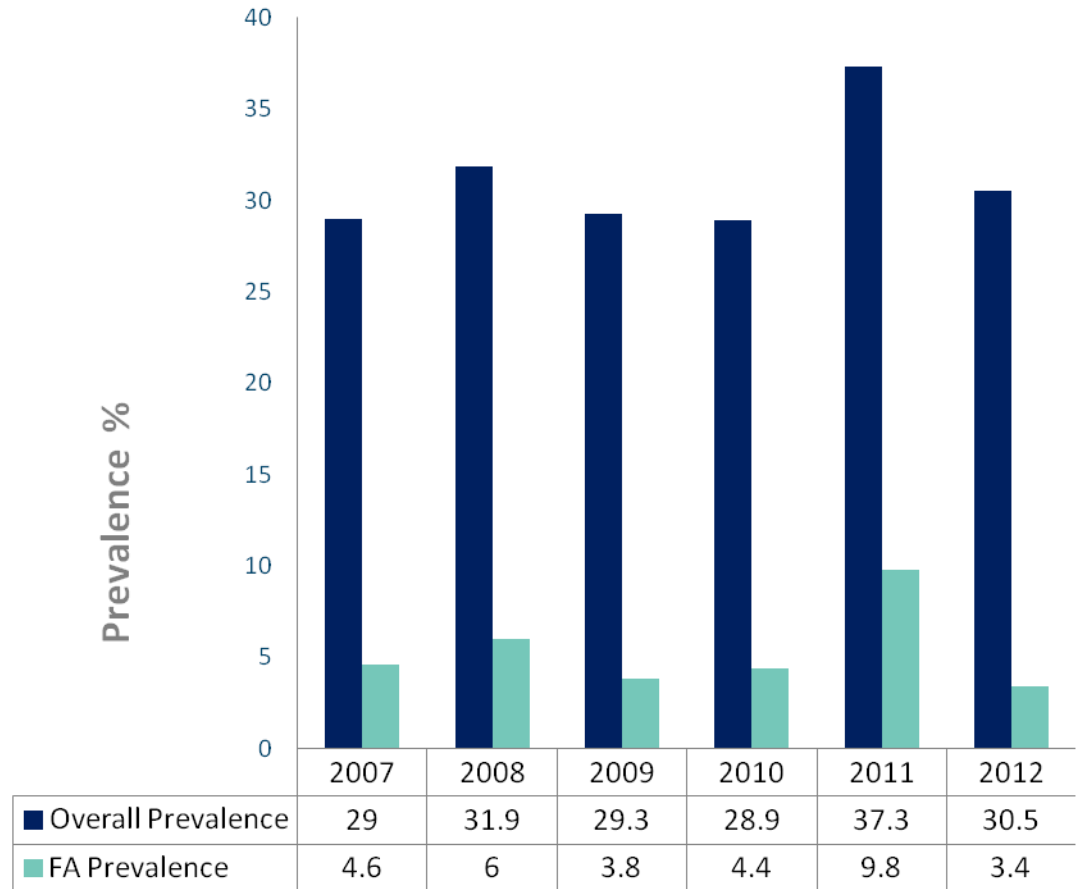


# LONG-TERM ACUTE CARE – USA PRESSURE ULCER PREVALENCE

In LTAC, both overall prevalence and FA prevalence have shown a **variation** in rates

- **1** in every **3** patients has a pressure ulcer<sup>3</sup>

Long-Term Acute Care (LTAC)



# PRESSURE ULCERS IMPACT: PATIENT QUALITY OF LIFE

- **Pain**

- Pressure ulcer pain can restrict desire to move and reposition, may lead to diminished activities of daily life and social isolation<sup>4</sup>

- **Odor**

- Malodor from a necrotic pressure ulcer and wound visibility may restrict social interactions<sup>4</sup>

- **Emotional**

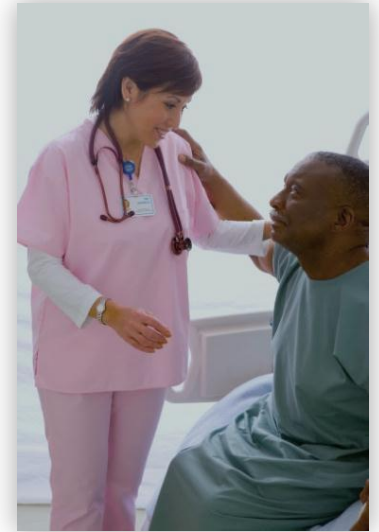
- Wounds perceived as betrayal of one's own body; associated with horror movies; shameful; repulsive<sup>4</sup>

- **Financial**

- “All these medical supplies you need to treat these bedsores. I think in the past 2 months, I've spent close to \$300 out of my pocket and you're on a fixed income”; “We had to live on my social security which was \$302.”<sup>5</sup>

- **Blame**

- Healthcare professionals often blame patients and caregivers for the development and recalcitrance of pressure ulcers<sup>4</sup>



4. Baharestani MM. In: Baranoski S, Ayello EA eds. *Wound Care Essentials: Practice Principles*. Lippincott, Williams & Wilkins, 3<sup>rd</sup> ed.2012;2-20.

5. Baharestani, MM. *Advances in Wound Care*. 1994;7:40-52.

# COST OF PRESSURE ULCERS TO HEALTHCARE INSTITUTIONS: ACUTE CARE

Cost to the Healthcare System is significant:

- Ancillary acute care costs range from **\$9,200** to **\$10,845** per individual pressure ulcer<sup>6</sup>
- Treatment costs for Stage IV pressure ulcer per hospital stay averaged:  
— **\$124,327**( hospital-acquired) to **\$129,248** (community-acquired)<sup>7</sup>
- **Ranked as most costly medical problem exceeding annual cost of \$3.86 billion<sup>8</sup>**

*Since October 1, 2008, Centers for Medicare and Medicaid Services (CMS) is no longer providing additional payment for Stage III or IV pressure ulcers that develop **during the hospital stay**, or that are **not documented by the physician or CMS defined provider as present on admission.**<sup>9</sup>*

6. Jackson M, et al. *Crit Care Nurse*. 2011;31:44-53

7. Brem H, et al. *Am J Surg*. 2010;200:473-477.

8. Milliman. Available at [www.soa.org/Files/Research/Projects/research-econ-measurement.pdf](http://www.soa.org/Files/Research/Projects/research-econ-measurement.pdf) . 2010;p.7,21. Accessed July 25, 2012.

9. Centers for Medicare and Medicaid Services. Available at <http://www.cms.gov/Medicare/Medicare-Fee-for-Service-Payment/HospitalAcqCond/index.html?redirect=/HospitalAcqCond> Accessed November 1, 2012.

# COST OF PRESSURE ULCERS TO HEALTH CARE INSTITUTIONS: LONG-TERM CARE (LTC)

- LTC facilities may be subject to **civil monetary penalties** under **Tag F 314** (pressure ulcers)<sup>11</sup>
- Facilities must ensure and provide documentation:
  1. Resident **does not develop pressure ulcer** unless condition demonstrates **unavoidable** (per CMS survey criteria<sup>11</sup>)
  2. Resident **with pressure ulcers** receives **necessary treatment** and services to **promote healing** and **prevent further complications**
- Penalties vary per severity levels during CMS surveys and can range from \$500 to \$10,000 per day<sup>12</sup>

11. Department of Health and Human Services. Available at [http://www.hsag.com/App\\_Resources/Documents/PrU\\_LS1\\_F\\_314.pdf](http://www.hsag.com/App_Resources/Documents/PrU_LS1_F_314.pdf) Accessed November 29, 2012.

12. Michigan State Survey Civil Money Penalty. [http://www.mi.gov/documents/mdch/bhs\\_cmp\\_ij\\_worksheet\\_226812\\_7.pdf](http://www.mi.gov/documents/mdch/bhs_cmp_ij_worksheet_226812_7.pdf) Accessed October 3, 2012.

# PRESSURE ULCERS AND CMS QUALITY INDICATORS

## CMS quality assessment:

- **Acute Care:** Present on Admission (POA) Indicator for inpatient hospitals and VBP<sup>13</sup>
- **Nursing Home: Nursing Home Compare**<sup>14</sup>
  - Prevalence in long-term stay residents and new or worsening pressure ulcers in short-term stay residents

## Home Care: Home Health Compare<sup>15</sup>

—Treating wounds and preventing pressure ulcers category considers how often:

- patients' wounds improved or healed after an operation
- the home health team checked patients for the risk of developing pressure ulcers
- the home health team included treatments to prevent pressure ulcers in the plan of care
- the home health team took doctor-ordered action to prevent pressure ulcers



13. Department of Health and Human Services. <http://www.cms.gov/Medicare/Medicare-Fee-for-Service-Payment/HospitalAcqCond/downloads/hacfactsheet.pdf> Accessed October 26, 2012.

14. <http://www.medicare.gov/NursingHomeCompare/search.aspx?bhcp=1> Accessed November 20, 2012.

15. <http://www.medicare.gov/homehealthcompare/search.aspx>; Accessed October 26, 2012.

# PRESSURE ULCER PREVENTION & TREATMENT PROGRAMS: CRITICAL COMPONENTS

- Prevention and treatment **clinical guidelines** have been developed<sup>16-22</sup>  
— AHRQ, NPUAP-EPUAP, WOCN<sup>®</sup>, WHS, AMDA
- **Key points** of these guidelines are:

Skin assessment and management

Risk assessment, using a valid and reliable risk assessment tool

Nutritional support

Repositioning

Pressure redistribution surfaces

16. European Pressure Ulcer Advisory Panel and National Pressure Ulcer Advisory Panel. Prevention and treatment of pressure ulcers: quick reference guide. Washington DC: National Pressure Ulcer Advisory Panel;2009.

17. Agency for Healthcare Research and Quality (AHRQ). Available at <http://guideline.gov/content.aspx?id=23868> Accessed September 5, 2012.

18. Panel on the prediction and prevention of pressure ulcers in adults. Pressure Ulcers in Adults: Prediction and Prevention. Clinical Practice guideline No 3. AHCPE Publication NO. 92-0047. Rockville, MD: Agency for Health Care Policy and Research, 1992.

19. Bergstrom, N, et al. Treatment of pressure ulcers in Adults. Clinical Practice Guideline. November 15. Rockville, MD. Public Health Service. US Department of Health and Human Services. Agency for Health Care Policy and Research; Agency for Health Care Policy and Research publication 95-0652, December 1994.18.

20. Whitney, J., Phillips, L, Aslam, R. et al., Guidelines for the treatment of pressure ulcers. Wound Repair and Regeneration. 2006; 14:663-79.

21. WOCN guideline for prevention and management of pressure ulcers. 2010. Mount Laurel NJ, WOCN; <http://www.guideline.gov/content.aspx?id=23868&search=wocn+guideline+for+prevention+of+pressure+ulcers>.

22. AMDA: <http://amda.com/tools/guidelines.cfm#pressureulcer>

# SKIN ASSESSMENT

- Skin assessment is the evaluation of the patient's entire skin (from head-to-toe)<sup>1</sup>
- Emphasis should be on **bony prominences** and other areas at risk for pressure ulcer development
  - Sacrum/Coccyx
  - Heels
  - Buttocks
- 5 elements assessed<sup>23</sup>
  - Skin **color**
  - Skin **temperature**
  - Skin **turgor**
  - Skin **moisture level**
  - Skin **integrity**

## Head-to-Toe Skin Assessment



### INSPECT AND PALPATE

Document all skin issues including:

- Skin color
- Skin temperature
- Skin moisture status
- Skin integrity
  - Pressure ulcer
  - Healed pressure ulcer
  - Moisture
  - Moles
  - Bruises
  - Rashes
  - Incisions
  - Scars
  - Burns
- Any abnormalities

*Remember to pay special attention to the feet and heels*

© Zulkowski & Ayello; 2010

23. Baranoski S, et al. In: Baranoski S and Ayello EA, eds. *Wound Care Essentials: Practice Principles*. 3<sup>rd</sup> ed. Lippincott, Williams and Wilkins; 2012:57-82.

1. NPUAP prevention and treatment of pressure ulcers: clinical practice guideline, 2009 pg 27.

# SKIN COLOR: COMPARE ADJACENT AREAS<sup>23</sup>

- Redness can be an indicator of many skin problems
- The etiology of reddened skin on the sacral area needs to be accurately identified
  - **Pressure ulcer: non-blanchable versus blanchable (other skin problems such as MASD)**
  - Rash
  - Infection, cellulitis
- Purple/bruised looking skin
- Paper-thin skin
- Dark or reddened areas
- Vitamin and mineral deficiencies can also show on the skin
  - Vitamin C deficiency: purplish blotches on lightly traumatized areas (due to capillary fragility and subepithelial hemorrhages)
  - Zinc deficiency: redness of nasolabial fold and eyebrows

**Reddened skin** on the sacral area can be from a variety of etiologies:



Moisture-associated skin damage (MASD)



Stage I pressure ulcer



# SKIN MOISTURE<sup>24-27</sup>

- Skin can be dry (**xerosis**) or damaged from too much **wetness** (MASD)
- Etiology can be:
  - Incontinence, urine, stool, or both (IAD)
  - Wound exudate (maceration)
  - Perspiration, including patients with a fever
  - Between skin folds (example – persons with higher BMI)
  - Ostomy or fistula that leaks

***Need to get the etiology right so you can treat the cause appropriately.***



MASD



Wound Maceration

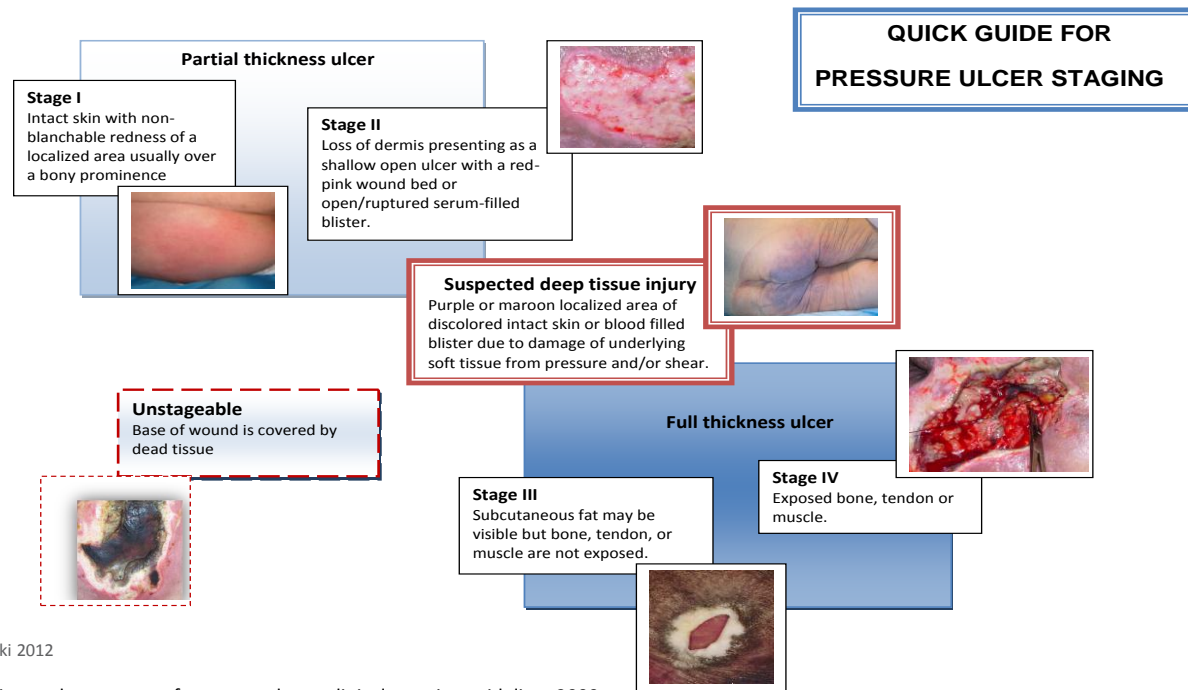


Ostomy

24. Zulkowski K. *Adv Skin Wound Care*. 2012;25:231-236.  
25. Gray M, et al. *J Wound Ostomy Continence Nurs*. 2011;38:233-241.  
26. Colwell J, et al. *J Wound Ostomy Continence Nurs*. 2011;38:541-553.  
27. Black J, et al. *J Wound Ostomy Continence Nurs*. 2011;38:359-370.

# PRESSURE ULCER STAGING CONCEPTS

- NPUAP staging is based on the type of tissue visualized or palpated<sup>1</sup>
- If pressure ulcer into cartilage, classify as stage IV<sup>28</sup>
- Do not stage mucosal pressure ulcers<sup>29</sup>
- Centers for Medicare and Medicaid Service (CMS) has adapted NPUAP staging definitions in long-term care (LTC) and long-term care hospitals (LTCH), as they direct clinicians to do a holistic examination to determine if a pressure ulcer is a Stage II or an sDTI<sup>30,31</sup>
- **Do not reverse stage** when documenting a healing pressure ulcer<sup>1</sup>



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1. NPUAP prevention and treatment of pressure ulcers: clinical practice guideline, 2009

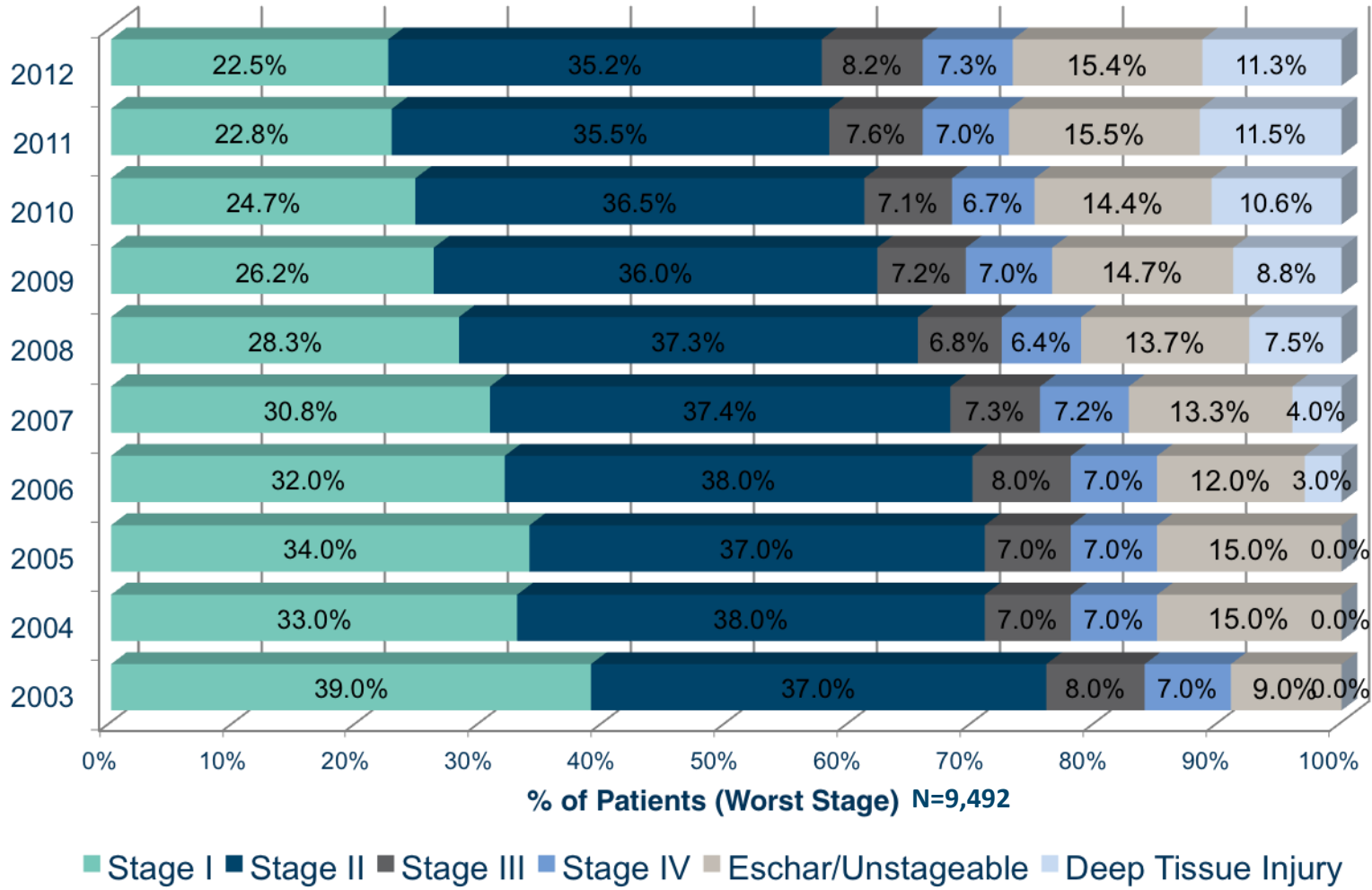
28. Pressure Ulcers with Exposed Cartilage Are Stage IV Pressure Ulcers, NPUAP Position Paper, August 2012, <http://www.npuap.org/wp-content/uploads/2012/01/Cartilage-Position-Statement1.pdf>

29. Mucosal Pressure Ulcers, An NPUAP Position Statement, [http://www.npuap.org/wp-content/uploads/2012/03/Mucosal\\_Pressure\\_Ulcer\\_Position\\_Statement\\_final.pdf](http://www.npuap.org/wp-content/uploads/2012/03/Mucosal_Pressure_Ulcer_Position_Statement_final.pdf)

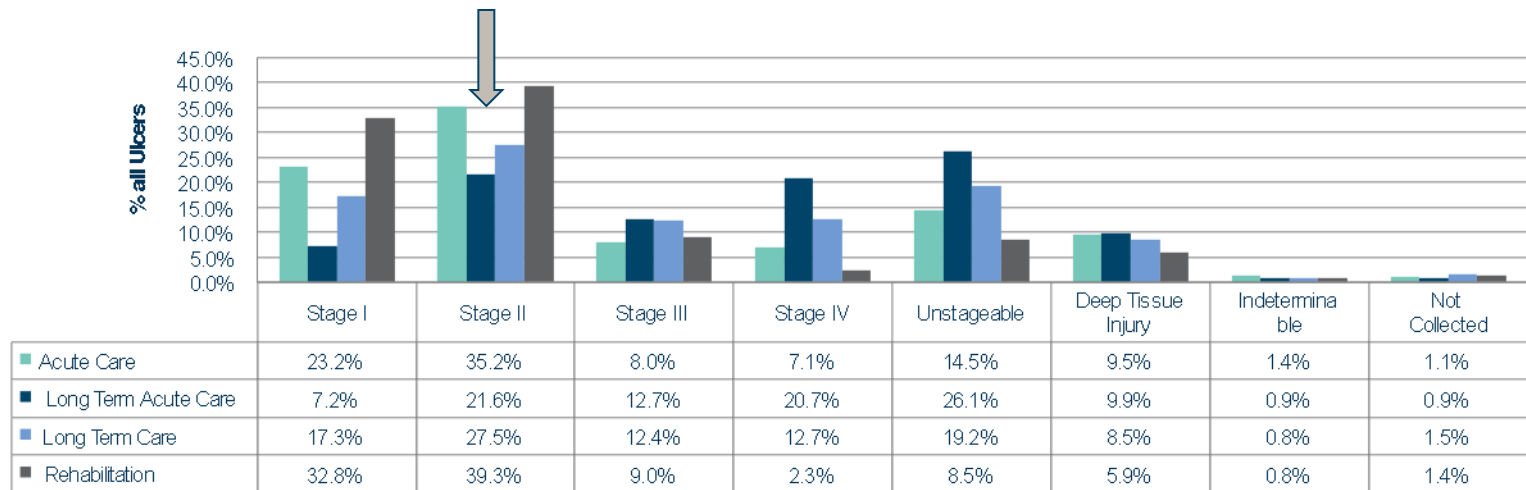
30. CMS Nursing Home Quality Initiative, Resident Assessment Initiative (RAI) <http://cms.gov/Medicare/Quality-Initiatives-Patient-Assessment-Instruments/NursingHomeQualityInits/MDS30RAIManual.html>

31. MDS 3.0 Manual, Updated for May 2013. Available at: <http://www.ncdhhs.gov/dhsr/nhlc/pdf/train/mds30.pdf>

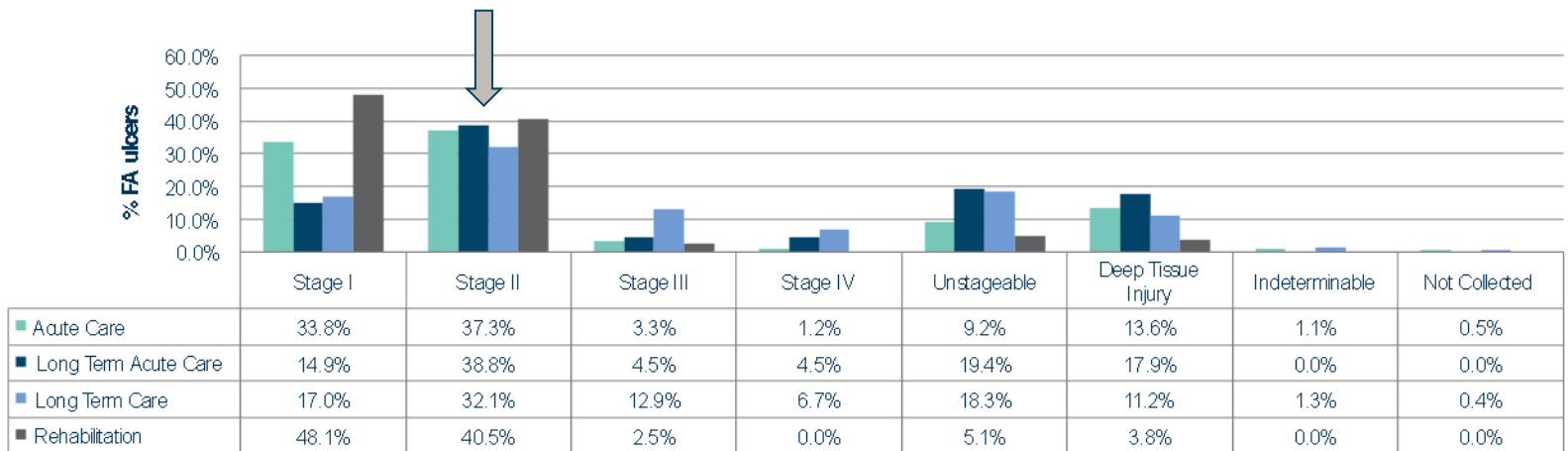
# PERCENT OF PATIENTS WITH PRESSURE ULCERS



# 2012 USA DATA: OVERALL (OP) AND FACILITY ACQUIRED (FA) PRESSURE ULCERS BY STAGE



OP: N=15,662

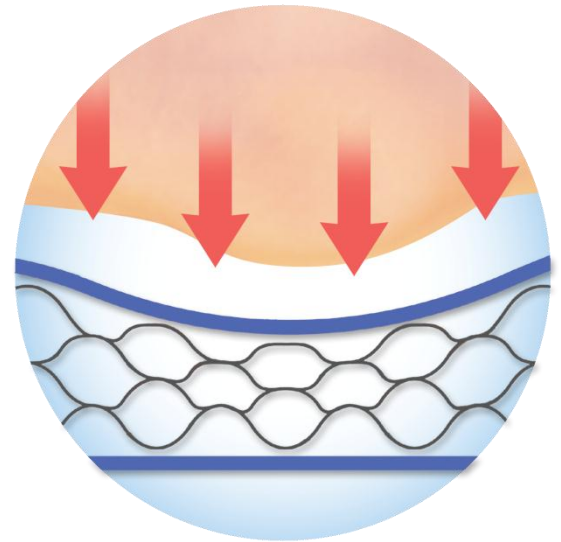


FA: N=4,918

# CAUSES OF PRESSURE ULCERS: PRESSURE

## Pressure:

- The force per unit area exerted perpendicular to the plane of interest<sup>1</sup>
  - Compresses tissue
  - Restricts blood flow
  - Results in ischemia & necrosis
  - Ruptures cells & vessels
  - Causes tissue deformation



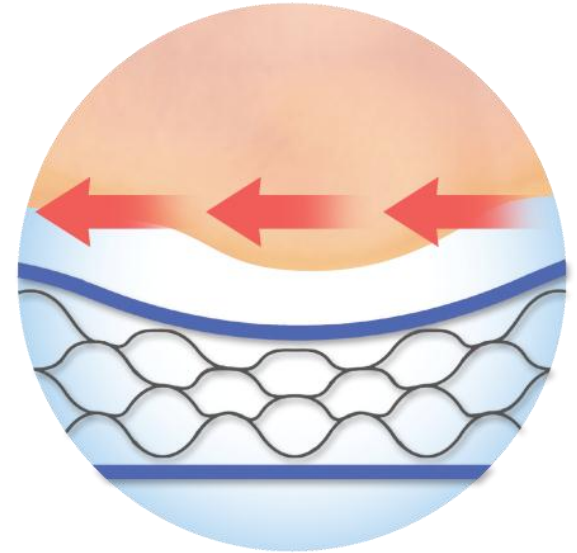
**ACTIONS: Utilization of support surface that immerses & envelops body to redistribute pressure, frequent repositioning, less linen layers.**

1. National Pressure Ulcer Advisory Panel and European Pressure Ulcer Advisory Panel. Pressure ulcer Prevention & Treatment Clinical Practice Guideline. Washington DC: National Pressure Ulcer Advisory Panel; 2009.

# CAUSES OF PRESSURE ULCERS: SHEAR

## Shear:

- Action or force resulting from applied forces which causes or tends to cause two contiguous internal parts of the body to deform in the transverse plane<sup>32</sup>
- Stretches and distorts internal tissue
- May cause occlusion of vessels perpendicular to skin surface, leading to ischemia & necrosis, but most importantly **deformation** of the tissues!<sup>1</sup>



**ACTIONS: Utilization of surfaces and bed frames designed to minimize force & stress on tissue as patient slides, less linen layers, no-drag lifting/repositioning techniques.**

1. National Pressure Ulcer Advisory Panel and European Pressure Ulcer Advisory Panel. Pressure ulcer Prevention & Treatment Clinical Practice Guideline. Washington DC: National Pressure Ulcer Advisory Panel; 2009.

32. Shear Force Initiative. Available at [http://www.npuap.org/wp-content/uploads/2012/02/Shear\\_slides.pdf](http://www.npuap.org/wp-content/uploads/2012/02/Shear_slides.pdf) Accessed September 26, 2012.

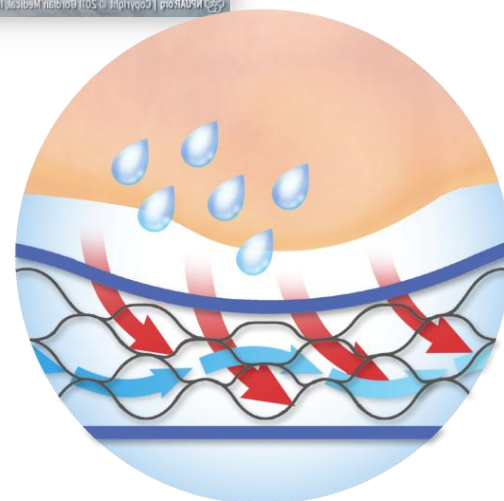
# CAUSES OF PRESSURE ULCERS: MICROCLIMATE (TEMPERATURE AND MOISTURE)

## Microclimate:

- Local tissue temperature and moisture (relative humidity) level at the body/support surface interface<sup>1</sup>
- Situations where microclimate may play a critical role:
  - Heavy perspiration
  - Heavily draining wound
  - Incontinence
  - Moisture (relative humidity)
    - Weakens skin and increases susceptibility to injury
    - May lead to maceration of the skin over time



Moisture-associated skin damage in Stage I pressure ulcer



**ACTIONS: Incontinence management, utilization of support surface with a high-performing low air loss feature to address excess accumulation of moisture and heat on skin, routine skin care.**

1. National Pressure Ulcer Advisory Panel and European Pressure Ulcer Advisory Panel. Pressure ulcer Prevention & Treatment Clinical Practice Guideline. Washington DC: National Pressure Ulcer Advisory Panel; 2009.

# BRADEN SCALE (WWW.BRADENSACLE.COM)<sup>37</sup>

- Developed in the 1980s by Barbara Braden and Nancy Bergstrom
- The tool has been tested for reliability in multiple clinical studies<sup>34-37</sup>
- **6 factors** assessed<sup>33,34</sup>
  - **Sensory/perception:** ability to feel and respond to pressure-related discomfort
  - **Moisture:** exposure of skin to moisture
  - **Activity:** degree of physical activity
  - **Mobility:** ability to change or control positioning independently
  - **Nutrition:** usual food intake
  - **Friction and shear:** surfaces rubbing against each other

RISK FACTOR	SCORE/DESCRIPTION	1	2	3	4
SENSORY/PERCEPTION	1. COMPLETELY UNABLE TO FEEL AND RESPOND TO PRESSURE-RELATED DISCOMFORT 2. LIMITED ABILITY TO FEEL AND RESPOND TO PRESSURE-RELATED DISCOMFORT 3. MODERATE ABILITY TO FEEL AND RESPOND TO PRESSURE-RELATED DISCOMFORT 4. FULLY AWARE OF AND RESPONDS TO PRESSURE-RELATED DISCOMFORT				
MOISTURE	1. COMPLETELY UNABLE TO FEEL AND RESPOND TO PRESSURE-RELATED DISCOMFORT 2. LIMITED ABILITY TO FEEL AND RESPOND TO PRESSURE-RELATED DISCOMFORT 3. MODERATE ABILITY TO FEEL AND RESPOND TO PRESSURE-RELATED DISCOMFORT 4. FULLY AWARE OF AND RESPONDS TO PRESSURE-RELATED DISCOMFORT				
ACTIVITY	1. COMPLETELY UNABLE TO FEEL AND RESPOND TO PRESSURE-RELATED DISCOMFORT 2. LIMITED ABILITY TO FEEL AND RESPOND TO PRESSURE-RELATED DISCOMFORT 3. MODERATE ABILITY TO FEEL AND RESPOND TO PRESSURE-RELATED DISCOMFORT 4. FULLY AWARE OF AND RESPONDS TO PRESSURE-RELATED DISCOMFORT				
MOBILITY	1. COMPLETELY UNABLE TO FEEL AND RESPOND TO PRESSURE-RELATED DISCOMFORT 2. LIMITED ABILITY TO FEEL AND RESPOND TO PRESSURE-RELATED DISCOMFORT 3. MODERATE ABILITY TO FEEL AND RESPOND TO PRESSURE-RELATED DISCOMFORT 4. FULLY AWARE OF AND RESPONDS TO PRESSURE-RELATED DISCOMFORT				
NUTRITION	1. COMPLETELY UNABLE TO FEEL AND RESPOND TO PRESSURE-RELATED DISCOMFORT 2. LIMITED ABILITY TO FEEL AND RESPOND TO PRESSURE-RELATED DISCOMFORT 3. MODERATE ABILITY TO FEEL AND RESPOND TO PRESSURE-RELATED DISCOMFORT 4. FULLY AWARE OF AND RESPONDS TO PRESSURE-RELATED DISCOMFORT				
FRICTION/ SHEAR	1. COMPLETELY UNABLE TO FEEL AND RESPOND TO PRESSURE-RELATED DISCOMFORT 2. LIMITED ABILITY TO FEEL AND RESPOND TO PRESSURE-RELATED DISCOMFORT 3. MODERATE ABILITY TO FEEL AND RESPOND TO PRESSURE-RELATED DISCOMFORT 4. FULLY AWARE OF AND RESPONDS TO PRESSURE-RELATED DISCOMFORT				
<b>TOTAL SCORE</b>	<b>Total score of 12 or less represents HIGH RISK</b>				

33. Ayello EA, Braden B. *Adv Skin Wound Care*. 2002;15: 125-132.

34. Braden BJ. *Adv Skin Wound Care*. 2012;25:61.

35. Bergstrom et al. *Nurs Res*. 1998 Sep-Oct;47(5):261-9.

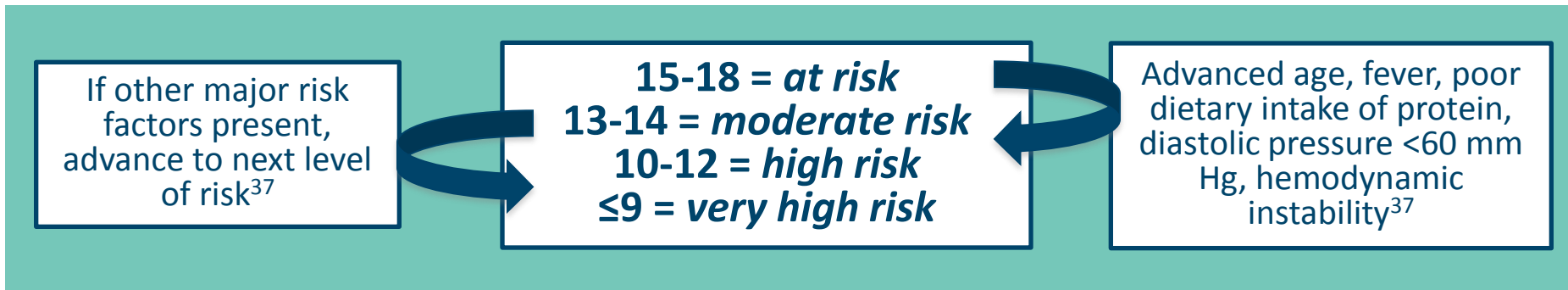
36. Bergstrom N, Braden BJ. *Nurs Res* 2002;51(6):398-403

37. [http://www.bradenscale.com/images/protocols\\_by\\_level\\_of\\_risk.pdf](http://www.bradenscale.com/images/protocols_by_level_of_risk.pdf)



# BRADEN SCALE: THE LOWER THE SCORE, THE HIGHER THE RISK

- Each of the 6 Braden subscales is rated with a numerical score of 1 to 4, except friction which is scored 1 to 3<sup>37</sup>
- Subscores are added up, and total score reflects the following risk levels



- **The lower the score, the higher the risk!**<sup>37</sup>
- Patient factors can move a patient from one category of risk to another<sup>33,37</sup>
  - Subscale scores need to be addressed in the plan of care<sup>34,37</sup>
  - The best care is prescribed when the Braden Scale is used in conjunction with nursing judgment<sup>34</sup>

33. Ayello EA, Braden B. *Adv Skin Wound Care*. 2002;15: 125-132.

34. Braden BJ. *Adv Skin Wound Care*. 2012;25:61.

37. [http://www.bradenscale.com/images/protocols\\_by\\_level\\_of\\_risk.pdf](http://www.bradenscale.com/images/protocols_by_level_of_risk.pdf).

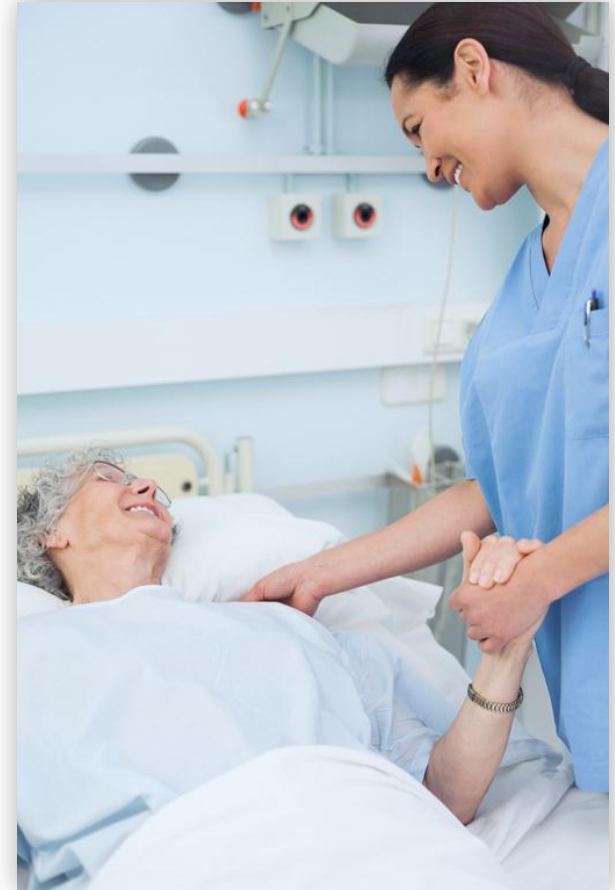
# WHEN TO PERFORM RISK ASSESSMENTS

## For all care settings<sup>33,39</sup>

- On admission
- Changes in patient condition

## Reassessment frequency varies

- **Acute Care:** At least q 48 hours; some daily risk assessment
  - IHI recommends daily skin inspection<sup>38</sup>
  - High-acuity units may do skin assessment every shift
- **Long-Term Care:** Weekly during the first 4 weeks, then monthly/quarterly
- **Home Care:** every RN visit



33. Ayello EA, Braden B. *Adv Skin Wound Care*. 2002;15:125-132.

39. Ayello EA, et al. In: Baranoski S, Ayello EA eds. *Wound Care Essentials*, Wolters Klower, 3<sup>rd</sup> ed.2012;324-359.

38. Institute for Healthcare Improvement. Available at <http://www.ihl.org/explore/pressureulcers/pages/default.aspx>. Accessed September 7, 2012.

# INTERVENTIONS ASSOCIATED WITH BRADEN SUBSCORES

## MOISTURE:

- Use a commercial moisture barrier, absorbent pads, or diapers that wick and hold moisture
- Address the cause of moisture if possible
- Offer a bedpan or urinal, and a glass of water in conjunction with turning schedules
- Maintain good hydration and avoid drying out the patient's skin
- Use support surface with adequate low air loss feature (assists to address heat and humidity)



## NUTRITION:

- Consult a dietitian and act quickly to alleviate nutritional deficits



## SHEAR:

- Head of bed no more than 30° unless otherwise indicated
- Use a trapeze, lift sheet, or other devices to assist in moving a patient
- Protect the patient's elbows, heels, sacrum, and back of head if he or she is exposed to friction



## MOBILITY/ACTIVITY:

- Use pressure redistribution surfaces, chair pads for limited mobility patients
- Reposition frequently, elevate heels, avoid prolonged HOB elevation above 30, and slouched position
- Do not massage reddened bony prominences or use doughnut-type devices

# DEFINITION OF A SUPPORT SURFACE

- A specialized device for pressure redistribution designed for management of tissue loads, microclimate, and/or other therapeutic functions
- Multiple types of products (ie. mattress, integrated bed system, mattress replacement, overlay, or seat cushion or seat cushion overlay)<sup>1</sup>



**Mattress Replacement System**



**Integrated Bed**



**Air Fluidized Therapy**



**Seat Cushion**

1. National Pressure Ulcer Advisory Panel and European Pressure Ulcer Advisory Panel. Pressure ulcer prevention & treatment Clinical Practice Guideline. Washington DC: National Pressure Ulcer Advisory Panel; 2009.

# STANDARDIZATION OF THERAPY SUPPORT SURFACE TESTING – S3I<sup>40</sup>

In 2001, the NPUAP formed the Support Surface Standards Initiative (S3I) committee composed of experts from academia, industry, and independent test labs with goals including:

- Develop and validate standardized test methods for surfaces
- Establish vocabulary of standardized terms and definitions related to surfaces
- Enable clinicians to make apples-to-apples comparison on performance of surfaces

## **S3I expected to publish its first National Test Standards in 2013:**

- **Vocabulary of Terms & Definitions**
- **Support Surface Immersion**
- **Heat and Humidity Performance (2 tests)**

40. <http://www.npuap.org/resources/educational-and-clinical-resources/support-surface-standards-initiative-s3i/>. Accessed December 5, 2012.

# SUPPORT SURFACES IMPACT EXTRINSIC PRESSURE ULCER RISK FACTORS (MECHANICAL FACTORS)

Extrinsic Factor	Effect	Surface Role	Contributing Patient Factors
<b>PRESSURE</b>	Distortion of tissues and vessels: ischemia <ul style="list-style-type: none"> <li>• Injury to cells, vessels, and lymphatics</li> <li>• Edema</li> </ul>	<b>Goal: Immerse and envelop body to redistribute pressure.</b> <b>Support surface materials and design may include:</b> <ul style="list-style-type: none"> <li>• Zoning</li> <li>• Bladder pressures tuned to site, size, HOB</li> <li>• Conformable materials</li> </ul>	<b>Immobility</b> <ul style="list-style-type: none"> <li>• Sensory loss</li> <li>• Patient position</li> </ul>
<b>SHEAR</b>	<ul style="list-style-type: none"> <li>• Exacerbation of pressure stress and injury</li> <li>• Shearing of dermal/epidermal junctions</li> </ul>	<b>Goal: Surface should distort in response to stress so tissue doesn't need to.</b> <ul style="list-style-type: none"> <li>• Layers that slide readily over one another</li> <li>• Materials with minimal horizontal stiffness</li> <li>• Shear-reduction algorithms</li> </ul>	<b>Immobility</b> <ul style="list-style-type: none"> <li>• Sensory loss</li> <li>• Patient position</li> </ul>
<b>FRICTION</b>	<ul style="list-style-type: none"> <li>• Epithelial abrasion</li> </ul>	<b>Goal: Minimize force on skin as patient moves across surface.</b> <ul style="list-style-type: none"> <li>• Surface distorts with lateral motion (as above)</li> <li>• Low friction surface materials, fabrics</li> <li>• Patient management</li> </ul>	<b>Inflammation</b> <ul style="list-style-type: none"> <li>• Aged skin</li> <li>• Patient position</li> <li>• Skin dryness/ moisture</li> </ul>

# SURFACE DESIGN FOR PRESSURE MANAGEMENT

## Immersion:

Depth of penetration into surface



## Design choices to optimize can include:

- Powered, multi-zone surface to adjust to separate body areas
- Surface algorithms tuned to adjust by body weight and when HOB raised



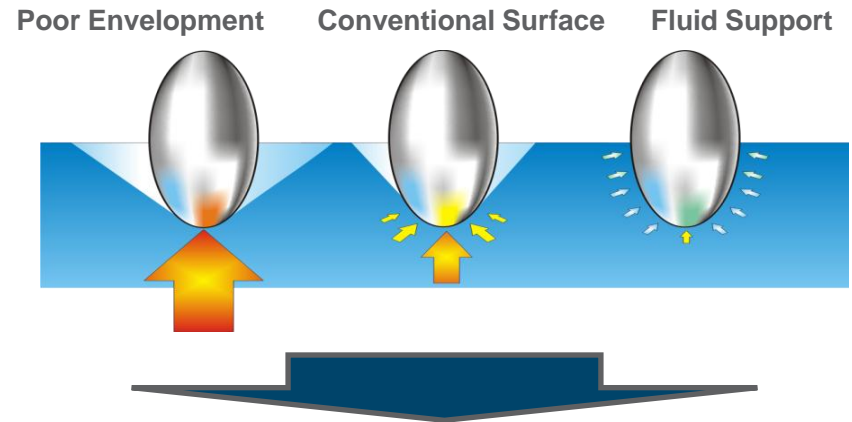
Single-zone surface



4-zone surface

## Envelopment:

Contact area of level of immersion



## Design choices to optimize can include:

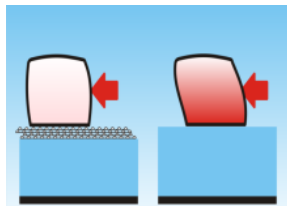
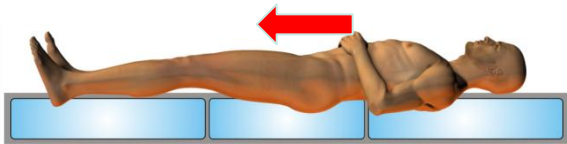
- Conformable, stretchy surface materials
- Bladder design (horizontal or vertical shape)
- Fluid support (air fluidized)



# SURFACE DESIGN FOR SHEAR AND FRICTION MANAGEMENT

## Key-have surface or frame absorb shear, not the body

- As the patient head is raised, or they are pulled up in bed, shear forces may cause tissue distortion, like the red box
- Goal is to have surface/bed frame absorb shear not tissue, like pink box



## Design choices to optimize include:

- Layers that slide readily over one another
- Materials that deform easily with minimal “push-back” on skin
- Algorithms that automatically reposition to relieve shear



Surface anti-shear liner: eases sliding between surface layers



Surface & frame makes pressure adjustments to minimize sustained shear



# SUPPORT SURFACES IMPACT EXTRINSIC PRESSURE ULCER RISK FACTORS (MICROCLIMATE)

Extrinsic Factor	Effect	Surface Role	Contributing Patient Factors
<p><b>MICROCLIMATE: MOISTURE</b></p>	<ul style="list-style-type: none"> <li>• Maceration</li> <li>• Dissolves collagen, which gives skin its strength               <ul style="list-style-type: none"> <li>– Weakens skin</li> <li>– Increases friction</li> </ul> </li> </ul>	<p><b>Goal: combat excess accumulation of moisture on skin</b></p> <ul style="list-style-type: none"> <li>• Rate of airflow and proximity of air flow to affected skin areas</li> <li>• Temperature of air</li> <li>• Moisture vapor transmission rate of materials (MVTR)</li> </ul>	<p><b>Immobility</b></p> <ul style="list-style-type: none"> <li>• Perspiration</li> <li>• Incontinence</li> <li>• Draining wounds</li> </ul>
<p><b>MICROCLIMATE: TEMPERATURE</b></p>	<ul style="list-style-type: none"> <li>• Perspiration → maceration</li> <li>• Increased metabolic rate → increased ischemia</li> <li>• Low temperature → risk of hypothermia/ discomfort</li> </ul>	<p><b>Goal: combat excess accumulation of heat on skin</b></p> <ul style="list-style-type: none"> <li>• Rate of airflow and proximity of air flow to affected skin areas</li> <li>• Temperature of air</li> <li>• Limited thermal insulation against skin</li> <li>• Moisture vapor transmission rate of fabric (MVTR)</li> </ul>	<p><b>Immobility</b></p> <ul style="list-style-type: none"> <li>• Poor nutrition</li> <li>• Thermoregulation difficulties</li> <li>• Fever</li> </ul>

# SURFACE DESIGN FOR MICROCLIMATE

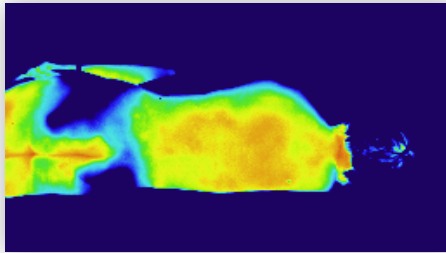
## Surface impact on the body:

1. Heat passes from warmer body to cooler surface
2. Rate that heat is trapped or passes through surface determines amount of heat accumulation
3. Moisture flows from high-humidity interface into the lower humidity surface
4. Rate that moisture is trapped in or passes through surface determine amount of moisture accumulation

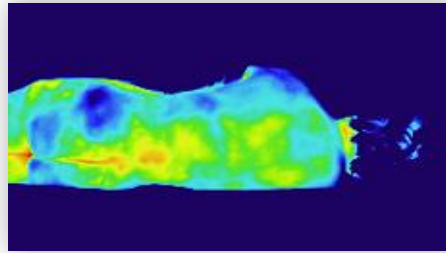
*Skin may warm*

*Skin may become moist*

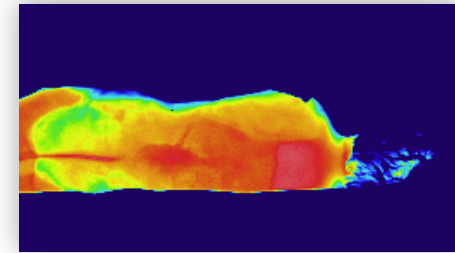
Function of managing the heat and humidity of the skin is to prevent accumulation of heat and moisture on skin.



*A more advanced microclimate technology*



*Traditional Low Air Loss*

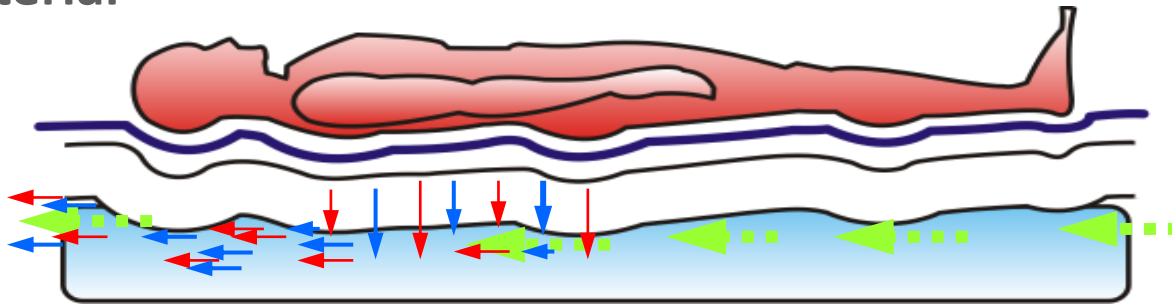


*Foam Surface*

- Infrared images of a 5' 2" 135 lb female after 3 hours at 30° head-of-bed elevation
  - **Low air loss surface removes more heat from the body than the foam surface**
  - **Advanced Microclimate® technology surface greatly reduces accumulated heat in the lower back area**

# SURFACE DESIGN FOR MICROCLIMATE: MANAGING HEAT AND HUMIDITY OF THE SKIN

- Heat and humidity(H<sub>2</sub>O) are withdrawn from skin more rapidly when air is...
  - Flowing relatively close to skin so heat and H<sub>2</sub>O pass readily from skin to airstream
  - Flowing at a relatively high rate so it can remove heat and H<sub>2</sub>O that reaches airstream rapidly and prevents warming in mattress
  - Relatively cool or dry so the airstream will absorb a large quantity of heat and H<sub>2</sub>O and carry it away for ejection
- Heat and H<sub>2</sub>O flow rapidly into the airstream for removal when the material layers between the skin and the airstream are thin and composed of high moisture vapor transmission (MVT) material



Rate that heat and humidity are trapped in or pass through the surface determines amount of accumulation.

# NPUAP RECOMMENDATIONS REGARDING SUPPORT SURFACES<sup>1</sup>

*“Provide a support surface that is properly matched to the individual’s needs for pressure redistribution, shear reduction, and microclimate control”*

• Select a support surface that meets the individual’s needs. Consider the following factors:

- Number, severity, and location of the pressure ulcers
- Risk for additional pressure ulcers
- Need for additional features such as ability to control moisture, temperature, and friction/shear

• **If pressure ulcers are not healing:**

- Reevaluate the individual and his/her pressure ulcer(s)
- Intensify prevention strategies as indicated
- Consider changing the support surface to improve pressure redistribution, shear reduction, and microclimate control matched to the individual’s needs



1. National Pressure Ulcer Advisory Panel and European Pressure Ulcer Advisory Panel. Pressure ulcer prevention & treatment Clinical Practice Guideline. Washington DC: National Pressure Ulcer Advisory Panel; 2009.

## STATE OF SUPPORT SURFACE CLINICAL EVIDENCE – MORE IS NEEDED

- All concerned groups agree that more investigation is necessary
- NPUAP has commended the comparative effectiveness project but disputed some of AHRQ's findings. Among their concerns are the following:<sup>41</sup>
  - Conclusion based on admittedly **low-quality studies**
  - **Absence of certain studies that limits making a definitive inference**, such as conducting a study on the same mattress with and without air escaping through the cover in order to isolate the effect of the LAL feature; there is no such study in the literature
  - **Imprecise description of clinical situations**
- ***Despite being inconclusive and requiring more studies, there is evidence in the literature that indicates the effectiveness of certain therapy support surfaces in specific patient conditions***

41. <http://www.npuap.org/pressure-ulcer-treatment-strategies-a-comparative-effectiveness-review/>. Accessed December 5, 2012.

# EVIDENCE-BASED MEDICINE: LOW AIR LOSS (LAL) SUPPORT SURFACES



52 high risk patients in a surgical ICU were placed on 1 of 2 beds<sup>42</sup>:

- No patient (0/31) developed new supine area (surface-related) pressure ulcers on LAL weight-based pressure redistribution heat and humidity control beds (LAL-MCM)
- 4/21 patients on integrated powered air pressure redistribution beds (IP-AR-older surfaces) developed pressure ulcers

21 patients with BMI >35, of whom 6 had 10 pressure ulcers were placed on LAL bariatric therapy beds<sup>43</sup>:

- 5 pressure ulcers healed during the study
- Average surface area decreased from 5.4cm<sup>2</sup> to 2.6cm<sup>2</sup>
- No new pressure ulcers formed

*Limitations of the study include low number of subjects and lack of comparator arm.*

In a pilot study, 30 patients with 33 existing pressure ulcers or at-risk were placed on LAL beds<sup>44</sup>

- None of 30 patients developed new pressure ulcers and their 33 existing pressure ulcers showed significant improvement
- Average LOS was 6 days
- Average decrease in volume of all ulcers was 41%
- Average decrease in area of all ulcers was 5%

42. Black J, et al. *J Wound Ostomy Continence Nurs.* 2012; 39:267-73.

43. Pemberton V, et al. *Ostomy Wound Manage.* 2009;55:44-48.

44. Fimiani J, et al. *Symposium on the Advances of Skin and Wound Care.* 2008 (Poster PW020).

Note : Hill-Rom supported studies

# EVIDENCE-BASED MEDICINE: AIR FLUIDIZED THERAPY (AFT)



In a retrospective study of 664 nursing home patients who were placed on 3 groups of surfaces:

- Those placed on **AFT beds experienced significantly faster healing rates** (*4.4x greater than air surfaces*) even though they had higher severity of illness
- Those placed on **air surfaces experienced more hospitalizations** (*2.6x greater than AFT*)<sup>45</sup>

In a study, 5 patients with sDTIs were placed on AFT within 12 hours of discovery:

- Patients **experienced much less tissue breakdown than expected**, sDTIs can rapidly develop into Stage III or IV wounds
- **4 injuries healed** prior to discharge; 4 developed into **Stage II ulcers**, and **2 remained sDTIs** at discharge<sup>46</sup>

In a comparison of post-cardiovascular surgery patients, 27 patients were identified based on common risk characteristics and placed on AFT:

- Only **1 of 27 patients** who were placed on **AFT beds developed a Stage I pressure ulcer**, compared to 40 ulcers among 25 patients in the retrospective control group that did not receive a specialty surface intervention<sup>6</sup>

45 Ochs RF, et al. *Ostomy Wound Manage.* 2005;51:38-68.

46. Allen L. *J Wound Ostomy Continence Nurs.* 2012;39:555-561.

6. Jackson M, et al. *Crit Care Nurse.* 2011;31:44-53.

Note: Hill-Rom supported studies

# THERAPY SURFACE SELECTION FACTORS: ART AND SCIENCE OF SURFACE SELECTION

- *“The idea that all therapy beds prevent pressure ulcers is a common misconception. Actually the therapy bed is an adjunct to repositioning patients. The selection of a therapy bed should be tailored to the specific needs of the patient.”<sup>47</sup>*
- Surface selection criteria may also include consideration of:

<b>Total Braden Score</b>	<b>Nutrition</b>	<b>Co-morbid Conditions</b>
<b>Number/Location of Existing Pressure Ulcers</b>	<b>Age</b>	<b>Low Serum Albumin</b>
<b>Wound Severity</b>	<b>Length of Stay</b>	<b>Rate of Wound Improvement on Current Surface</b>
<b>Mobility/Activity</b>	<b>Vasopressor Administration</b>	<b>#Turning Surfaces</b>
<b>Moisture</b>	<b>Staffing Levels</b>	<b>Repositioning Status</b>
<b>Friction/Shear</b>	<b>Low Blood Pressure Perfusion</b>	<b>Mechanical Ventilation Required</b>



# OVERALL PRESSURE ULCER PREVENTION/TREATMENT PROGRAM

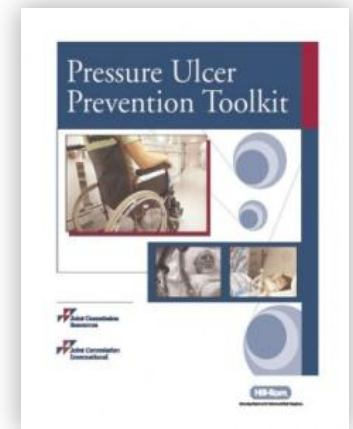
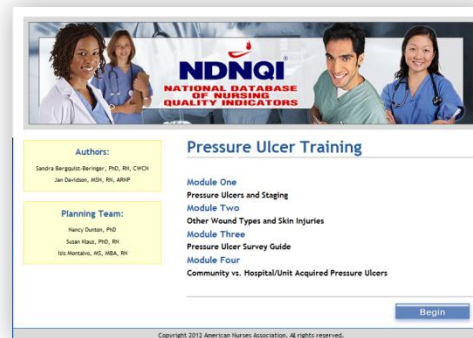
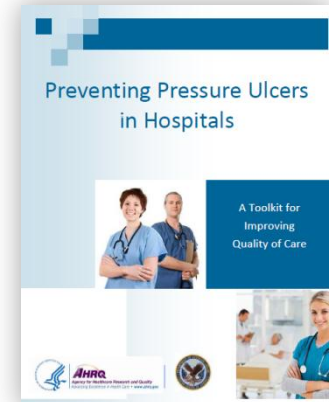
- Therapy support surfaces are one component of a larger program to prevent and treat pressure ulcers
- Should be applied in conjunction with other healthcare specialists and in the framework of guidelines issued by quality monitoring agencies and professional bodies
- Successful programs have combined multiple strategies

***NPUAP Consensus Panel unanimously concluded “pressure redistribution support surfaces do not replace turning or repositioning and that turning and repositioning intervals can probably be lengthened on more advanced support surfaces. To date, no definitive literature guides the determination of turning intervals”<sup>48</sup>***

# RESOURCES

## Several organizations have established resources and toolkits for general use:

- **AHRQ Preventing Pressure Ulcers in Hospitals - A toolkit for improving quality of care**<sup>49</sup>
- **The Joint Commission Resources Toolkit**<sup>50</sup>
- American Nursing Association (ANA) **National Database of Nursing Quality Indicators (NDNQI)**<sup>51</sup>
- **American Professional Wound Care Association (APWCA®)**
- **SELECT Mnemonic**<sup>52</sup>
  - Search
  - Explore
  - Locate
  - Evaluate
  - Choose
  - Translate



49 Berlowitz D, et al. 2012. Available at <http://www.ahrq.gov/research/lrc/pressureulcertoolkit/putoolkit.pdf>. Accessed October 5, 2012.

50. Joint Commission Resources. Pressure Ulcer Prevention Toolkit, 2012.

51. NDNQI. Available at <https://www.nursingquality.org/NDNQIPressureUlcerTraining/>. Accessed October 26, 2012.

52. APWCA. SELECT: evaluation and implementation of clinical practice guidelines: A guidance document from the American Professional Wound Care Association. *Adv Skin Wound Care*. 2010;23:161-168.

# ORGANIZATIONAL BARRIERS EXIST TO IMPLEMENTING PRESSURE ULCER PREVENTION PROGRAMS

- **Barriers** are associated with<sup>53,54</sup>
  - Knowledge level (physician, nursing, and other patient care providers)
  - Communication: handoff and transition information
  - Delineation of responsibilities: who is responsible for what?
  - Access to expert resources: certified wound specialists, wound ostomy continence nurse, industry partners
  - Ease of access to skin care and pressure ulcer prevention supplies
  - Pressure redistribution equipment availability
- **Equipment and supplies** needed for pressure ulcer prevention and treatment may not be readily available
  - Consider the business case for the purchase of pressure redistributing equipment versus equipment rentals<sup>55</sup>
- **Protocols**
  - ensuring the right products go to the right patients at the right time

53. Jankowski I, Nadzam DM. *Jt Comm J Qual Patient Saf.* 2011;37:253-264.

54. Niederhauser A, et al. *Adv Skin Wound Care.* 2012;25:167-188.

55. Institute for Clinical Systems Improvement. Available at [http://www.icsi.org/pressure\\_ulcer\\_treatment\\_protocol\\_review\\_and\\_comment/pressure\\_ulcer\\_treatment\\_protocol.html](http://www.icsi.org/pressure_ulcer_treatment_protocol_review_and_comment/pressure_ulcer_treatment_protocol.html). Accessed September 10, 2012.

# BARRIERS IMPLEMENTING PREVENTIVE PROGRAMS

Gaps in implementing ideal preventive measures identified in the literature:<sup>53,54,56</sup>

- Limitations in staff education and training
- Lack of physician involvement
- Limited involvement of unlicensed nursing staff
- Lack of plan for communicating at-risk status
- Limited quality improvement evaluations of bedside practices



54. Niederhauser, A. et al. *Adv Skin Wound Care*. 2012;25:167-88.

53. Jankowski IM, Nadzam DM. *Jt Comm J Qual Patient Saf*. 2011;37:253-264.

56. Lyder CH, Ayello, EA. *Adv Skin Wound Care*. 2012;25:72-6.

# BEST ORGANIZATIONAL PRACTICES

## Key elements for successful pressure ulcer prevention programs:<sup>56,57</sup>

- High-level leadership involvement and support
- Interdisciplinary participation and close collaboration with industry partners
- Stakeholders and team members actively participate; address and reduce staff turnover
- Policies/procedures/protocols
- Education throughout the organization
- Quality evaluation with timely dissemination of outcomes throughout the organization
- Celebrate successes; identify program champions



56. Lyder CH, Ayello EA. *Adv Skin Wound Care*. 2012;25:72-76.

57. Institute for Healthcare Improvement. Available at <http://www.ihl.org/offering/MembershipsNetworks/MentorHospitalRegistry/Pages/PressureUlcerPrevention.aspx>. Accessed September 6, 2012.

# CONCLUSION

In this webinar, we have:

- Reviewed the impact of Pressure Ulcers: Prevalence, Incidence, Cost, Quality of Life
- Discussed the Critical Components of successful pressure ulcer prevention and treatment programs, with a focus on
  - Skin Assessment
  - Risk Assessment
  - Science of Support Surface design, and impact on support surface performance
- Identified key Resources & Tools, Barriers and Solutions to implement a successful pressure ulcer prevention program
- Full bibliography at the end of this deck; available once archived

# Thank You For Attending!

- Special thanks to Elizabeth Ayello for this informative and wonderful presentation
- Remember to fill out the on-line webinar Evaluation Form now to obtain your CE certificate
- In a Group? Come back to the site yourself by May 1<sup>st</sup> using your login registration credentials, fill out Evaluation form then:
  - Fax – 972-929-1901
  - Email - [clinical.education@cadentmed.com](mailto:clinical.education@cadentmed.com)
- Your certificate will be emailed so please be sure you've provided your current email
- This session will be archived on Hill-Rom's ***Clinical Resource Center (CRC)*** at : <https://library.hill-rom.com/>
  - We will send the specific link to you via email
    - No CE will be provided for the archived version

Thank You

# Q&A From Live Webinar Event

**Did I understand you correctly that blister pressure ulcers are not staged the same across the care continuum? Can you explain that again?**

Yes. In long term care and long term acute care, CMS has adapted, not adopted the NPUAP staging definitions. The intent regarding blister pressure ulcers is not just to rely on the color of the fluid in the blister, but instead to do a holistic assessment of the surrounding skin for signs of deep tissue injury. So for example, a serum filled blister pressure ulcer according to the NPUAP definitions would be a stage II, but in LTC or LTC if there were signs of deep tissue injury in the surrounding skin (for example, soft boggy tissue, increased warmth, discolored tissue, this would be staged as a sDTI. Refer to my september2010 article in Advances in skin and wound care for more details.

**I'm not sure I heard this right, but has the repositioning schedule now changed away from q2hrs**

Q2h is not the be all end all for every patient; some patient's need turning more often, some need less, it really needs to be an individualized repositioning schedule! Both CM and the 2009 NPUAP clinical practice guidelines agree that turning and repositioning schedules need to be individualized for the patient. This includes, but is not limited to the individual's condition and co morbidities as well as the type of support surface they are on. Some research has supported that when the patient is on the certain support surfaces, turning and repositioning schedules can be q 4 hrs rather than q 2 hrs and others need q 1 hr. So the key is to know your patient's needs and selecting the right support surface for the patient and assessing if the time of the turning repositioning schedule is meeting your patient's pressure redistribution

**You mentioned several resources and initiatives to reduce pressure ulcer incidence. What is the most important thing a facility should do to decreased pressure ulcers?**

It's not just one thing, but bundling pressure ulcer care practices and educating the multidisciplinary team across the institution or facility is the main characteristic of all successful pressure ulcer reduction initiatives. System wide change and practice interventions so all disciplines understand their practice role in preventing pressure ulcers is key.

**Does CMs mandate that a pressure ulcer risk assessment tool be used?**

No, CMS does not mandate in LTC, LTCH, inpatient rehabilitation or Home care that a validated pressure ulcer risk assessment be used- it does allow the use of such a tool as part of the comprehensive patient assessment process that can also include clinical examination of the patient, review of co morbidities, medication, history of pressure ulcers and other pertinent factors.

**Can I use this slide deck as a teaching tool at my facility?**

Yes, the voice over presentation and downloadable pdf will be available soon from Hill-Rom. Look for an email communicating its availability. Please acknowledge the source of the presentation.

**What is the national benchmark for prevalence?**

You can use the IPUP2012 results which reported the overall average prevalence for all care settings in the USA to be 9.7%.



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