The Science of Support Surfaces:

Nomenclature, Design for Performance, Selection

179873 rev 3 12-MAR-2018 ENG - US

Objective

Participants will:

- Review National Pressure Injury Advisory Panel (NPUAP) classifications, definitions, and descriptions of support surfaces.
- Describe technologies used to address extrinsic risk factors.
- Examine the evidence for therapy support surface selection.
- **Describe the Wound Ostomy and Continence Nurses Society (WOCN) support surface selection algorithm.**

179873 rev 3 12-MAR-2018 ENG - US

Standardization of Therapy Support Surface Testing – S3I

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 surface.
- Establish vocabulary of standardized terms and definitions related to surfaces.
- Enable clinicians to make apples-to-apples comparison on performance of surfaces.

S3I published its first National Test Standards in 2014:[1]

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

1. Rehabilitation Engineering and Assistive Technology Society of North America American National Standard for Support Surfaces – Volume 1: Requirements and test methods for Full Body Support Surfaces. RESNA ss-1-2014, published 2014.

179873 rev 3 12-MAR-2018 ENG - US

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 (i.e., mattress, integrated bed system, mattress replacement, overlay or seat cushion or seat cushion overlay).[2]

Mattress Replacement System

Integrated Bed

Air Fluidized Therapy

Seat Cushion

2. National Pressure Ulcer Advisory Panel. Support Surface Standards Initiative. Terms and Definitions. Available at: http://www.npuap.org/wp-content/uploads/2012/03/NPUAP_S3I_TD.pdf. 2007. Accessed May 16, 2017.

179873 rev 3 12-MAR-2018 ENG - US

There is a Need to Redistribute Pressure any time the Patient is…

- Immobile
- Unable to change their position independently
- Sensory impaired
- At risk for skin breakdown from:
  - Heat and moisture
  - Friction stress
  - Shear stress
  - Excessive pressure to a specific body area
- **This includes products for both the bed and the chair.**

A support surface may also be used to manage less obvious factors that contribute to the development of a pressure injury.

179873 rev 3 12-MAR-2018 ENG - US

Physical Concepts Related to Support Surfaces[2]

- Friction, shear and pressure are key surface-related risk factors for pressure injuries.
- Pressure redistribution, immersion and envelopment are concepts used to assess surface performance in addressing pressure risk factors.

Term	Definition
FRICTION (FRICTIONAL FORCE)	The resistance to motion in a parallel direction relative to the common boundary of two surfaces.
ENVELOPMENT	The ability of a support surface to conform to, so to fit or mold around irregularities in the body.
IMMERSION	Depth of penetration (sinking) into a support surface.
PRESSURE	The force per unit area exerted perpendicular to the plane of interest.
PRESSURE REDISTRIBUTION	The ability of a support surface to distribute load over the contact areas of the human body.
SHEAR (SHEAR STRESS)	The force per unit area exerted parallel to the plane of interest.
SHEAR STRAIN	Distortion or deformation of tissue as a result of shear stress.

2. National Pressure Ulcer Advisory Panel. Support Surface Standards Initiative. Terms and Definitions. Available at: http://www.npuap.org/wp-content/uploads/2012/03/NPUAP_S3I_TD.pdf. 2007. Accessed May 16, 2017.

179873 rev 3 12-MAR-2018 ENG - US

Immersion and Envelopment

Immersion and envelopment properties of a surface are critical to optimize pressure redistribution:

- Immersion and envelopment are how one's weight is distributed across the surface of the bed so as to have equal weight distribution.
- Although this prevents the patient from having pressure areas, it may make independent movement difficult. **Therefore, it is important to keep in mind the mobility goals for your patient when selecting a support surface.**

HAMMOCK EFFECT
The tight cover prevents immersion and envelopment of the patient, resulting in suspension above the support surface and limited pressure redistribution. Proper sheet size selection is important.

179873 rev 3 12-MAR-2018 ENG - US

Components of Support Surfaces[2]

Components are material(s) used for the support surface, which may be used alone or in combination. Product design and components have profound impact on performance of surfaces.

Term	Definition
AIR	A low-density fluid with minimal resistance.
CELL/BLADDER	A means of encapsulating a support medium.
VISCOELASTIC FOAM	A type of porous polymer material that conforms in proportion to the applied weight. The air exits the foam cells slowly, which allows the material to respond slower than a standard elastic foam (memory foam).
ELASTIC FOAM	A type of porous polymer material that conforms in proportion to the applied weight. The air exits the foam cells more rapidly due to a greater density (non-memory).
CLOSED CELL FOAM	A non-permeable structure in which there is a barrier between cells preventing gases or liquids from passing through the foam.
OPEN CELL FOAM	A permeable structure in which there is a barrier between cells and gases or liquids can pass through the foam.
GEL	A semi-solid system consisting of a network of solid aggregates, colloidal dispersions, or polymers that may exhibit elastic properties (can range from a hard gel to a soft gel).

2. National Pressure Ulcer Advisory Panel. Support Surface Standards Initiative. Terms and Definitions. Available at: http://www.npuap.org/wp-content/uploads/2012/03/NPUAP_S3I_TD.pdf. 2007. Accessed May 16, 2017.

179873 rev 3 12-MAR-2018 ENG - US

Categories of Support Surfaces[2]

Categories refers to the different types of support surfaces as characterized by specific applications or features.

Term	Definition
REACTIVE SUPPORT SURFACE	A powered or non-powered support surface with the capability to change its load distribution properties only in response to applied load.
ACTIVE SUPPORT SURFACE	A powered support surface with the capability to change its load distribution properties with or without applied load.
INTEGRATED BED SYSTEM	A bed frame and support surface that are combined into a single unit whereby the surface is unable to function separately.
NON-POWERED	Any support surface not requiring or using external sources of energy to operate (energy = D/C or A/C).
POWERED	Any support surface requiring or using external sources of energy to operate (energy = D/C or A/C).
OVERLAY	An additional support surface designed to be placed directly on the top of an existing surface.
MATTRESS	A support surface designed to be placed directly on the existing bed frame.

2. National Pressure Ulcer Advisory Panel. Support Surface Standards Initiative. Terms and Definitions. Available at: http://www.npuap.org/wp-content/uploads/2012/03/NPUAP_S3I_TD.pdf. 2007. Accessed May 16, 2017.

179873 rev 3 12-MAR-2018 ENG - US

Features of Support Surfaces[2]

Features of support surfaces are functional components that can be used alone or in combination to address pressure injury risk factors.

Term	Definition
AIR FLUIDIZED	A feature of a support surface that provides pressure redistribution via a fluid-like medium created by forcing air through beads as characterized by immersion and envelopment.
ALTERNATING PRESSURE	A feature of a support surface that provides pressure redistribution via cyclic changes in loading and unloading as characterized by frequency, duration, amplitude, and rate of change parameters.
LATERAL ROTATION	A feature of a support surface that provides rotation about a longitudinal axis.
LOW AIR LOSS (LAL)	A feature of a support surface that provides a flow of air to assist the managing of heat and humidity (microclimate) of the skin.
ZONE	A segment with single pressure redistribution capacity.
MULTI-ZONE SURFACE	A surface in which different segments can have different pressure redistribution capabilities.

2. National Pressure Ulcer Advisory Panel. Support Surface Standards Initiative. Terms and Definitions. Available at: http://www.npuap.org/wp-content/uploads/2012/03/NPUAP_S3I_TD.pdf. 2007. Accessed May 16, 2017.

179873 rev 3 12-MAR-2018 ENG - US

Support Surfaces Impact Extrinsic Pressure Injury Risk Factors (Mechanical Factors)

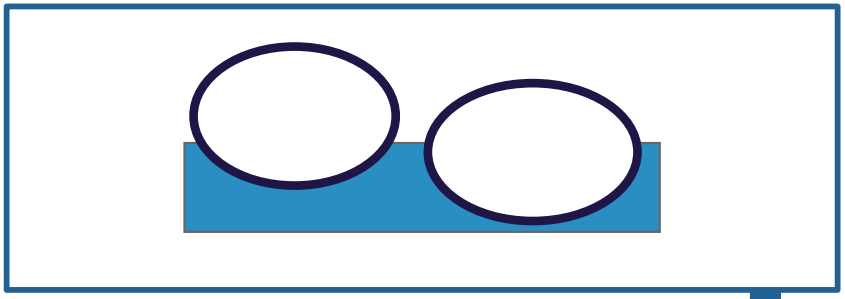
Extrinsic Factor	Effect	Surface Role	Contributing Patient Factors
PRESSURE	Distortion of tissues and vessels: ischemia • Injury to cells, vessels and lymphatics • Edema	**Goal: Immerse and envelope body to redistribute pressure. Support surface materials and design may include:** • Zoning • Bladder pressures tuned to site, size, HOB • Conformable materials	**Immobility:** • Sensory loss • Patient position
SHEAR	• Exacerbation of pressure stress and injury • Shearing of dermal/ epidermal junctions	**Goal: Surface should distort in response to stress so tissue doesn't need to.** • Layers that slide readily over one another • Materials with minimal horizontal stiffness • Shear-reduction algorithms	**Immobility:** • Sensory loss • Patient position
FRICTION	• Epithelial abrasion	**Goal: Minimize force on skin as patient moves across surface.** • Surface distorts with lateral motion (as above) • Low friction surface materials, fabrics • Patient management	**Immobility:** • Aged skin • Patient position • Skin dryness/moisture

179873 rev 3 12-MAR-2018 ENG - US

Surface Design for Pressure Management

Immersion:

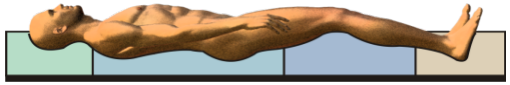
Depth of penetration into surface



Design choices to optimize can include:

- Powered, multi-zone surface to adjust to separate body areas.
- Surface adjusts for body weight and when HOB is raised.

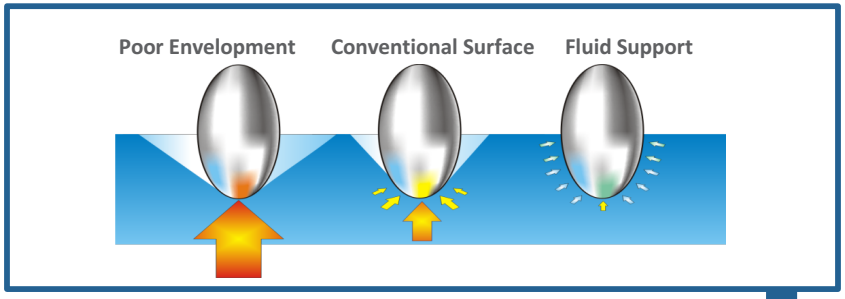
Single-zone surface



4-zone surface

Envelopment:

Contact area of level of immersion



Design choices to optimize can include:

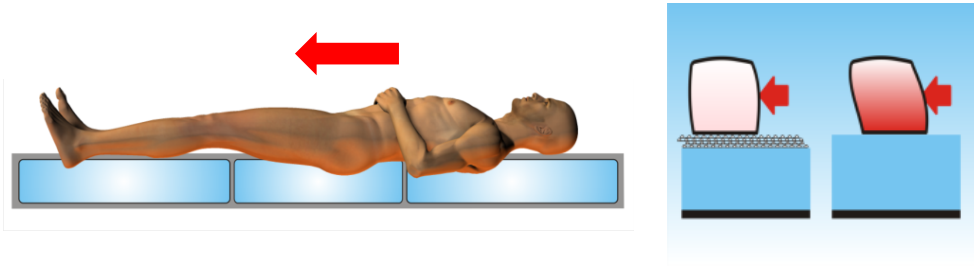
- Conformable, stretchy surface materials
- Bladder design (horizontal or vertical shape)
- Fluid support (air fluidized)

179873 rev 3 12-MAR-2018 ENG - US

Surface Design for Shear and Friction Management

Key is to have surface or frame absorb shear rather than 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.
- Surface designs that automatically reposition to relieve shear.

Surface anti-shear liner eases sliding between surface layers.

Surface/frame makes pressure adjustments to minimize sustained shear.

179873 rev 3 12-MAR-2018 ENG - US

Support Surfaces Impact Extrinsic Pressure Injury Risk Factors (Microclimate)

Extrinsic Factor	Effect	Surface Role	Contributing Patient Factors
MICROCLIMATE: MOISTURE	• Maceration • Dissolves collagen, which gives skin its strength – Weakens skin – Increases friction	**Goal: Combat excess accumulation of moisture on skin.** • Rate of airflow and proximity of air flow to affected skin areas • Temperature of air • Moisture vapor transmission rate of materials (MVTR)	**Immobility:** • Perspiration • Incontinence • Draining wounds
MICROCLIMATE: TEMPERATURE	• Perspiration → maceration • Increased metabolic rate → increased ischemia • Low temperature → risk of hypothermia/ discomfort	**Goal: Combat excess accumulation of heat on skin.** • Rate of airflow and proximity of air flow to affected skin areas • Temperature of air • Limited thermal insulation against skin • Moisture vapor transmission rate of fabric (MVTR)	**Immobility:** • Poor nutrition • Thermoregulation difficulties • Fever

179873 rev 3 12-MAR-2018 ENG - US

Surface Design for Microclimate

Surface impact on the body:

- Heat passes from warmer body to cooler surface.
- Rate that heat is trapped or passes through surface determines amount of heat accumulation.

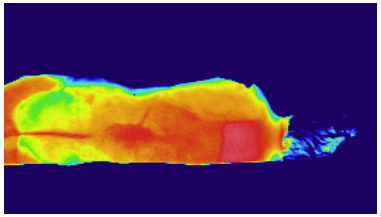
Skin may warm

- Moisture flows from high-humidity interface into the lower humidity surface.
- Rate the moisture is trapped in or passes through surface determine amount of moisture accumulation.

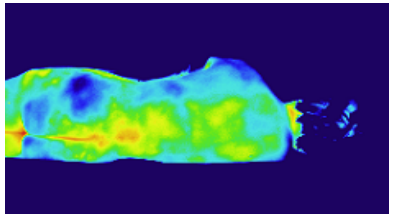
Skin may become moist

Function of managing the heat and humidity of the skin to prevent maceration and skin warming which can exacerbate tissue ischemia.

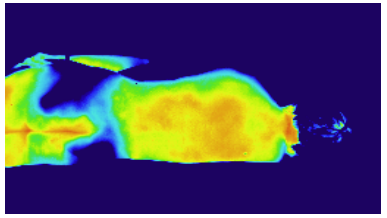
- Infrared images of a 5’2”, 135 lb female after 3 hours at 30° head-of-bed elevation.
- **Low air loss surface removes more heat from the body than the foam surface.**
- **Advanced Microclimate® technology surface greatly reduces accumulated heat.**



Foam Surface



Traditional Low Air Loss

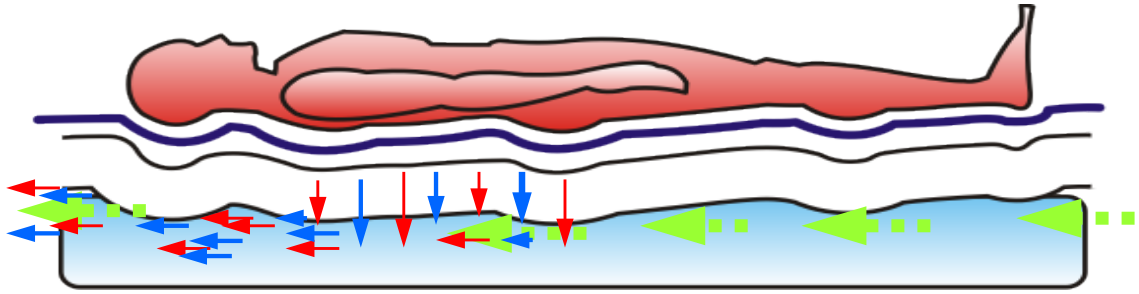


Advanced Microclimate® Technology

179873 rev 3 12-MAR-2018 ENG - US

Surface Design for Microclimate: Managing heat and humidity of the skin

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



- **Heat and humidity (H_2O) are withdrawn from skin more rapidly when air is…**
  - Flowing relatively close to skin so heat and H_2O pass readily from skin to airstream.
  - Flowing at a relatively high rate so it can remove heat and H_2O 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_2O and carry it away for ejection.
- **Heat and H_2O 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.**

179873 rev 3 12-MAR-2018 ENG - US

NPUAP Recommendations Regarding Support Surfaces[3]

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 injuries
  - Risk for additional pressure injuries
  - Need for additional features such as ability to control moisture, temperature and friction/shear
- **If pressure injuries are not healing:**
  - Re-evaluate the individual and his/her pressure injury(s).
  - Intensify prevention strategies as indicated.
  - Consider changing the support surface to improve pressure redistribution, shear reduction, and microclimate control matched to the individuals' needs.

3. National Pressure Ulcer Advisory Panel, European Pressure Ulcer Advisory Panel and Pan Pacific Pressure Injury Alliance. Prevention and Treatment of Pressure Ulcers: Quick Reference Guide. Emily Haesler (Ed.). Cambridge Media: Perth, Australia; 2014.

179873 rev 3 12-MAR-2018 ENG - US

Evidence-Based Medicine: Low Air Loss

52 high risk patients in a surgical ICU were placed on 1 of 2 beds: [6]

- **No patient (0/31) developed new supine area** (surface-related) pressure injuries 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)* **developed pressure injuries.**

21 patients with BMI >35, of whom 6 had 10 pressure injuries were placed on LAL bariatric therapy beds:[7]

- **5 pressure injuries healed** during the study.
- Average **surface area decreased** from 5.4 cm^2 to 2.6 cm^2.
- **No new pressure injuries** 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 injuries or at-risk were placed on LAL beds:[8]

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

6. Black J, Berke C, Urzendowski G. Pressure ulcer incidence and progression in critically ill subjects: influence of low air loss mattress versus a powered air pressure redistribution mattress. J Wound Ostomy Continence Nurs. 2012;39:267-73.
7. Pemberton V, Turner V, VanGilder C. The effect of using a low-air-loss surface on the skin integrity of obese patients: results of a pilot study. Ostomy Wound Manage. 2009;55:44-48.
8. Fimiani J, Cohen E, VanGilder C. A pilot study of a new low air loss treatment surface in the critical care setting. Symposium on the Advances of Skin and Wound Care. 2008 (Poster PW020).

179873 rev 3 12-MAR-2018 ENG - US

Evidence-based Medicine Air Fluidized Therapy (AFT)

In a study, 664 nursing home patients 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).*[9]
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 3 or 4 wounds. • **4 injuries healed** prior to discharge; **4** developed into **Stage 2 injuries**, and **2 remained sDTIs** at discharge.[10]
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 1 pressure injury**, compared to 40 injuries among 25 patients in the retrospective control group that did not receive a specialty surface intervention.[11]

9. Ochs RF, Horn SD, van Rijswijk L, Pietsch C, Smout RJ. Comparison of air-fluidized therapy with other support surfaces used to treat pressure ulcers in nursing home residents. Ostomy Wound Manage. 2005;51:38-68.
10. Allen L, McGarrah B, Barrett D, Stenson B, Turpin PG, Vangilder C. Air-fluidized therapy in patients with suspected deep tissue injury: a case series. J Wound Ostomy Continence Nurs. 2012;39:555-561.
11. Jackson M, McKenney T, Drumm J, Merrick B, LeMaster T, VanGilder C. Pressure ulcer prevention in high-risk postoperative cardiovascular patients. Crit Care Nurse. 2011;31:44-53.

179873 rev 3 12-MAR-2018 ENG - US

Therapy Support Surfaces – State of Clinical Evidence: Research Limitations

Findings from research often have limited use for guidelines due to:

- Inconsistencies in how support surfaces are classified.
- Rapid advances in technology outpacing outcomes research.
- Research design limitation.
  - Small study size
  - Non-randomization of patients
  - Not controlling for variables

"Independent, well-designed, multi-centre RCTs are needed to compare the clinical and cost-effectiveness of different types of pressure-relieving devices for patients at different levels of risk for pressure injury." (McInnes, et al. 2015. pg 19.)

4. McInnes E, Jammali-Blasi A, Bell-Syer SEM, Dumville JC, Middleton V, Cullum N. Support surfaces for pressure ulcer prevention. Cochrane Database of Systematic Reviews 2015, Issue 9. Art. No.: CD001735.
5. McInnes E, Dumville JC, Jammali-Blasi A, Bell-Syer SEM. Support surfaces for treating pressure ulcers. Cochrane Database of Systematic Reviews 2011, Issue 12. Art. No.: CD009490.

179873 rev 3 12-MAR-2018 ENG - US

Therapy Support Surfaces – State of Clinical Evidence: What we Know

The Cochrane Review Group – a highly respected, international source of independent medical effectiveness reviews, has concluded that people developed fewer pressure injuries when laying on:

- High specification foam mattress as opposed to ordinary foam mattresses.[4]
- Medical grade sheepskin overlays.[4]
- Pressure-relieving overlays on the operating table.[4]

The incidence of pressure injuries in people at risk is reduced by foam alternatives to the standard hospital foam mattress.

4. McInnes E, Jammali-Blasi A, Bell-Syer SEM, Dumville JC, Middleton V, Cullum N. Support surfaces for pressure ulcer prevention. Cochrane Database of Systematic Reviews 2015, Issue 9. Art. No.: CD001735.
5. McInnes E, Dumville JC, Jammali-Blasi A, Bell-Syer SEM. Support surfaces for treating pressure ulcers. Cochrane Database of Systematic Reviews 2011, Issue 12. Art. No.: CD009490.

179873 rev 3 12-MAR-2018 ENG - US

Therapy Support Surfaces – State of Clinical Evidence: What we Know

- **There is some limited evidence in favor of alternating-pressure devices over standard mattresses.**
- **The relative merits of alternating-pressure and constant low pressure devices for pressure injury prevention is unclear.[4]**
- **Low air loss mattresses have been shown to reduce the incidence of pressure injuries in ICU.**
- There is no conclusive evidence for the superiority of any support surface over another for the treatment of existing pressure injuries.[5]
- **Rigorous research comparing different support surfaces is needed.[4]**

There is no conclusive evidence for the superiority of any support surface over another for the treatment of existing pressure injuries.[5]

4. McInnes E, Jammali-Blasi A, Bell-Syer SEM, Dumville JC, Middleton V, Cullum N. Support surfaces for pressure ulcer prevention. Cochrane Database of Systematic Reviews 2015, Issue 9. Art. No.: CD001735.
5. McInnes E, Dumville JC, Jammali-Blasi A, Bell-Syer SEM. Support surfaces for treating pressure ulcers. Cochrane Database of Systematic Reviews 2011, Issue 12. Art. No.: CD009490.

179873 rev 3 12-MAR-2018 ENG - US

Therapy Surface Selection Factors: Art and Science of Surface Selection

- *"The idea that all therapy beds prevent pressure injuries is a common misconception. Actually, the therapy bed is an **adjunct to** repositioning patients and does not decrease the required frequency of repositioning. The selection of a therapy bed should be tailored to the specific needs of the patient."*[12]
- Surface selection criteria may also include consideration of:

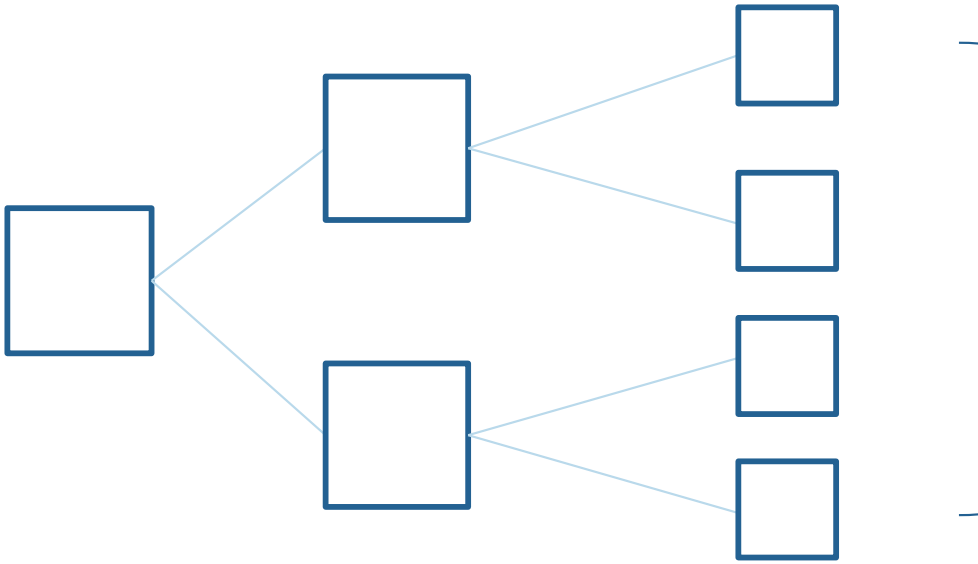
Total Braden Score	**Nutrition**	**Co-morbid Conditions**
Number/Location of Existing Pressure Injuries	**Age**	**Low Serum Albumin**
Wound Severity	**Length of Stay**	**Rate of Wound Improvement on Current Surface**
Mobility/Activity	**Vasopressor Administration**	**#Turning Surfaces**
Moisture	**Staffing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

12. Jankowski IM. Tips for protecting critically ill patients from pressure ulcers. Crit Care Nurse. 2010;30:S7-S9.

179873 rev 3 12-MAR-2018 ENG - US

Support Surface Selection Algorithms

- As discussed before, when it comes to support surfaces, one size does not fit all and choosing the right surface needs considerations of multiple factors.[13]
- Algorithms are being developed to help decision-making for support surfaces.



There is recommendation today on an established algorithm.

13. Norton L, Coutts P, Sibbald RG. Beds: practical pressure management for surfaces/mattresses. Adv Skin Wound Care. 2011;24:324-332.

179873 rev 3 12-MAR-2018 ENG - US

An Evidence and Consensus-Based Support Surface Algorithm: Publication

- McNichol L, Watts C, Mackey D, Beitz, J, Gray M. Identifying the Right Patient for the Right Surface at the Right Time: Generation and Content Validation of an Algorithm for Support Surface Selection. J Wound Ostomy and Continence Nurs. 2015:42(1)19-37.
- *Terminology Related to Support Surfaces* and *General Glossary* are included in the manuscript.

179873 rev 3 12-MAR-2018 ENG - US

WOCN Consensus Conference, May 2014

Sponsored development of evidence-based approach with 20 leading national experts.

WOCN finding integrated into our approach.[14,15]

- Braden score determines “at risk” patients, subscale scores identify surface needs.
- Patients with significant mobility issues (Braden subscale score 1 or 2) place on reactive/constant low pressure or alternating pressure surface.
- Patients with significant moisture issues (Braden subscale score 1 or 2) place on a low air loss (LAL) surface.
- Patients with wounds and limited turning surfaces place on LAL.
- For wounds, Air Fluidized Therapy recommended when turning surfaces are limited AND significant moisture AND mobility issues (Braden subscale score 1 or 2).

14. McNichol L, Watts C, Mackey D, Beitz, J, Gray M. Identifying the Right Patient for the Right Surface at the Right Time: Generation and Content Validation of an Algorithm for Support Surface Selection. J Wound Ostomy and Continence Nurs. 015:4(1)19-37.
15. An Evidence- and Consensus-Based Support Surface Algorithm. Available at: http://algorithm.wocn.org . Accessed May 16, 2017.

179873 rev 3 12-MAR-2018 ENG - US

Surface Selection Criteria: Patient Characteristics

Prevention Example

PRESSURE ULCER RISK FACTORS			
VERY HIGH RISK	HIGH RISK	MODERATE RISK	LOW RISK
BRADEN SCORE: At Risk ≤18	At Risk ≤18	At Risk ≤18	At Risk ≥23
MOBILITY SUBSCALE: 1 or 2: Low Mobility	3 or 4: High Mobility	1 or 2: Low Mobility	3 or 4: High Mobility
MOISTURE SUBSCALE: 1 or 2: High Moisture	1 or 2: High Moisture	3 or 4: Low Moisture	3 or 4: Low Moisture
OTHER IMPLICATIONS: None	None	None	None

Low Air Loss (LAL)

Risk levels are based upon the WOCN® Consensus:

- Overall Braden Score: ≤ 18 vs. > 18
- Braden Subscale Scores:
  - Moisture: (High risk 1 or 2 vs. Low 3 or 4)
  - Mobility: (High risk 1 or 2 vs. Low 3 or 4)

179873 rev 3 12-MAR-2018 ENG - US

Overall Pressure Injury Prevention/Treatment Program

- Therapy support surfaces are one component of a larger program to prevent and treat pressure injuries.
- Should be applied in conjunction with a **multi-disciplinary treatment** and in the framework of guidelines issued by quality monitoring agencies and professional bodies.
- Successful programs combine multiple strategies.

NPUAP Consensus Panel unanimously concluded "pressure redistribution support surfaces do not replace turning or repositioning and that turning and repositioning can probably be lengthened on more advanced support surfaces."[16]

16. Black J, et al. Pressure Ulcers: Avoidable or Unavoidable? Results of the National Pressure Ulcer Advisory Panel Consensus Conference. 2011; 57(2):24-37.

179873 rev 3 12-MAR-2018 ENG - US

Know if the Bed is Working

If powered, be sure it is plugged in and working correctly.

- Be sure it is the right size for the patient (especially important for larger persons whose weight may be centered in one area).

In addition…

- Document the bed use in the nursing notes daily.
- **Use bed linen sparingly — avoid layering under patient's skin.**
- Be sure the staff knows how the surface/bed works.
- Know your facility's process for reporting broken beds for repair.
- Teach the patient and family how the surface/bed works and how is is helping with skin care.

Remember…

- **A support surface does not replace good nursing care.**
- **Patients still need to be turned and repositioned.**

179873 rev 3 12-MAR-2018 ENG - US

Conclusions

- Support surfaces are an integral part of pressure injury prevention and treatment.
- Support surfaces can address and alleviate the extrinsic pressure injury risk factors of pressure, shear/friction, heat and humidity.
- All support surfaces are not the same; in order to do the above, various combinations of physical concepts, components and features need to be designed.
  - There is a science to designing these surface solutions.
- An NPUAP initiative — S3I — has begun to address comparison testing to optimize surface choice based on performance.
- Although all concerned parties agree more research is needed, existing clinical evidence and expert opinion interweave to formulate surface selection criteria.

179873 rev 3 12-MAR-2018 ENG - US

References

1. Rehabilitation Engineering and Assistive Technology Society of North America American National Standard for Support Surfaces – Volume 1: Requirements and test methods for Full Body Support Surfaces. RESNA ss-1-2014, published 2014.
2. National Pressure Ulcer Advisory Panel. Support Surface Standards Initiative. Terms and Definitions. Available at: http://www.npuap.org/wp-content/uploads/2012/03/NPUAP_S3I_TD.pdf. 2007. Accessed May 16, 2017.
3. National Pressure Ulcer Advisory Panel, European Pressure Ulcer Advisory Panel and Pan Pacific Pressure Injury Alliance. Prevention and Treatment of Pressure Ulcers: Quick Reference Guide. Emily Haesler (Ed.). Cambridge Media: Perth, Australia; 2014.
4. McInnes E, Jammali-Blasi A, Bell-Syer SEM, Dumville JC, Middleton V, Cullum N. Support surfaces for pressure ulcer prevention. Cochrane Database of Systematic Reviews 2015, Issue 9. Art. No.: CD001735.
5. McInnes E, Dumville JC, Jammali-Blasi A, Bell-Syer SEM. Support surfaces for treating pressure ulcers. Cochrane Database of Systematic Reviews 2011, Issue 12. Art. No.: CD009490.
6. Black J, Berke C, Urzendowski G. Pressure ulcer incidence and progression in critically ill subjects: influence of low air loss mattress versus a powered air pressure redistribution mattress. J Wound Ostomy Continence Nurs. 2012;39:267-73.
7. Pemberton V, Turner V, VanGilder C. The effect of using a low-air-loss surface on the skin integrity of obese patients: results of a pilot study. Ostomy Wound Manage. 2009;55:44-48.
8. Fimiani J, Cohen E, VanGilder C. A pilot study of a new low air loss treatment surface in the critical care setting. Symposium on the Advances of Skin and Wound Care. 2008 (Poster PW020).
9. Ochs RF, Horn SD, van Rijswijk L, Pietsch C, Smout RJ. Comparison of air-fluidized therapy with other support surfaces used to treat pressure ulcers in nursing home residents. Ostomy Wound Manage. 2005;51:38-68.
10. Allen L, McGarrah B, Barrett D, Stenson B, Turpin PG, Vangilder C. Air-fluidized therapy in patients with suspected deep tissue injury: a case series. J Wound Ostomy Continence Nurs. 2012;39:555-561.

References

11. Jackson M, McKenney T, Drumm J, Merrick B, LeMaster T, VanGilder C. Pressure ulcer prevention in high-risk postoperative cardiovascular patients. Crit Care Nurse. 2011;31:44-53.
12. Jankowski IM. Tips for protecting critically ill patients from pressure ulcers. Crit Care Nurse. 2010;30:S7-S9.
13. Norton L, Coutts P, Sibbald RG. Beds: practical pressure management for surfaces/mattresses. Adv Skin Wound Care. 2011;24:324-332.
14. McNichol L, Watts C, Mackey D, Beitz, J, Gray M. Identifying the Right Patient for the Right Surface at the Right Time: Generation and Content Validation of an Algorithm for Support Surface Selection. J Wound Ostomy and Continence Nurs. 015:4(1)19-37.
15. An Evidence- and Consensus-Based Support Surface Algorithm. Available at: http://algorithm.wocn.org . Accessed May 16, 2017.
16. Black J, et al. Pressure Ulcers: Avoidable or Unavoidable? Results of the National Pressure Ulcer Advisory Panel Consensus Conference. 2011; 57(2):24-37.

179873 rev 3 12-MAR-2018 ENG - US