Identifying the Right Surface for the Right Patient at the Right Time:

Consensus Statements and a Content-Validated Algorithm for Support Surface Selection

Laurie McNichol, MSN, RN, GNP, CWOCN, CWON-AP, Clinical Nurse Specialist and WOC Nurse, Cone Health, Wesley Long Hospital, Greensboro, North Carolina

Dianne Mackey, MSN, RN, CWOCN, Staff Educator, Chair, National Wound Management Sourcing and Standards Team, Home Health/Hospice/Palliative Care, Kaiser Permanente, San Diego, California

Carolyn Watts, MSN, RN, CWON, CBPN-IC, Senior Associate in Surgery, Clinical Nurse Specialist, WOC Nurse, Vanderbilt University Medical Center, Nashville, Tennessee

Janice M. Beitz, PhD, RN, CS, CNOR, CWOCN, CRNP, APN-C, FAAN, Professor of Nursing, School of Nursing – Camden, Rutgers University, Camden, New Jersey

Mikel Gray, PhD, PNP, FNP, CUNP, CCCN, FAANP, FAAN, Professor and Nurse Practitioner, Department of Urology and School of Nursing, University of Virginia Health Sciences Center, Charlottesville, Virginia

Correspondence: Laurie McNichol, MSN, RN, GNP, CWOCN, CWON-AP, Cone Health, Wesley Long Hospital, 501 N Elam Ave., Greensboro, NC 27403
(laurie.mcnichol@conehealth.com).

The content of this document is intended for general information purposes and is not intended to be a substitute for medical or legal advice.
The authors have no relevant disclosures.

ABSTRACT

The use of support surfaces is an integral component of pressure ulcer prevention programs and treatment recommendations, but evidence to guide support surface selection, particularly for the treatment of pressure ulcers, is lacking. In an effort to provide clinical guidance for selecting support surfaces to match individual patient needs, the Wound, Ostomy and Continence Nurses Society (WOCN®) set out to develop an evidence- and consensus-based algorithm. Previously, supportive evidence for the use of support surfaces for the prevention and treatment of pressure ulcers was identified through comprehensive literature review, an evidence-based draft algorithm for support surface selection was developed and face validated, and draft consensus statements were generated for decision points in the draft algorithm not supported by high-level evidence (refer to companion article, Identifying the right surface for the right patient at the right time: Literature review and a draft algorithm for support surface selection). A consensus panel of 20 key opinion leaders convened and achieved consensus on these statements and modified the draft algorithm. The resulting evidence- and consensus-based algorithm was then content validated. The Content Validity Index (CVI) for the algorithm was strong (0.95 out of 1.0) with an overall mean score of 3.72 (out of 1 to 4), suggesting that the steps were appropriate to the purpose of the algorithm. To our knowledge, this is the first support surface selection algorithm based on a comprehensive literature review that has been content validated.

Short title: A Content-Validated Algorithm for Support Surface Selection
**Keywords:** Support surface, algorithm, pressure ulcer, prevention, treatment

**Acknowledgements:** The Support Surface Consensus Panel would like to thank the following individuals for their special contributions to the project: the WOCN for conceiving this important initiative; Laurie McNichol, Dianne Mackey, and Carolyn Watts for their leadership, dedication, and time commitment in making this project a reality; Hill-Rom (Batesville, Indiana) for the educational grant support and Conference venue, without which this project would not have been possible; Magellan Medical Technology Consultants for their role in planning and facilitating the Conference; Mikel Gray for his expertise in moderating the Conference; Janice Beitz for her expertise in algorithm development and content validation; Evan Call for providing recommendations for support surface inspection; Marie Sabo Recine, MS, MT(ASCP), for providing medical writing assistance; and Charlotte Gasperlin for conducting data analysis for content validation.

The content of this document is based on the results of a 2-day Consensus Conference held May 15 to 16, 2014, in Greensburg, Indiana and is a continuation of previous work on the project. The information contained herein does not necessarily represent the opinions of all authors and panel members, Hill-Rom, or Magellan Medical Technology Consultants.
INTRODUCTION

Support surfaces comprise a variety of mattresses, overlays, and integrated bed systems used to redistribute pressure, reduce shearing forces, and control heat and humidity. Virtually all evidence-based clinical practice guidelines include the use of support surfaces as a component of comprehensive pressure ulcer prevention programs and treatment recommendations.\(^1-^4\) Although a number of support surfaces have been shown to reduce the incidence of pressure ulcers in individuals at risk or facilitate healing when compared with standard mattresses, there is insufficient evidence to guide support surface selection to match individual patient needs in many situations. The lack of evidence regarding the superiority of one type of support surface over another has been documented in 4 high-quality systematic reviews.\(^5-^8\) Comparative evidence in the treatment setting is particularly inconclusive.

In an effort to provide clinical guidance for selecting support surfaces to match individual patient needs, the Wound, Ostomy and Continence Nurses Society (WOCN\(^\text{®}\)) sought to develop an evidence- and consensus-based algorithm. With this aim, they assembled a Task Force of key opinion leaders that identified and categorized levels of supportive evidence for the use of support surfaces for the prevention and treatment of pressure ulcers, developed an evidence-based draft algorithm for support surface selection, established draft consensus statements for decision points in the draft algorithm not supported by high-level evidence, and determined face validation of the draft algorithm. These preconference activities are detailed in a companion article, *Identifying the right surface for the right patient at the right time: Literature review and a draft algorithm for support surface selection*. A consensus panel of 20 key opinion leaders then convened and achieved consensus on these statements, provided feedback and modified the draft
algorithm, and subjected the algorithm to content validation (Box 1). This article presents the resulting evidence- and consensus-based algorithm.

METHODS

Preconference Activities

Details regarding the duties of the Advisory Task Force for the project (LM, DM, and CW), the role of Mikel Gray as consensus facilitator and moderator, the role of Janice Beitz in algorithm development, the role of Magellan Medical Technology Consultants, Inc. of Minneapolis, MN, in conference planning and facilitation, performance of the literature review and identification and strength ranking of supporting evidence, draft algorithm development and face validation, and draft consensus statement development has previously been reported (see companion article).

Support Surface Terminology. Selected terminology regarding components, features (ie, functional components of a support surface that can be used alone or in combination with other features), and categories of support surfaces previously defined for use in this initiative are listed in Table 1. Additional terms are defined in the Glossary (Box 2).

Support Surface Consensus Panel Members. The Task Force identified potential consensus panel members in North America based on their expertise in support surface technologies or their clinical applications. Members were invited to participate based on their knowledge and experience in this area of clinical management, membership in relevant professional organizations, geographic location, and practice settings (acute care, long-term acute care, long-
term care, and home care). Many potential invitees were responsible for support surface selection and value-based purchasing (VBP) decisions in their respective practice setting. Invitations to each potential representative were made via phone or e-mail, with background provided on the purpose of the meeting, meeting logistics, the voting process for consensus statements presented and/or formulated at the Conference, and development of the support surface selection algorithm. Researchers in the area of pressure ulcer prevention and support surface and seat cushion development and evaluation were also invited. In addition to the 3 Task Force members, 14 clinicians and 3 researchers attended the Conference.

State of the Science. Task Force members created a brief presentation to provide background information that included an overview of clinical issues related to support surface selection; terminology related to support surface components, features, and categories; intended audience; and scope of the algorithm. This presentation, copies of the key systematic reviews, and background on support surface terminology were sent to the invited participants prior to the Conference.

Consensus Conference Format
The 2-day Conference began with a presentation summarizing preconference activities and the state-of-the-science, as well as an overview of the draft support surface algorithm, which was presented on multiple slides due to its size. This was followed by a discussion of evidence-based statements, some of which were further refined based on panel member input, and draft consensus statements. An interactive PowerPoint® version 2013 (Microsoft, Seattle, WA) software program and wireless response system pads (IML ViewPoint Express and IML Click,
IML, Minneapolis, MN) allowed anonymous interactive voting by the panel members and Task Force. Each draft consensus statement was projected on an individual slide and read aloud by the moderator. In some cases, panel members were allowed to provide feedback and suggest revisions to the statement prior to voting, whereas in other cases, an initial vote was cast by the panel members before discussion. This process facilitated maximum participation by the panel members and refinement of the consensus statements. Furthermore, the open discussion allowed for the development of additional relevant consensus statements.

Consensus on each statement was obtained based on general principles outlined by Murphy and colleagues,\textsuperscript{15} using 80\% agreement as the criterion for consensus. If consensus was not achieved on the first vote, the statement was edited based on panel member input and a second, and sometimes third, vote was taken. In cases where consensus could not be reached, or if a statement was considered not relevant, consensus regarding deletion of the statement was obtained. The draft algorithm was then reviewed in detail and modified as needed based on the final consensus statements and panel member input and discussion. Panel agreement was obtained for all algorithm decision nodes not supported by evidence-based statements.

\textit{Content Validation and Data Analysis}

A data collection form was developed to evaluate content validity of the algorithm. The form contained 18 questions regarding panel demographic and pertinent professional credential data (eg, gender, age, educational background, wound care certification, years of experience, practice setting) and 29 items representing each decision statements/pathways in the draft algorithm. Following revision of the algorithm and prior to the end of the Conference, panel members were asked to rank the individual items on scale of 1 to 4 where: 1 = Not relevant/appropriate; 2 =
Unable to assess relevance without revision, 3 = Relevant but needs minor alteration, or 4 = Very relevant and appropriate. This process was originally proposed by Lynn and Waltz & Bausell and modified by Grant & Davis. Panel members were also asked to comment on the comprehensiveness of the algorithm, describe omissions, and suggest changes to improve clarity, parsimony, and relevance. All panel members agreed to participate.

Data analysis was conducted using Excel version 2013 (Microsoft, Seattle, WA). Data were coded and entered into a database by an assistant, analyzed by the data coordinator, and reviewed by the authors. Descriptive statistics were used to summarize demographic and pertinent professional credential data. Ratings of all 29 algorithm decision statements/steps were entered and mean scores were calculated. The Content Validity Index (CVI) also was calculated using processes described by Polit and Beck. Comments regarding decision statements/steps were transcribed and thematically analyzed using qualitative data reduction techniques.

RESULTS

Support Surface Terminology

Several terms related to support surfaces were defined or refined during the Conference. The National Pressure Ulcer Advisory Panel (NPUAP) Support Surface Standards Initiative defines reactive support surface but does not define the commonly used term constant low pressure (CLP) support surface, a term that is also used in the Cochrane systematic reviews. Therefore, consensus was obtained on this category definition. The panel agreed to refer to these support surfaces as reactive/CLP support surfaces, defining them as a powered or nonpowered support surface providing pressure redistribution in response to an applied load (patient) through immersion and envelopment. The panel agreed with the Task Force's decision to refer to
Australian Medical-grade sheepskin overlays separately from other reactive/CLP products due to their unique properties and limited availability. However, it was the opinion of some panel members that the term “CLP” may not appropriately describe all the properties of the support surface.

Panel members noted that support surfaces were often referred to by feature alone and agreed that support surface category should be indicated along with support surface features for this initiative. For example, a reactive/CLP support surface may be referred to as a reactive/CLP with a low air loss (LAL) or air-fluidized (AF) feature if present. The only commercially available active support surface is one that includes an alternating pressure (AP) feature. These are referred to as active with an AP feature. Panel members noted that there have been significant changes in evolution of support surface technology that make neat categorization of some support surfaces difficult. Also, much of the evidence was derived before the technology was developed, such that combinations of features may now be found in a single support surface.

Evidence-based Statements

During the Conference, panel members discussed previously derived evidence-based statements regarding skin and pressure ulcer risk assessment, general recommendations for support surfaces, and use of support surfaces to prevent or treat pressure ulcers. They provided additional details, comments, and recommendations. For example, regarding the need to assess individuals for other intrinsic and extrinsic risk factors for pressure ulcer development, panel members recommended adding the comorbid factors of advanced age, fever, poor dietary intake of protein, diastolic pressure <60 mmHg, hemodynamic instability, anemia, and generalized edema to
patient weight and weight distribution. Comments and recommendations related specifically to support surfaces are shown in Table 2.

**Consensus Statements**

Box 3 lists statements upon which consensus was achieved by panel members during the Conference.

**Support Surface Algorithm**

The draft support surface algorithm was subjected to panel review and agreed-upon modifications were incorporated to generate the algorithm shown in Figure 1. As with the draft algorithm, the final support surface algorithm is designed for selection of support surfaces, including overlays, mattresses, and integrated bed systems, for prevention and treatment of pressure ulcers (excluding medical device-related pressure ulcers). The target audience for use of this algorithm includes nurses; physicians; advanced practitioners such as nurse practitioners, clinical nurse specialists, and physician assistants; physical therapists; and occupational therapists. The algorithm is designed to be used for adult patients (including morbidly obese individuals) across the entire continuum of care, including acute care (ie, intensive care, medical-surgical, rehabilitation, orthopedics, and emergency department), long-term acute care, long-term care/skilled nursing, and home care settings. This algorithm was not designed for use in neonates, infants, or children and adolescents less than 16 years of age, and selected settings (operating room and interventional diagnostic suite) where the length of stay is less than 24 hours. Use of seating surfaces and cushions, continuous lateral rotation mattresses, and other
special purpose beds or surfaces, such as those for proning, multiple fractures, and unstable
spine, were not incorporated into this algorithm.

Users enter the algorithm at the point of the initial skin assessment, which is followed by
pressure ulcer risk assessment. Based on the risk for development of pressure ulcers (Braden
score cut-off of 18\(^4\)) or presence of pressure ulcers, users follow pathways for pressure ulcer
prevention or treatment. Suggested support surface selections based primarily on Braden
moisture and mobility subscale scores are provided, as well as guidance regarding performance
of skin and pressure ulcer risk reassessments, determining the need for a change in or removal
from a support surface, and support surface considerations and contraindications. We
acknowledge the need for individual facilities to adapt the algorithm for their use by including
the specific products used at their facility, along with appropriate staff education.

**Content Validation**

Demographics. The panel included 20 experts; 16 were female (80%) and the panel’s average
age was 56.2 years. Nine (45%) were advanced practice nurses and 6 (30%) were registered
nurses. Two participants were physical therapists, one was an engineer, two were researchers,
and one was a certified prosthetist. The majority (80%) were certified in wound care.
Respondents manage a variety of wounds, including pressure ulcers (n=15, 37%), surgical (n=9,
22%), trauma (n=5, 12%), lower extremity (n=2, 5%), or others (n=1, 2% each: atypical, burns,
leg ulcers [all kinds], lower extremity [venous insufficiency], lymphatic/venous, malignant,
mixed etiology, neuropathic, and vascular). More than half (n=10, 59%) encounter 10 or more
patients per week who are at risk for or have a pressure ulcer, 3 (18%) encounter 1 such patient
per week, and 2 (12%) encounter 4 to 6 such patients per week. The 3 nonclinical participants
have 25 years, 18 years, and 6 years, respectively, in experience with support surface technology. See Appendix 2 for additional demographic details, including professional credentials, wound care certification, education, and practice settings.

Quantitative Analysis. Table 3 illustrates changes incorporated into the final algorithm and mean scores and Content Validity Index (CVI) for the individual steps. The mean score was 3.72 ± 0.48 out of 4 (mean ± SD), indicating components of the algorithm were ranked as “very relevant and appropriate” or “relevant and needed only minor alteration.” The CVI for the entire algorithm was 0.95, well above the minimum (0.70 or 0.80) considered acceptable. All decision statements/steps were above this minimum except one: *For intact/closed skin not at risk for development of pressure ulcers (Braden >18), reassess need for support surface* (Treatment of Pressure Ulcers, Step 6). The CVI for this item was 0.65. Review of comments revealed that lower ranking on this item reflected disagreement with the language included in the draft algorithm that has subsequently been clarified.

Qualitative Analysis. All comments entered into the data collection form were collated and reviewed by the Task Force. Respondents’ comments reflected concern about: 1) exclusive use of the Braden scale for pressure ulcer risk assessment and the limited number of comorbid conditions listed for consideration; 2) the need to provide definitions for each of the categories of support surfaces, particularly Australian Medical-grade sheepskin, as well as a desire for inclusion of examples of support surfaces in each category; 3) the desire to provide more specific guidance with regard to support surface recommendations; 4) possible inclusion of patient preference as consideration for support surface selection; and 5) a desire to compress the
algorithm presented during the conference for efficiency and ease of use. In a few instances, respondents felt that instructions for the user to “consider” use of a support surface were too soft and should be replaced with “should.” Minor modifications to were made to the algorithm’s wording to improve clarity or appropriateness based on qualitative feedback.

**DISCUSSION**

An evidence- and consensus-based algorithm for support surface selection was created and content validated. The CVI for the algorithm was strong (0.95 out of 1.0), with an overall mean score of 3.72 (out of 1 to 4), suggesting that the steps were appropriate to the purpose of the algorithm. Only one validation score was below 3.0, and this statement was revised. Overall, respondents were very pleased with the outcome. Respondents’ comments reflected concern about the use of only the Braden scale for pressure ulcer risk assessment and the limited number of comorbidities listed for consideration, the need to provide definitions for categories of support surfaces and for inclusion of examples, the desire to provide more specific guidance with regard to support surface recommendations, and the desire to compress the algorithm for efficiency and ease of use.

Support surface terminology was a topic of considerable discussion when drafting the algorithm and during the Consensus Conference. Panel members agreed to use the convention of a respective support surface category with added features as applicable. Definitions of these terms were provided for algorithm users. The use of this convention is adaptable to the future addition of new support surface features or combinations. Despite the high-level clinical evidence supporting the effectiveness of Australian Medical-grade sheepskin in the prevention of pressure ulcers, there was much discussion regarding the inclusion of these overlays as a
suggested support surface due to their limited availability and usage in the United States. However, as sheepskin that conforms to defined standards is now available through online suppliers, this category of support surface was included in the algorithm as a suggested option for pressure ulcer prevention, although it was considered separately from other reactive/CLP products.

Unique to this algorithm is the use of 2 Braden subscale scores—mobility and moisture—to guide support surface selection. During the development of the draft algorithm, the Task Force felt that nutritional needs, which are critical, are relatively well met in most care settings. Based on level C evidence (expert consensus), it was determined that the moisture and mobility subscale scores were highly indicative of risk for development of pressure ulcers across all care settings. The decision to focus on these subscale scores as a significant component of the algorithm for support surface selection was supported by the expert panel. For example, using the algorithm, reactive/CLP support surfaces are considered appropriate for a variety of subscale score combinations, whereas additional features (ie, LAL, AF) are also suggested in cases where mobility and/or moisture issues are present. In some instances, however, consensus on more specific recommendations for support surface selection could not be achieved, suggesting that multiple support surface options may be appropriate under specific circumstances.

The Braden Scale is a valid and reliable predictor of pressure ulcer risk, but alone, its use in clinical practice does not reduce the risk of pressure ulcers to zero. An analysis of results of a retrospective cohort study of risk factors for pressure ulcer development in older adults receiving home health care found that activity and moisture subscale scores predicted
pressure ulcer development. However, when overall level of risk was added to regression modeling of individual Braden subscale scores, the total score was more strongly related to pressure ulcer development, and no individual scale improved risk prediction. A large, retrospective study examining factors associated with development of pressure ulcers in at-risk intensive and progressive care patients found that low scores on the friction/shear, moisture, sensory perception, and mobility subscales were more predictive than total Braden score alone. Results of a comprehensive literature review on pressure ulcer risk assessment in the critical care population suggests that sensory perception, mobility, moisture, and friction/shear subscale scores are predictive of pressure ulcer development. A study examining the relationship of individual Braden subscale scores to pressure ulcer prevalence in obese and non-obese hospitalized patients found high-risk total Braden and Braden subscale scores, except for moisture, to be significantly related to the occurrence of pressure ulcers in both groups. However, high-risk total Braden score and mobility and friction/shear subscale scores were much more strongly related to ulcer occurrence in obese patients. Results of a retrospective review of hospitalized Brazilian patients at risk of pressure ulcers (Braden score ≤13) suggests that score stratification by subscale may extend and specify the total Braden score to better direct interventions to prevent pressure ulcers. A recent chart audit of patients with hospital-acquired pressure ulcers identified a patient that was deemed at low risk of pressure ulcer development based on total Braden score, but who may have benefitted from interventions based on suboptimal sensory perception, activity, and mobility subscale scores.

The relative contributions of the cumulative Braden score, Braden subscale scores, clinical judgment, and experience in clinical decision-making are not known. Results of an analysis of an existing database investigating relationships between Braden subscale scores and
nurses’ selection of 10 commonly used pressure ulcer preventive interventions suggest that subscale scores influence nurses’ endorsement of various preventive interventions in 2 ways: unique combinations of subscale scores providing risk information and generation of predictable patterns of increased endorsement of interventions as subscale scores decreased/risk increased.55 Whether preventive strategies, including the use of specific support surfaces that are based on the combined use of Braden moisture and mobility subscale scores, are effective in improving patient outcomes requires additional research.

The algorithm specifies selection of support surfaces based on categories and features. However, pressure ulcer prevention and treatment effectiveness depends on how the surfaces manage specific extrinsic risk factors, such as pressure distribution, heat, moisture, and shear. Unfortunately, features do not necessarily translate into effective performance. For example, the LAL feature was designed to manage moisture and humidity to reduce pressure ulcer risk associated with excessively moist skin. However, products with the LAL feature demonstrate a wide range of performance when they are tested.56 This introduces some risk in using the algorithm as a guide. In the future, when support surfaces are characterized using standardized performance tests, such as the Rehabilitation Engineering and Assistive Technology Society of North America (RESNA) Standards Committee on Support Surfaces Volume 1 (SS-1) tests for immersion57 and heat and water vapor transmission,58,59 the algorithm’s recommendations on support surface selection might specify performance criteria in place of types and features. For example, the algorithm may recommend a surface with an evaporative capacity greater than some minimum value instead of recommending a surface with the LAL feature. Other tests, such as the RESNA SS-1 test for immersion60 could be used to help differentiate reactive/CLP products.
LIMITATIONS
The support surface selection algorithm was designed for use in adult and bariatric patients in care settings where the length of stay is longer than 24 hours. It does not address use of seating surfaces and cushions, continuous lateral rotation mattresses, and other special purpose beds or surfaces. High-level evidence regarding comparative efficacy of support surfaces and their optimal usage in specific patient populations and in conjunction with other therapeutic modalities is lacking, particularly for individuals with existing pressure ulcers. Clinical evidence regarding the use of the combination of Braden moisture and mobility subscale scores as predictors of pressure ulcer risk or as a means to tailor prevention strategies is also lacking. In each of these cases, decisions supported in the algorithm relied on lower level evidence (consensus among members of an expert panel). In some instances, consensus on more specific recommendations for support surface selection could not be achieved, suggesting that multiple support surface options may be appropriate under specific circumstances. Lastly, the algorithm specifies selection of support surfaces based on categories and features, which do not necessarily translate into effective performance.

CONCLUSIONS AND RECOMMENDATIONS FOR PRACTICE
Support surfaces are only one component in pressure ulcer prevention and management protocols, but their role is critical. Multiple factors come into play when selecting a support surface, but there exists limited guidance supported by high-level evidence for choice of a specific type of support surface over another. This content-validated support surface selection algorithm and the accompanying consensus statements were developed in response to the critical
need for this type of information for use in clinical practice. To our knowledge, this is the first support surface selection algorithm based on a comprehensive literature review that has been content validated. In the algorithm, support surface selection is largely driven by Braden mobility and moisture subscale scores. There is increasing interest noted in the literature related to use of subscale scores to assist clinicians in prioritizing specific areas to determine what pressure ulcer prevention elements need to be the focus in specific patients. However, this does not mean that all prevention elements are not addressed in all patients; it just helps clinicians and caregivers identify areas that need to be the focus in specific patients to provide a more individualized approach to prevention and treatment. We are hopeful that use of the combination of Braden mobility and moisture subscale scores will help tailor pressure ulcer prevention and treatment strategies and improve patient outcomes. We invite facilities to adapt this algorithm for their own use by including the specific products used at their facility and to incorporate appropriate staff education for optimal implementation.

KEY POINTS

- High-level evidence regarding comparative efficacy of support surfaces and their optimal usage in specific patient populations and in conjunction with other therapeutic modalities is lacking, particularly for individuals with existing pressure ulcers.

- In an effort to provide clinical guidance for selecting support surfaces to match individual patient needs, an evidence- and consensus-based algorithm for support surface selection that largely utilizes Braden mobility and moisture subscale scores to drive selection was developed and content validated.
• Consensus was obtained for statements supporting decision points in the draft algorithm not supported by high-level evidence and/or providing ancillary information.

• Health care facilities may adapt this algorithm for their own use by including the specific products used at their facility.
REFERENCES


3. Association for the Advancement of Wound Care (AAWC). AAWC Guideline of Pressure Ulcer Guidelines. Malvern, PA: Association for the Advancement of Wound Care (AAWC); 2010;14:1-57.


49. Gadd MM. Braden Scale cumulative score versus subscale scores: are we missing opportunities for pressure ulcer prevention? JWOCN. 2014;41:86-89.


52. Tescher AN, Branda ME, Byrne TJ, Naessens JM. All at-risk patients are not created equal: analysis of Braden pressure ulcer risk scores to identify specific risks. *JWOCN.* 2012;39:282-291.


59. Rehabilitation Engineering and Assistive Technology Society of North America (RESNA). *SS-1 Support Surfaces: Section 4 Standard protocol for measuring heat and water vapor*

FIGURE 1. Support surface algorithm
### TABLE 1: Terminology Related to Support Surfaces

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Support surface</td>
<td><em>Project definition:</em> A specialized device (ie, any overlay, mattress, or integrated bed system) for pressure redistribution designed for management of pressure, shear, or friction forces on tissue; microclimate; or other therapeutic functions</td>
</tr>
<tr>
<td>Standard mattress</td>
<td><em>Project definition:</em> A mattress not intended to prevent or treat pressure ulcers</td>
</tr>
</tbody>
</table>

### Components of Support Surfaces

| Closed cell foam      | Nonpermeable structure in which there is a barrier between cells, preventing gases/liquids from passing through the foam |
| Open cell foam (“high specification”) | Permeable structure in which there is no barrier between cells and gases/liquids can pass through the foam. Includes elastic (nonmemory) and viscoelastic (memory) foam, types of porous polymer materials that conform in proportion to the applied weight |
| Gel                   | Semisolid system consisting of a network of solid aggregates, colloidal dispersions or polymers, which may exhibit elastic properties |
| Fluid                 | Substance that has no fixed shape and yields easily to external pressure |

29
<table>
<thead>
<tr>
<th>Features of Support Surfaces</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Air fluidized (AF)</strong></td>
</tr>
<tr>
<td><strong>Alternating pressure (AP)</strong></td>
</tr>
<tr>
<td><strong>Low air loss (LAL)</strong></td>
</tr>
<tr>
<td><strong>Zone</strong>(^b)</td>
</tr>
<tr>
<td><strong>Multi-zoned surface</strong>(^b)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Categories of Support Surfaces</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Reactive/Constant low pressure (CLP) support surface</strong></td>
</tr>
<tr>
<td><strong>Active support surface</strong></td>
</tr>
<tr>
<td><strong>Overlay</strong></td>
</tr>
<tr>
<td><strong>Integrated bed system</strong></td>
</tr>
</tbody>
</table>

*a* Unless otherwise noted, all information is adapted from the National Pressure Ulcer Advisory Panel (NPUAP) Support Surface Standards Initiative.⁹

*b* May refer to reactive/CLP support surfaces with or without an LAL feature, or active support surfaces with an AP feature.

*c* Due to the distinct properties and limited availability of Australian Medical-grade sheepskin overlays, these devices are discussed separately from other CLP products.
### TABLE 2: Evidence-based Statements: Panel Comments and Recommendations

<table>
<thead>
<tr>
<th>Statement</th>
<th>Comments and Recommendations</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>General Recommendations for Support Surfaces</strong></td>
<td></td>
</tr>
<tr>
<td>3.1. Support surfaces are not a stand-alone intervention for the prevention and treatment of pressure ulcers, but are to be used in conjunction with proper nutritional support, moisture management, pressure redistribution when in bed and chair, turning and repositioning, risk identification, and patient and caregiver education.</td>
<td>Panel members concur with existing guidelines and the need to use support surfaces along with these recommended components.</td>
</tr>
<tr>
<td>3.2. Support surfaces do not eliminate the need for turning and repositioning.</td>
<td>Panel members noted that “turning” is often incorrectly used in place of the proper term “repositioning.”</td>
</tr>
<tr>
<td>3.3. Consider concurrent use of a pressure-redistribution seating surface or cushion of an appropriate type along with the use of any support surface.</td>
<td>Panel members noted that, if an individual requires use of a support surface, he or she should also be considered for use of an appropriate pressure redistribution seating surface or cushion.</td>
</tr>
<tr>
<td>3.4. Consider product lifespan when choosing a support surface.</td>
<td>Recommendations in this document are based on the assumption that a support surface has</td>
</tr>
</tbody>
</table>
been maintained according to manufacturer specifications. Staff who have ongoing exposure to support surfaces during bedding or room changes should practice a continual awareness and opportunity-based observation of support surface lifespan indicators, with the surface referred to engineering or maintenance for testing or evaluation for continued use if observed, irrespective of stated product lifespan. Specific guidance regarding support surface inspection can be found in Appendix 1.

<table>
<thead>
<tr>
<th>3.5.</th>
<th>When choosing a support surface, consider contraindications for use of specific support surfaces as specified by the manufacturer.</th>
<th>Refer to Figure 1, Table B for select considerations and contraindications for various types of support surfaces.</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.6.</td>
<td>To achieve the full benefits of a support surface, the support surface must be functioning properly and used correctly according to manufacturer’s instructions.</td>
<td>Although it may sound obvious to state that a support surface must be functioning properly, panel members noted cases in the field where active support surfaces with an AP feature were nonfunctional.</td>
</tr>
</tbody>
</table>

*Use of Support Surfaces to Prevent Pressure Ulcers*

| 4.1. | High-specification foam mattresses are more effective in reducing the incidence of |
pressure ulcers in persons at risk than standard hospital foam mattresses.\textsuperscript{6,20}

4.2. There is no evidence of the superiority of any one high-specification foam mattress over an alternative high-specification foam mattress.\textsuperscript{6}

4.3. Sheepskin overlays (Australian Medical-grade) are effective in reducing the incidence of pressure ulcers compared to standard care.\textsuperscript{6,7}

The panel considers Australian Medical-grade sheepskin to be an appropriate choice for pressure ulcer prevention in patients without significant mobility and moisture issues (Braden mobility and moisture subscale scores of 4 or 3). However, the panel noted that this product is not readily available in the United States other than through online suppliers and is not considered as a standard of care for that reason.

4.4. There is insufficient evidence to determine comparative effectiveness of various reactive/constant low pressure (CLP) support surfaces.\textsuperscript{6,7}

4.5. Active support surfaces with an alternating pressure (AP) feature are more effective than standard hospital mattresses
4.6. Overlays and mattresses with AP features demonstrate similar efficacy in reducing pressure ulcer incidence.\(^6,7\)

4.7. Mattresses with a multi-stage AP feature are more effective than overlays with an AP feature in preventing full thickness pressure ulcers.\(^{14,21,22}\)

4.8. Mattresses with a single-stage AP feature and overlays with an AP feature are equally effective for prevention of partial thickness pressure ulcers.\(^{14,21,22}\)

4.9. Postoperative use of a support surface reduces the incidence of surgery-related pressure ulcers.\(^{23}\)

Panel members noted that additional research is needed to determine the impact of postoperative support surface use on the evolution of suspected deep-tissue injury (sDTI).

**Use of Support Surfaces to Treat Pressure Ulcers**

5.1. There is insufficient evidence to suggest that there are differences among the efficacies of reactive/CLP devices, AP devices, low air loss (LAL) therapy, profiling beds, or Australian Medical-grade
sheepskin for the treatment of existing pressure ulcers.⁵,⁸
<table>
<thead>
<tr>
<th></th>
<th>Steps in Draft Algorithm</th>
<th>Steps in Revised Algorithm with Associated Mean and Content Validity Index (CVI) Results</th>
<th>Mean Score (SD) (Range, 2.95-4.00)</th>
<th>CVI (Range, 0.65-1.0)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Assess and document a complete skin assessment for intact/nonintact skin.</td>
<td>Assess and document a complete skin assessment for intact skin/within normal limits (WNL) and nonintact skin/not WNL. <strong>Nonintact skin/not WNL includes:</strong> inflammation; moisture-associated skin damage (MASD); discoloration; induration; bogginess; broken skin: partial thickness, full thickness; healed pressure ulcer &lt;12 months.</td>
<td>3.85 (0.37)</td>
<td>1.00</td>
</tr>
<tr>
<td>2.</td>
<td>Assess and document a pressure ulcer risk assessment using the Braden scale.</td>
<td>Assess and document a pressure ulcer risk assessment using Braden scale. Consider patient weight, weight distribution, and the following comorbidities/major risk factors: advanced age, fever, poor dietary intake of protein, diastolic pressure below 60 mmHg, hemodynamic instability, generalized edema, anemia.</td>
<td>3.80 (0.62)</td>
<td>1.00</td>
</tr>
<tr>
<td>3.</td>
<td>Following risk assessment, if patient not at risk for development of pressure ulcers (Braden &gt;18) and has intact skin, continue using current support surface, pending skin reassessment as per care setting.</td>
<td>Following risk assessment, if patient is not at risk for development of pressure ulcers (Braden &gt;18) and with intact skin: Continue using current support surface, pending skin reassessment as per care setting protocol.</td>
<td>3.70 (0.66)</td>
<td>0.90</td>
</tr>
<tr>
<td>4.</td>
<td>Following risk assessment, if patient at risk for development of pressure ulcers (Braden ≤18) and has intact skin, use support surface (preventative).</td>
<td>Following risk assessment, if patient is at risk for development of pressure ulcers (Braden ≤18) and with intact skin/WNL: Use support surface (preventative).</td>
<td>4.00 (0.00)</td>
<td>1.00</td>
</tr>
<tr>
<td>5.</td>
<td>Determine presence and location of pressure ulcers.</td>
<td>Determine presence and location of pressure ulcers.</td>
<td>3.95 (0.23)</td>
<td>1.00</td>
</tr>
<tr>
<td>6.</td>
<td>If no pressure ulcer(s) are present, and patient is not at risk for development of pressure ulcers (Braden &gt;18), treat per facility/department protocol.</td>
<td>If no pressure ulcer(s) present, and not at risk for development of pressure ulcers (Braden &gt;18), treat per facility/department protocol, continuing skin and pressure ulcer risk reassessment per care setting protocol.</td>
<td>3.90 (0.31)</td>
<td>1.00</td>
</tr>
<tr>
<td>7.</td>
<td>If no pressure ulcer(s) are present, but patient is at risk for development of pressure ulcers (Braden ≤18), treat per facility/department protocol and consider use of a support surface.</td>
<td>If no pressure ulcer(s) present, but at risk for development of pressure ulcers (Braden ≤18), treat per facility/department protocol, continuing skin and pressure ulcer risk reassessment per care setting protocol.</td>
<td>3.70 (0.57)</td>
<td>0.95</td>
</tr>
<tr>
<td>8.</td>
<td>If pressure ulcer(s) are present but not on the trunk, treat per facility/department protocol and consider use of a support surface (treatment).</td>
<td>If not at risk (Braden ≤18) or at risk for development of pressure ulcers (Braden &gt;18) and if pressure ulcer(s) are present but not on the trunk/pelvis, treat per facility/department protocol, continuing skin and pressure ulcer risk reassessment per care setting protocol.</td>
<td>3.55 (0.83)</td>
<td>0.90</td>
</tr>
<tr>
<td>9.</td>
<td>If pressure ulcer(s) are present and on the trunk, consider use of a support surface (treatment).</td>
<td>If not at risk (Braden ≤18) or at risk for development of pressure ulcers (Braden &gt;18) and if pressure ulcer(s) are present and on the trunk/pelvis, consider support surface (treatment).</td>
<td>3.90 (0.31)</td>
<td>1.00</td>
</tr>
</tbody>
</table>

**TABLE 3: Changes Incorporated into Final Algorithm and Quantitative Analysis**

**SKIN AND PRESSURE ULCER RISK ASSESSMENT**

**PREVENTION OF PRESSURE ULCERS**
1. Consider Braden subscale scores for moisture and mobility ($\geq 3$ or $\leq 2$).  

<table>
<thead>
<tr>
<th>Score</th>
<th>Support surface options: high-specification foam or Australian Medical-grade sheepskin, constant low pressure (CLP), alternating pressure (AP), or low air loss (LAL).</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.00 (0.00)</td>
<td>1.00</td>
</tr>
</tbody>
</table>

2. **Support surface options:** high-specification foam or Australian Medical-grade sheepskin, constant low pressure (CLP), alternating pressure (AP), or low air loss (LAL).  

<table>
<thead>
<tr>
<th>Score</th>
<th>Support surface options listed in Table A: Australian Medical-grade sheepskin, Reactive/CLP +/- LAL feature, Active with AP feature.</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.42 (0.90)</td>
<td>0.84</td>
</tr>
</tbody>
</table>

3. If Braden moisture or mobility subscale score is $\leq 2$, choose support surface based on: Current patient characteristics and risk factors: weight and weight distribution, fall/entrapment risk, risk for developing new pressure ulcers; previous support surface usage; contraindications.  

<table>
<thead>
<tr>
<th>Score</th>
<th>Suggested support surface options: CLP, AP, or LAL; choice dependent on specific score combination.</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.80 (0.41)</td>
<td>1.00</td>
</tr>
</tbody>
</table>

4. If Braden moisture and mobility subscale scores are both $\geq 3$, select high-specification foam or Australian Medical-grade sheepskin.  

<table>
<thead>
<tr>
<th>Score</th>
<th>If Braden moisture and mobility subscale scores are both $\geq 3$, choose support surface based on: Current patient characteristics and risk factors: weight and weight distribution, fall/entrapment risk, risk for developing new pressure ulcers; previous support surface usage; precautions/contraindications. <strong>Suggested options in Table A:</strong> Reactive/CLP or Australian Medical-grade sheepskin overlay.</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.47 (0.61)</td>
<td>0.94</td>
</tr>
</tbody>
</table>

5. Skin reassessment as per care setting.  

<table>
<thead>
<tr>
<th>Score</th>
<th>Skin reassessment as per care setting protocol.</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.95 (0.22)</td>
<td>1.00</td>
</tr>
</tbody>
</table>

6. Pressure ulcer risk assessment (consider patient weight and weight distribution as well as comorbidities and other contextual factors).  

<table>
<thead>
<tr>
<th>Score</th>
<th>Pressure ulcer risk assessment (consider patient weight, weight distribution, and the following comorbidities/major risk factors: advanced age, fever, poor dietary intake of protein, diastolic pressure below 60 mmHg, hemodynamic instability, generalized edema, anemia).</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.85 (0.37)</td>
<td>1.00</td>
</tr>
</tbody>
</table>

7. For intact skin not at risk for development of pressure ulcers (Braden $>18$), off support surface.  

<table>
<thead>
<tr>
<th>Score</th>
<th>For intact skin/WNL not at risk for development of pressure ulcers (Braden $&gt;18$), reassess need for support surface, continuing skin and pressure ulcer risk reassessment per care setting protocol.</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.20 (0.95)</td>
<td>0.85</td>
</tr>
</tbody>
</table>

8. For intact skin at risk for development of pressure ulcers (Braden $\leq 18$), continue using current support surface.  

<table>
<thead>
<tr>
<th>Score</th>
<th>For intact skin/WNL at risk for development of pressure ulcers (Braden $\leq 18$), continue current preventive support surface or consider changing to a different support surface, continuing skin and pressure ulcer risk reassessment per care setting protocol.</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.60 (0.68)</td>
<td>0.90</td>
</tr>
</tbody>
</table>

9. For nonintact skin/not WNL, determine if pressure ulcer(s) are present.  

<table>
<thead>
<tr>
<th>Score</th>
<th>For nonintact skin/not WNL not at risk for development of pressure ulcers (Braden $&gt;18$), continue using current support surface. For nonintact skin/not WNL not at risk for development of pressure ulcers (Braden $&gt;18$) and no pressure ulcer(s) present, treat per facility/department policy, continue current preventive support surface or consider changing to a different support surface, and continue skin and pressure ulcer risk reassessment per care setting protocol. For nonintact skin/not WNL not at risk for development of pressure ulcers (Braden $&gt;18$) and pressure ulcer(s) present outside of the trunk/pelvis, treat per facility department policy, continue current preventive support surface or consider changing to a different support surface, and continue skin and pressure ulcer risk reassessment per care setting protocol.</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.35 (0.81)</td>
<td>0.80</td>
</tr>
</tbody>
</table>
For nonintact skin/not WNL not at risk for development of pressure ulcers (Braden >18) and pressure ulcer(s) present on the trunk/pelvis, progress to Treatment Support Surface.

<table>
<thead>
<tr>
<th>TREATMENT OF PRESSURE ULCERS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1.</strong> Consider Braden moisture and mobility subscores (≥3 or ≤2).</td>
</tr>
<tr>
<td><strong>Treatment support surface options:</strong> high-specification foam, CLP, AP, LAL, or air-fluidized (AF).</td>
</tr>
<tr>
<td><strong>2.</strong> If Braden moisture or mobility subscale score is ≤2, choose support surface based on: current patient characteristics and risk factors: weight and weight distribution, fall/entrapment risk, risk for developing new pressure ulcers; previous support surface usage; contraindications. <strong>Suggested support surface options:</strong> CLP, AP, LAL, or AF; choice dependent on specific score combination.</td>
</tr>
<tr>
<td><strong>3.</strong> If Braden moisture and mobility subscale scores are both ≥3, select high-specification foam.</td>
</tr>
<tr>
<td><strong>4.</strong> Skin reassessment as per care setting.</td>
</tr>
<tr>
<td><strong>5.</strong> Pressure ulcer risk assessment (consider patient weight and weight distribution as well as comorbidities and other contextual factors).</td>
</tr>
<tr>
<td><strong>6.</strong> For intact skin not at risk for development of pressure ulcers (Braden &gt;18), use preventive support surface.</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>---</td>
</tr>
<tr>
<td>8.</td>
</tr>
<tr>
<td>9.</td>
</tr>
<tr>
<td>10.</td>
</tr>
</tbody>
</table>

For nonintact skin/pressure ulcer(s) present, not at risk for development of pressure ulcers (Braden >18), continue current treatment support surface or consider changing to a different support surface.

For nonintact skin/pressure ulcer(s) present, at risk for development of pressure ulcers (Braden ≤18), continue current treatment support surface or consider changing to a different support surface.

a Braden moisture subscale scores are as follows: 1 = constantly moist; 2 = very moist; 3 = occasionally moist; 4 = rarely moist.
Braden mobility subscale scores are as follows: 1 = completely immobile; 2 = very limited; 3 = slightly limited; 4 = no limitation.43
Refer to Appendix 3 for complete Braden scale descriptors.
BOX 1

Support Surface Consensus Panel Members:

Linda Alexander, MSN, RN, CWOCN, WOC Nurse, Boston Medical Center, Boston, Massachusetts

David M. Brienza, PhD, Professor, Department of Rehabilitation Science and Technology, Associate Dean for Strategic Initiative and Planning, School of Health and Rehabilitation Sciences, University of Pittsburgh, Pittsburgh, Pennsylvania

Evan Call, MS, CSM (NRM), Adjunct Faculty, Department of Microbiology, Weber State University, Ogden, Utah

Teresa Conner-Kerr, PhD, PT, CWS, CLT, Dean and Professor, College of Heath Sciences and Professions, University of North Georgia, Dahlonega, Georgia

Renee Cordrey, PT, PhD(c), MSPT, MPH, CWS, Physical Therapist, Wound Care Specialist, MedStar Georgetown University Hospital, Washington, DC, Genesis Rehab Services, Arlington, Virginia

Dorothy Doughty, MN, RN, CWOCN, CFCN, FAAN, WOC Nurse Clinician, Emory University Hospital, Atlanta, Georgia

Colleen Drolshagen, RN, CNS, CWOCN, Clinical Nurse Specialist and WOC Nurse, Cadence Health: Central DuPage Hospital, Winfield, Illinois

Joy L. Edvalson, MSN, FNP, CWOCN, Associate Chief Nurse, Non-Institutional Care, GLA Wound Care Program, Los Angeles, California

Margaret Goldberg, MSN, RN, CWOCN, Wound Care Consultant, Delray Wound Treatment Center, Delray Beach, Florida
Connie L. Harris, RN, ET, IIWCC, MSc, Clinical Nurse Specialist Wound & Ostomy / Clinical Lead Wound OBP, Red Cross Care Partners, Kitchener, Ontario, Canada

Susan Logan, RN, BSN, CWS, FACCWS, Wound Care Clinical Consultant, Kindred Healthcare, Inc., Louisville, Kentucky

Dianne Mackey, MSN, RN, CWOCN,* Staff Educator, Chair, National Wound Management Sourcing and Standards Team, Home Health/Hospice/Palliative Care, Kaiser Permanente, San Diego, California

Laurie (Lovejoy) McNichol, MSN, RN, GNP, CWOCN, CWON-AP,* Clinical Nurse Specialist and WOC Nurse, Cone Health, Wesley Long Hospital, Greensboro, North Carolina

David M. Mercer, RN, MSN, ACNP-BC, CWOCN, CFCN, Advanced Practice Nurse 2, Department of Wound, Ostomy, and Continence, University of Virginia Health System, Charlottesville, Virginia

Gail Parry, MSN, APRN-CNS, CWON, Clinical Nurse Specialist and WOC Nurse, Ochsner Medical Center Westbank, Gretna, Louisiana

Steven I. Reger, PhD, CP, Director Emeritus, Rehabilitation Technology, Department of Physical Medicine and Rehabilitation, Cleveland Clinic, Cleveland, Ohio

Brenda S. Rutland, RN, BSN, CWON, CWOC Nurse, Nursing Education, Carolinas Healthcare System, Charlotte, North Carolina

Nancy Tomaselli, MSN, RN, CS, CRNP, CWOCN, LNC, President & CEO, Premier Health Solutions, LLC, Cherry Hill, New Jersey

Carolyn Watts, MSN, RN, CWON, CBPN-IC,* Senior Associate in Surgery, Clinical Nurse Specialist, WOC Nurse, Vanderbilt University Medical Center, Nashville, Tennessee
Sunniva Zaratkiewicz, PhD(c), BSN, RN, CWCN, Program Manager, Wound, Ostomy, & Limb Preservation Services, Harborview Medical Center, Seattle, Washington

*Members of the Support Surface Consensus Task Force.
BOX 2
GLOSSARY TERMS

**Australian Medical-grade sheepskin:** Sheepskin that conforms to Australian Standard AS 4480.1-1997 for size; performance criteria (ie, laundering temperature range up to 60° or 80°C); urine resistance; wool type, wool length [30mm], and final finish; and labeling.¹²

**Bottoming out:** The state of support surface deformation at which no increase in mattress/overlay deformation occurs when further loading is applied.¹³

**Envelopment:** The ability of a support surface to conform to irregularities in the body.²

**Friction:** The resistance to motion in a parallel direction relative to the common boundary of 2 surfaces.⁹

**Immersion:** Depth of penetration (sinking) into a support surface.⁹

**Offload:** To remove pressure from any area.²

**Pressure redistribution:** The ability of a support surface on which an individual is placed to distribute the load over the contact areas of the human body, thereby reducing the load on areas in contact with the support surface.²

**Profiling bed:** Motor-driven turning and tilting bed that either aids manual repositioning of the patient or repositions the patient; also known as a kinetic or turning bed.⁴

**Repositioning:** Involving a change in position in the lying or seated individual, with the purpose of relieving or redistributing pressure and enhancing comfort, undertaken at regular intervals.²

**Shear:** The force per unit area exerted parallel to the plane of interest.⁹

**Stage (of AP devices):** Referring to the inflation and deflation cycle of the air cells in a support surface with an alternating pressure feature. Single-stage inflation cycles have a relatively steep
transition during inflation and deflation of air cells, whereas the transition is more gradual with multi-stage inflation cycles.$^{14}$

**Standard mattress:** A mattress not intended to prevent or treat pressure ulcers (Task Force definition).

**Suspected deep-tissue injury (sDTI):** 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, or warmer or cooler than adjacent tissue. DTI may be difficult to detect in individuals with dark skin tones. Evolution may include a thin blister over a dark ulcer bed. The wound may further evolve and become covered by thin eschar. Evolution may be rapid, exposing additional layers of tissue even with treatment.$^{2}$

**Tissue ischemia:** The reduction of oxygen levels below normal.$^{2}$

**Turning:** The act of changing position; a component of “turning and repositioning.”$^{2}$

**Turning surface:** Surface of the body onto which an individual may be turned. Individuals are presumed to have 4 turning surfaces on which to lie (ie, prone, supine, right side, and left side), unless documented otherwise.
BOX 3

Consensus Statements

General Recommendations for Support Surfaces

1.1 When choosing a support surface, consider current patient characteristics and risk factors, including weight and weight distribution; fall and entrapment risk; risk for developing new pressure ulcers; number, severity, and location of existing pressure ulcers; as well as previous support surface usage and patient preference.

Panel members identified these individual patient characteristics, needs, and risk factors as being particularly important when selecting a support surface.

1.2 A person who exceeds the weight limit or whose body dimensions exceed his or her current support surface should be moved to an appropriate bariatric support surface.

If the weight capacity of a support surface is exceeded, the surface may lose its ability to provide pressure redistribution and the individual may “bottom out.” There should be adequate room to turn the individual side-to-side and to allow for offloading the sacral area. A bariatric support surface of an appropriate type should be used if a person exceeds the weight limit or dimensions of his or her current support surface.

1.3 For persons who are candidates for progressive mobility, consider a support surface that facilitates getting out of bed.
Progressive mobility is a series of planned movements undertaken in a sequential manner, designed with the goal of returning an individual to his or her baseline mobility status. For bedridden individuals, progressive mobility begins with various positioning and mobility techniques, progressing from the bed to sitting in a chair to ambulation. Use of a support surface that provides a stable surface that eases an individual’s ability to get out of bed can facilitate progressive mobility.

1.4 **Persons who meet facility protocol for a low bed frame and who have a pressure ulcer, or are at risk for developing a pressure ulcer, should also receive an appropriate support surface.**

Persons who meet facility protocol for a low bed frame due to stature, altered mental status, risk of falling out of bed, etc., should also receive an appropriate support surface if they have, or are at risk of developing, a pressure ulcer.

1.5 **Persons who have medical contraindications for turning should be considered for an appropriate support surface and repositioning with frequent small shifts.**

Repositioning to reduce the duration and intensity of pressure exerted over bony prominences, is an integral component of pressure ulcer prevention and treatment, and must regularly occur regardless of support surface usage. In cases where turning might not be practical or appropriate (eg, in the critically ill patient with hemodynamic instability, or in patients with unstable cervical, thoracic, or lumbar spinal fractures), use of an appropriate
support surface for pressure redistribution should be considered. In addition, repositioning with frequent small weight shifts (also referred to as mini turns, micro turns, or micropositioning) should be performed, as these movements are also considered to be of value. Minor shifts of the shoulders or hips are usually sufficient to allow some tissue reperfusion. Techniques for small weight shifts include slow movements to 10 degrees with recovery, use and removal of pillow props, using a turn/lift sheet to tilt the individual off the sacrum, and lifting the head or an extremity off the bed surface for 1 to 2 minutes at a time.\textsuperscript{26}

1.6 For persons experiencing intractable pain, consider providing an appropriate alternative to the current support surface.

Persons experiencing intractable pain may require a change in the current support surface for comfort. Because pain is subjective and each individual is different, one type of support surface may be more comfortable than another.

1.7 Persons with a new myocutaneous flap on the posterior or lateral trunk or pelvis should be provided with an appropriate support surface per facility protocol.

A variety of support surface types may be used to facilitate pressure redistribution away from the surgical site in patients receiving myocutaneous flaps and skin grafts and use of support surfaces are an integral component of postsurgical care.\textsuperscript{27} However, data regarding the relative effectiveness of various support surfaces in improving healing rates in postflap patients are lacking. As surgical outcomes are highly individualized and dependent on
surgical techniques, efficacy comparisons may be difficult. Results of a small trial involving 12 patients who received myocutaneous flap surgery for repair of pressure ulcers showed equivalent rates of postoperative tissue breakdown with a support surface with an AF feature and a nonpowered air-filled support surface.\textsuperscript{28} It is recommended that persons with a new myocutaneous flap on the posterior or lateral trunk or pelvis should be provided with an appropriate support surface, the choice of which may be dictated by facility protocol or surgeon preference.

1.8 Minimize the number and type of layers between the patient and the support surface.

Laboratory studies demonstrate that additional layers can adversely affect the pressure-redistribution, heat dissipation, and moisture management capabilities of support surfaces, all of which may contribute to skin breakdown.\textsuperscript{29,30} For example, statistically significant increases in peak sacral interface pressure as compared to a single fitted sheet were noted in one study when additional bed linens and/or incontinence pads were placed alone or in combination over a multi-zone foam support surface or a support surface with an LAL feature, and added layers increased pressure proportionately.\textsuperscript{29} A separate study showed significant reductions in heat dissipation and evaporative moisture transmission of a support surface with an LAL feature with the majority of combinations of added layers tested, particularly those that included underpads with plastic-backing.\textsuperscript{30} Users should refer to manufacturer instructions for use of linens and pads for moisture management or positioning for a specific support surface and minimize the number and types of layers used.
2.1. **There is no difference between reactive/CLP support surfaces and active support surfaces with an AP feature with regard to efficacy in pressure ulcer prevention.**

Systematic reviews show inconsistent evidence suggesting the relative equivalence of reactive/CLP support surfaces and active support surfaces with an AP feature with regard to pressure ulcer prevention (Strength of Evidence = B), with most comparative trials showing no significant difference between treatment groups. Panel members felt the lack of difference in efficacy between these two categories of support surfaces to be definitive rather than suggestive.

2.2. **Persons with Braden mobility subscale scores of 2 or 1 and Braden moisture subscale scores of 4 or 3 should be placed on a reactive/CLP support surface or an active support surface with an AP feature.**

Persons with Braden mobility subscale scores of 2 or 1 have very limited mobility or are completely immobile, respectively and are at increased risk of developing a pressure ulcer. Panel members reached consensus that these individuals should be placed on a reactive/CLP support surface or an active support surface with an AP feature due to their limitation in ability to change body position. As moisture is not an issue with these patients (Braden moisture subscale scores of 4 or 3), use of a support surface with additional features (ie, LAL, AF) may not be necessary.
Use of Support Surfaces in the Treatment of Pressure Ulcers

3.1. Current evidence suggests there is no difference between reactive/CLP support surfaces and active support surfaces with an AP feature for pressure ulcer treatment.

Systematic review\(^8\) identified 3 studies of poor- to fair-quality that compared use of active support surfaces with an AP feature and reactive/CLP devices, including static air-\(^{31}\), fluid-\(^{32}\), and gel-filled\(^{33}\) support surfaces in individuals with existing pressure ulcers. No significant difference between treatment groups in at least one measure of healing was seen, but study designs varied and results were conflicting, so the consensus panel felt the lack of difference in efficacy between these two categories of support surfaces to be suggestive rather than definitive.

3.2. Persons with Braden mobility subscale scores of 4 or 3, existing pressure ulcers on the trunk or pelvis, and 2 available turning surfaces should be placed on a reactive/CLP (air, foam, gel, or viscous fluid) support surface.

Persons with Braden mobility subscale scores of 4 or 3 have slight or no limitations in mobility, respectively. Panel members concurred that the use of a reactive/CLP support surface is appropriate based on the patient's ability to move and the availability of 2 available turning surfaces, which together allows effective positioning off the existing pressure ulcer(s).
3.3. Persons with Braden mobility subscale scores of 2 or 1 and Braden moisture subscale scores of 4 or 3 should be placed on a reactive/CLP support surface or an active support surface with an AP feature.

As in the preventive setting, panel members reached consensus that individuals with Braden mobility subscale scores of 2 or 1 should be placed on a reactive/CLP support surface or an active support surface with an AP feature due to their limitation in ability to change body position. As moisture is not an issue with these patients, use of a support surface with additional features (ie, LAL, AF) may not be necessary.

3.4. Persons with Braden mobility subscale scores of 2 or 1, existing pressure ulcers on the trunk or pelvis, and 2 available turning surfaces should be placed on a reactive/CLP support surface or an active support surface with an AP feature.

Panel members concurred that a reactive/CLP support surface or an active support surface with an AP feature is recommended in patients with existing pressure ulcers on the trunk or pelvis, despite the availability of 2 available turning surfaces, due to the person’s lack of or limited mobility (Braden mobility subscale scores of 2 or 1), which may not allow effective positioning off the existing pressure ulcer(s).

3.5. Persons with Braden mobility subscale scores of 2 or 1, a Braden moisture subscale score of 1 with moisture that cannot be managed by other means, along with existing pressure ulcers on the trunk or pelvis, should be placed on a reactive/CLP support
Support surfaces with LAL or AF features are often used for moisture control. The flow of air in support surfaces with an LAL feature assists in managing the heat and humidity of the skin, and the high degree of moisture vapor permeability through the sheet and cover of support surfaces with an AF feature assists in managing body fluids. Panel members felt that persons with existing pressure ulcers on the trunk or pelvis who lack or have limited mobility should be placed on a reactive/CLP support surface with an LAL or AF feature when their skin is constantly moist and the moisture cannot be managed by other means.

3.6. Persons with multiple Stage II, or large (of sufficient size to compromise a turning surface) or multiple Stage III or Stage IV pressure ulcers on the trunk or pelvis involving more than 1 available turning surface, should be placed on a reactive support surface with an LAL or AF feature.

Support surfaces with LAL or AF features are often used in the treatment of pressure ulcers, particularly full-thickness ulcers. Systematic review of 5 comparative studies of varying quality conducted in the late 1980s and 1990s noted greater wound improvement on surfaces with AF features in terms of reduced ulcer size, providing limited evidence that these support surfaces are more effective than alternative surfaces. Results were consistent across studies, leading to a moderate strength of evidence rating overall. In contrast, systematic review of 4 studies of varying quality comparing support surfaces with an LAL feature and foam overlays found no statistically significant difference between the treatment groups in healing.
of pressure ulcers. Panel members felt strongly that reactive/CLP support surfaces with either an LAL or AF feature can provide additional benefit (eg, increased immersion and pressure redistribution, reduction in shear or friction, or management of heat and humidity) and should be used when multiple turning surfaces are affected, as the patient cannot always be positioned off the ulcer and will spend relatively more time on unaffected areas. Although management of heat and humidity is the benefit most often associated with support surfaces with an LAL feature, these devices provide a therapeutic option in the homecare setting, where support surfaces with an AF feature are not practical.

3.7. Persons who have ulcers (Stages II-IV) on 2 or more turning surfaces, or have 1 or no available turning surfaces, should be placed on an active support surface with an AP feature or a reactive support surface with an LAL or AF feature.

As in the previous statement, panel members felt that reactive support surfaces with LAL or AF features can provide additional benefit when multiple turning surfaces are affected. Due to the severity and number of areas of breakdown, active support surfaces with an AP feature were also considered to add additional benefit due to the limitation in patients’ ability to change body position.

3.8. In cases of suspected deep-tissue injury (sDTI) located on the trunk or pelvis, intervention should include strategies that facilitate tissue temperature reduction between the patient and the support surface (eg, implementation of a turning regimen and use of a support surface that facilitates temperature reduction, eg, one with a gel
As the degree of tissue damage in sDTI cannot be determined until the injury evolves, intervention is often identical to that for full-thickness pressure ulcers. Panel members agreed that temperature reduction is an important intervention in cases of sDTI located on the trunk or pelvis.

Increased temperature is a well-known risk factor for pressure ulcer development, and studies have demonstrated that increase in local skin temperature can occur as a result of both pressure application and the insulating effect of mattresses and cushions. Animal studies have documented increased severity, depth, and speed of pressure-associated tissue damage with increased skin temperature, and reduction in damage with local cooling to 25°C (77°F). Subsequent human studies have shown that local cooling reduces the severity of ischemia and enhances tissue ischemia tolerance. It has been estimated that lowering skin temperature from 36°C to 28°C (97°F to 82°F) is equivalent to reducing the interface pressure by 29%. Conversely, a pilot study in humans showed that a one-degree increase in skin temperature was equivalent to 12 mm Hg to 15 mm Hg of interface pressure with respect to indicators of tissue ischemia. Thus, managing both interface pressure and skin temperature may reduce the risk of pressure ulcer development caused by tissue ischemia.

Strategies recommended by the panel to facilitate tissue temperature reduction between the patient and the support surface include turning and repositioning and use of support surfaces with a gel surface or AP, LAL, or AF features. The panel stressed that the turning regimen must be individualized to the person. In addition, it must be kept in mind that support surfaces within the same category may have different performance
characteristics with regard to temperature reduction.

3.9. **Persons with pressure ulcers on the head or upper or lower extremities should be offloaded and may not require a change in the current support surface.**

There was consensus among panel members that the existence or development of pressure ulcers in areas outside of the trunk and pelvis do not necessarily require a change in the support surface currently in use. However, the affected area(s) should be offloaded per facility protocol.

3.10. **If, while on a reactive/CLP support surface with an LAL or AF feature, a person’s condition improves such that the person no longer has a pressure ulcer or no longer is at high risk for the development of a pressure ulcer, the person should be placed on a reactive/CLP support surface or an active support surface with an AP feature.**

If a person is currently on a support surface, panel members agreed that it is important to reassess the appropriateness of and need for that support surface, particularly when the support surface is one with additional features that provide increased immersion and pressure redistribution, reduction in shear or friction, or management of heat and humidity. Just as one may move to a support surface with additional features in cases where conditions change and the current support surface does not adequately address these issues, one should consider moving to a support surface without these features if conditions improve such that these features are no longer required.
APPENDIX 1

Hospital Staff Inspection of Support Surfaces

Hospital staff who have ongoing exposure to support surfaces during bedding changes and room changeover should practice a continual awareness and opportunity-based observation of support surface life indicators. This can include nursing staff, certified nurse assistants, and housekeeping, engineering, and maintenance personnel.

Inspect for:

1. Mattress height or thickness
   a. Compression set results in areas where a body shape begins to be evident on the surface.
      When this occurs, the cushioning effect (immersion and envelopment) of the mattress has been compromised.

2. Mattress discoloration
   a. Areas that become discolored on a support surface are associated with areas of high use impact. This can result in increased moisture and temperature exposure to the support Surface. This shortens the surface life.
   b. These areas appear as a visual yellowing, a visible darkening, or a fading of the original color.
   c. Areas of discoloration also correspond to areas of reduced immersion and envelopment.

3. Seam separations
a. Sewn seams are punctures in the barrier fabric of the support surface. These areas should be inspected carefully for broken thread, torn stitches, and unstitched areas. These become areas of microbial ingress and accelerated damage to the surface internals.

4. Zipper and zipper cover flap
   a. It is highly recommended that only surfaces that can be opened and inspected be used in support surface environments.
   b. The zipper should be inspected for zipper attachment, welding, or sewing so that there are no openings or separations in the attachment to the cover.
   c. The cover flap should completely shield the zipper from ingress and contamination run off. If the flap is stretched, unsewn, torn, or open, or no longer covering the zipper, it becomes an area of contamination ingress.
   d. Zipper, zipper tongue and teeth. Inspect for zipper mismatch or teeth offset, broken tongue, or missing teeth, all of which results in potential ingress openings.

5. Cover integrity
   a. Pin holes. Unzip the cover and look through the cover toward a light source and observe for pinholes. These correspond with points of stain, changes in cushioning properties, foam degradation, and contamination risk.
   b. Tears tend to be visibly obvious; inspect for frayed fabric and tears that represent potential penetrations and sites of ingress.
   c. Backing separations are where the moisture barrier separates, bubbles, or granulates away from the fabric. These represent areas of high shear and loss of protection for internals from incontinence sweat, disinfectants, etc. These are all associated with reductions in
support surface internals life and performance and reduce immersion, envelopment, and infectious barrier properties.

6. Internals

a. Foam should not be discolored, compressed, sagging, torn, or abraded. One test for foam effective life is to rub the gloved hand over the surface and observe if the foam surface is graining away under the brushing or scrubbing action. Failing foam breaks into small grains or dust, while good foam may “dust” slightly, but not break down under this action.

b. Fire barriers are knit fabrics sometimes found under the cover. These tend to fray, stretch, separate, and tear. Loss of complete coverage changes the compressive and fire barrier properties of the surface.

c. Knit or fabrics used in internal construction can yield, sag, stretch, and fray. These impact the surface’s ability to perform according to the original specifications.

d. Bladders containing air, viscous fluid, fluid, or gel can stiffen, rupture, leak, harden, or become displaced. All of these compromise the surface's ability to protect tissue.

7. Odor

a. Surfaces that are stained or contaminated tend to emit an odor that can resemble incontinence or microbial growth. Both of these indicate organic materials in the surface’s internals and compromise infection control, immersion, and envelopment and predispose to compression set. Odor can be severe enough to be considered a failure when it is unpleasant enough to generate patient complaints.

b. Disinfectants may penetrate the cover and create a specific odor as well. This indicates that the cover is compromised.
8. Backing

a. Mattress backing functions to hold the surface in place, protect the internals from contamination, and provide structural integrity. Tears, rips, loss of grip, abrasions, or color fading all reduce the barrier properties and are indicative of accelerating wear.

If any of these are observed, it is recommended that the surface be referred to engineering/maintenance for testing or evaluation for continued use.

Courtesy of Evan Call, MS, CSM (NRM). © 2014.
APPENDIX 2
Panel Member Demographics

Professional Credentials and Wound Certification of Support Surface Panel Members

<table>
<thead>
<tr>
<th>Professional Degree</th>
<th>Wound Certification</th>
<th>Professional Certification</th>
<th>Frequency (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engineer</td>
<td></td>
<td></td>
<td>1 (5%)</td>
</tr>
<tr>
<td>MS, CSM</td>
<td>CSM</td>
<td></td>
<td>1 (5%)</td>
</tr>
<tr>
<td>NP/CNS</td>
<td>CWOCN</td>
<td>CFCN</td>
<td>2 (10%)</td>
</tr>
<tr>
<td>NP/CNS</td>
<td>CWOCN</td>
<td>CRNP</td>
<td>1 (5%)</td>
</tr>
<tr>
<td>NP/CNS</td>
<td>CWOCN</td>
<td></td>
<td>3 (15%)</td>
</tr>
<tr>
<td>NP/CNS</td>
<td>CWOCN, CWON-AP</td>
<td></td>
<td>1 (5%)</td>
</tr>
<tr>
<td>NP/CNS</td>
<td>CWON</td>
<td></td>
<td>1 (5%)</td>
</tr>
<tr>
<td>NP/CNS</td>
<td>CWON</td>
<td>CBPN-IC</td>
<td>1 (5%)</td>
</tr>
<tr>
<td>PhD/CP</td>
<td></td>
<td>CP</td>
<td>1 (5%)</td>
</tr>
<tr>
<td>PT</td>
<td>CWS</td>
<td></td>
<td>1 (5%)</td>
</tr>
<tr>
<td>PT</td>
<td>CWS, CLT</td>
<td></td>
<td>1 (5%)</td>
</tr>
<tr>
<td>RN</td>
<td>CWCN</td>
<td></td>
<td>1 (5%)</td>
</tr>
<tr>
<td>RN</td>
<td>CWOCN</td>
<td></td>
<td>2 (10%)</td>
</tr>
<tr>
<td>RN</td>
<td>CWON</td>
<td></td>
<td>1 (5%)</td>
</tr>
<tr>
<td>RN</td>
<td>CWS</td>
<td></td>
<td>1 (5%)</td>
</tr>
</tbody>
</table>
The majority of panel members received their basic nursing or medical/health professional education in the United States (80%) and have a Master’s degree (n=13, 65%), followed by a Baccalaureate (n=4, 20%) or a doctoral degree (n=3, 15%). Most practice in the United States (n=19, 95%) and 1 member practices in Canada (5%). All use English as their primary language and 1 also uses Hungarian. Eighteen had 10 or more years of healthcare experience, including 12 (67%) with more than 30 years experience. The majority practice in a hospital, acute care setting (n=7, 41%); others practice in home care (n=2, 12%), outpatient clinics (n=2, 12%), universities (n=2, 12%), multiple practice settings (hospital, acute care, and outpatient clinic, n=2, 12%), education (n=1, 6%), or long-term acute care (n=1, 6%). Participants practice in urban (n=10, 59%), suburban (n=5, 29%), and multiple (urban, suburban, n=1, 6% and urban, suburban, rural, n=1, 6%) areas. Geographically, participants practice in the southeast (n=7, 41%), southwest (n=3, 18%), northeast (n=3, 18%), mid-Atlantic (n=1, 6%), northwest (n=1, 6%), Midwest (n=1, 6%), or nationally (n=1, 6%), with the most common states being North Carolina (n=3, 15%),
Pennsylvania (n=2, 10%), and California (n=2, 10%). Sizes of the practice facility/organization are varied: 500 or more beds (n=7, 44%), 300-499 beds (n=4, 25%), 200-299 beds (n=2, 13%), or 100-199 beds (n=1, 7%).
APPENDIX 3

Braden Scale for Predicting Pressure Sore Risk\textsuperscript{43}

Reprinted with permission.

\begin{table}[h]
\centering
\begin{tabular}{|l|c|c|}
\hline
\textbf{BRADEN SCALE FOR PREDICTING PRESSURE SORE RISK} & \multicolumn{2}{c|}{\textbf{Date of Assessment}} \\
\hline
\textbf{Patient's Name} & \textbf{Evaluator's Name} & \\
\hline
\textbf{Sensory Perception} & &  \\
ability is respond meaningfully to pressure-related discomfort &  \\
1. Completely Limited: Unresponsive (does not moan, \textit{e.g.} gripe, or grasp) to painful stimulus due to deep sedation or under anesthesia. Limited ability to feel pain over most of body. &  \\
2. Very Limited: Responds to painful stimulus. Cannot communicate discomfort except by moaning or restlessness. OR has a sensory impairment which limits the ability to feel pain or discomfort over 1/3 of body. &  \\
3. Slightly Limited: Responds to verbal commands, but cannot always communicate discomfort or the need to be turned. OR has some sensory impairment which limits ability to feel pain or discomfort over 1/3 of body. &  \\
4. No Impairment: Responds to verbal commands. Has no sensory deficit which would limit ability to feel or voice pain or discomfort. &  \\
\hline
\textbf{Moisture} & &  \\
Degree to which skin is exposed to moisture &  \\
1. Constantly Moist: Skin is kept moist almost constantly by perspiration, \textit{e.g.} \textit{e.g.}ownting. Every time patient is moved or turned. &  \\
2. Very Moist: Skin is always, but not always moist. Moisture is changed at least once a shift. &  \\
3. Occasionally Moist: Skin is occasionally moist, requiring an extra linen change approximately once a day. &  \\
4. Rarely Moist: Skin is usually, dry, skin only requires changing at routine intervals. &  \\
\hline
\textbf{Activity} & &  \\
degree of physical activity &  \\
1. Bedfast: Confined to bed. &  \\
2. Chairfast: Ability to walk severely limited or not possible. Cannot bear own weight and/or must be assisted into chair or wheelchair. &  \\
3. Walks Occasionally: Walks occasionally during day, but for very short distances, with or without assistance. Speaks majority of each shift in bed or chair &  \\
4. Walks Frequently: Walks outside room at least twice a day and inside room at least once every few hours during waking hours &  \\
\hline
\textbf{Mobility} & &  \\
ability to change and control body position &  \\
1. Completely immobile: Does not make even slight changes in body or extremity position without assistance. &  \\
2. Very Limited: Makes occasional slight changes in body or extremity position, but unable to make frequent or significant changes independently. &  \\
3. Slightly Limited: Makes frequent though slight changes in body or extremity position independently. &  \\
4. No Limitation: Makes major and frequent changes in position without assistance. &  \\
\hline
\textbf{Nutrition} & &  \\
usual food intake pattern &  \\
1. Very Poor: Never eats a complete meal. Rarely eats more than 1/2 of any food offered. Eats 2 services or less of protein (meat or dairy) products per day. Takes fluids poorly. Does not take a liquid dietary supplement. OR is NPO and/or maintained on clear liquids or TPN for more than 5 days. &  \\
2. Probably Inadequate: Rarely eats a complete meal and generally eats only about 1/2 of any food offered. Protein intake includes only 3 servings of meat or dairy products per day. Occasionally will take a dietary supplement. OR receives less than optimum amount of liquid diet or tube feeding. &  \\
3. Adequate: Eats over half of most meals. Eats a total of 4 servings of protein (meat, dairy) products per day. Occasionally will refuse a meal, but will usually take a supplement when offered. OR is on a tube feeding or TPN regimen which probably meets most nutritional needs. &  \\
4. Excellent: Eats most of every meal. Nearly refuses a meal. Usually eats a total of 4 or more servings of meat and dairy products per day. Occasionally eats a meal, but will usually take a supplement when offered. OR is on a tube feeding or TPN regimen which probably meets most nutritional needs. &  \\
\hline
\textbf{Friction & Shear} & &  \\
1. Problem: Requires moderate to maximum assistance in moving. Complete sliding without sliding against sheers is impossible. Frequently slides down in bed or chair, requiring frequent repositioning with minimum assistance. Speaks, contracts or agitates to almost constant friction. &  \\
2. Potential Problem: Moves freely or requires minimum assistance. Moving a more skin probably slides in bed or chair independently and has sufficient passive strength to shift up completely during moving. Maintains a relatively good position in bed or chair most of the time but occasionally slides down. &  \\
3. No Apparent Problem: Moves in bed and is chair independently; has sufficient passive strength to shift up completely during moving. Maintains a good position in bed or chair. &  \\
\hline
\end{tabular}
\caption{Braden Scale for Predicting Pressure Sore Risk}
\end{table}