

Prevention and Treatment of Pressure Ulcers: Quick Reference Guide



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Disclaimer:

This quick reference guide was developed by the National Pressure Ulcer Advisory Panel, the European Pressure Ulcer Advisory Panel and the Pan Pacific Pressure Injury Alliance. It presents a comprehensive review and appraisal of the best available evidence at the time of literature search related to the assessment, diagnosis, prevention and treatment of pressure ulcers. The recommendations in this quick reference guide are a general guide to appropriate clinical practice, to be implemented by qualified health professionals subject to their clinical judgment of each individual case and in consideration of the patient consumer's personal preferences and available resources. The guide should be implemented in a culturally aware and respectful manner in accordance with the principles of protection, participation and partnership.

Printed copies of the English version of this quick reference guide can be ordered, and PDFs downloaded, from the following websites:

NPUAP

npuap.org

EPUAP

epuap.org

Australian Wound Management Association (AWMA)

awma.com.au

Hong Kong Enterostomal Therapists Association Society

www.etnurse.com.hk

New Zealand Wound Care Society (NZWCS)

nzwcs.org.nz

Wound Healing Society Singapore

woundhealingsociety.org.sg

International Pressure Ulcer Guideline

internationalguideline.com

INTRODUCTION

Foreword

This *Quick Reference Guide* presents a summary of the recommendations and excerpts of the supporting evidence for pressure ulcer prevention and treatment. The more comprehensive *Clinical Practice Guideline* version of the guideline provides a detailed analysis and discussion of available research, critical evaluations of the assumptions and knowledge of the field, and description of the methodology used to develop guideline. This *Quick Reference Guide* is intended for busy health professionals who require a quick reference in caring for individuals in the clinical setting. **Users should not rely on excerpts from the *Quick Reference Guide* alone.**

The first edition of the guideline was developed as a four year collaboration between the National Pressure Ulcer Advisory Panel (NPUAP) and the European Pressure Ulcer Advisory Panel (EPUAP). In this second edition of the guideline, the Pan Pacific Pressure Injury Alliance (PPPIA) has joined the NPUAP and EPUAP. The goal of this international collaboration was to develop evidence-based recommendations for the prevention and treatment of pressure ulcers that could be used by health professionals throughout the world. An explicit scientific methodology was used to identify and critically appraise all available research. In the absence of definitive evidence, expert opinion (often supported by indirect evidence and other guidelines) was used to make recommendations. Drafts of the recommendations and supporting evidence were made available to 986 invited stakeholders (individuals and organizations) around the world. The final guideline is based on available research and the accumulated wisdom of the NPUAP, EPUAP, PPPIA and international stakeholders. In this edition of the guideline, a consensus voting process (GRADE) was used to assign a strength to each recommendation. The strength of recommendation identifies the importance of the recommendation statement based on potential to improve patient outcomes. It provides an indication to the health professional of the confidence one can have that the recommendation will do more good than harm, and can be used to assist in prioritizing pressure ulcer related interventions.

Printed copies of the English version of the *Clinical Practice Guideline* are available through links provided on the following websites:

NPUAP website:	www.npuap.org
EPUAP website:	www.epuap.org
Australian Wound Management Association (AWMA) website:	www.awma.com.au
Hong Kong Enterostomal Therapist Society website:	www.etnurse.com.hk
New Zealand Wound Care Society (NZWCS) website:	www.nzwcs.org.nz
Wound Healing Society Singapore website:	www.woundhealingsociety.org.sg
International Pressure Ulcer Guideline website:	www.internationalguideline.com

Suggested Citation

The NPUAP, EPUAP and PPPIA welcome the use and adaptation of this guideline at an international, national and local level. We request citation as the source, using the following format:

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: Osborne Park, Western Australia; 2014.

Limitations and Appropriate Use of This Guideline

- Guidelines are systematically developed statements to assist health professional and patient consumer decisions about appropriate health care for specific clinical conditions. The recommendations may not be appropriate for use in all circumstances.
- The decision to adopt any particular recommendation must be made by the health professional with consideration to available resources and circumstances of the individual patient. Nothing contained in this guideline is to be considered medical advice for specific cases.
- Because of the rigorous methodology used to develop this guideline, the Guideline Development Group members believe that the research supporting these recommendations is reliable and accurate. Every effort has been made to critically appraise the research contained within this document. However, we do not guarantee the reliability and accuracy of individual studies referenced in this document.
- This guideline is intended for education and information purposes only.
- This guideline contains information that was accurate at the time of publication. Research and technology change rapidly and the recommendations contained in this guideline may be inconsistent with future advances. The health professional is responsible for maintaining a working knowledge of research and technology advances that may affect his or her clinical decision making.
- Generic names of products have been used. Nothing in this guideline is intended as endorsement of a specific product.
- Nothing in this guideline is intended as advice regarding coding standards or reimbursement regulations.
- The guideline does not seek to provide full safety and usage information for products and devices; however commonly available safety and usage tips have been included. Adverse events reported in the included research have been reported in the evidence summaries and caution statements. All products should be used according to manufacturer's directions.

Purpose and Scope

The goal of this guideline is to provide evidence based recommendations for the prevention and treatment of pressure ulcers that can be used by health professionals throughout the world. The purpose of the prevention recommendations is to guide evidence based care to prevent the development of pressure ulcers and the purpose of the treatment focused recommendations is to provide evidence-based guidance on the most effective strategies to promote pressure ulcer healing.

The guideline is intended for the use of all health professionals, regardless of clinical discipline, who are involved in the care of individuals who are at risk of developing pressure ulcers, or those with an existing pressure ulcer. The guideline is intended to apply to all clinical settings, including hospitals, rehabilitation care, long term care, assisted living at home, and unless specifically stated, can be considered appropriate for all individuals, regardless of their diagnosis or other health care needs. The sections of the guideline for *Special Populations* add further guidance for population groups with additional needs, including those in palliative care, critical care, paediatric and operating room settings; bariatric individuals; individuals with spinal cord injury; and older adults. Additionally, the guideline may be used as a resource for individuals who are at risk of, or have an existing pressure ulcer, to guide awareness of the range of preventive and treatment strategies that are available. Prevention and treatment of mucosal membrane pressure ulcers are beyond the scope of this guideline.

Guideline Development

The full methodological process is outlined in the full *Clinical Practice Guideline*. The US National Pressure Ulcer Advisory Panel (NPUAP), European Pressure Ulcer Advisory Panel (EPUAP) and Pan Pacific Pressure Injury Alliance (PPPIA) collaborated to update the guidelines on the prevention and treatment of pressure ulcers and amalgamate the previous edition of two guidelines (prevention and treatment) into one comprehensive clinical practice guideline.

The guideline was produced by an interprofessional guideline development group (GDG) and numerous small working groups (SWGs), each consisting of representatives of the three development organizations.

The first step in the guideline development process was identifying the new evidence. The GDG commissioned a comprehensive review of the literature on pressure ulcer prevention and treatment in several electronic databases using a sensitive search strategy. All retrieved references were screened by the GDG and methodologist on pre-determined inclusion criteria and preliminary data extraction tables were completed. In a second step, the retrieved evidence was evaluated, and thereafter the full texts were divided according to topic and provided to the relevant SWGs. With the assistance of the methodologist, the SWG members conducted critical appraisals of the evidence, assigned a level of evidence to each study using a classification system adapted from Sackett (1997)¹, and refined the evidence tables.

The next stage was drafting the recommendations. Each SWG formulated conclusions about the body of available evidence and developed recommendations that emerged from the evidence. Recommendations from the 2009 guideline were reviewed and revised based on insights from new evidence and an analysis of the current cumulative body of evidence. The strength of the body of evidence was determined. This rating identifies the strength of cumulative evidence supporting a recommendation. The SWGs summarized the evidence supporting each recommendation. Recommendations and evidence summaries were reviewed by the GDG and international stakeholders with final drafts approved by the GDG.

The final stage involved determining the strength of each recommendation statement. Each individual who was involved in the guideline development process was invited to review every recommendation and participate in a web-based consensus voting process in which strength of recommendations were assigned. The recommendation strength represents the confidence a health professional can place in each recommendation, with consideration to the strength of supporting evidence; clinical risks versus benefits; cost effectiveness; and systems implications.

Guideline Recommendations

Recommendations are systematically developed statements to assist health professional and patient consumer decisions about appropriate health care for specific clinical conditions. The recommendations may not be appropriate for the use in all circumstances.

The recommendations in this guideline are a general guide to appropriate clinical practice, to be implemented by qualified health professionals subject to their clinical judgment of each individual case and in consideration of the patient consumer's personal preferences and available resources. The guideline should be implemented in a culturally aware and respectful manner in accordance with the principles of protection, participation and partnership.

The guidance provided in the guideline should not be considered medical advice for specific cases. This book and any recommendations within are intended for educational and informational purposes only. Generic names of products are provided. Nothing in this guideline is intended as an endorsement of a specific product.

Levels of Evidence, Strengths of Evidence and Strengths of Recommendations

Full explanation of the methodology is available in the full *Clinical Practice Guideline*. Individual studies were assigned a '**level of evidence**' based on study design and quality, using a classification system adapted from Sackett (1989)².

Levels of Evidence			
	<i>Intervention Studies</i>	<i>Diagnostic studies</i>	<i>Prognostic studies</i>
Level 1	Randomized trial(s) with clear-cut results and low risk of error OR systematic literature review or meta-analysis according to the Cochrane methodology or meeting at least 9 out of 11 quality criteria according to AMSTAR appraisal tool.	Systematic review of high quality (cross sectional) studies according to the quality assessment tools with consistently applied reference standard and blinding.	Systematic review of high quality (longitudinal) prospective cohort studies according to the quality assessment tools.
Level 2	Randomized trial(s) with uncertain results and moderate to high risk of error.	Individual high quality (cross sectional) studies according to the quality assessment tools with consistently applied reference standard and blinding among consecutive persons.	A prospective cohort study.
Level 3	Non randomized trial(s) with concurrent or contemporaneous controls.	Non-consecutive studies, or studies without consistently applied reference standards.	Analysis of prognostic factors amongst persons in a single arm of a randomized controlled trial.
Level 4	Non randomized trial(s) with historical controls.	Case-control studies, or poor/ non-independent reference standard.	Case-series or case-control studies, or poor quality prognostic cohort study, retrospective cohort study.
Level 5	Case series with no controls. Specify number of subjects.	Mechanism-based reasoning, study of diagnostic yield (no reference standard).	Not applicable.

The full body of evidence supporting each recommendation was given a '**strength of evidence**'. A consensus voting process (GRADE) involving all the experts formally engaged in the guideline development was used to assign a '**strength of recommendation**' that indicates the confidence the health professional can have that the recommended practice will improve patient outcomes (i.e., do more good than harm). The overall aim of the '**strength of recommendation**' is to help health professionals to prioritize interventions.






Strengths of Evidence	
A	The recommendation is supported by direct scientific evidence from properly designed and implemented controlled trials on pressure ulcers in humans (or humans at risk for pressure ulcers), providing statistical results that consistently support the recommendation (Level 1 studies required).
B	The recommendation is supported by direct scientific evidence from properly designed and implemented clinical series on pressure ulcers in humans (or humans at risk for pressure ulcers) providing statistical results that consistently support the recommendation. (Level 2, 3, 4, 5 studies)
C	The recommendation is supported by indirect evidence (e.g., studies in healthy humans, humans with other types of chronic wounds, animal models) and/or expert opinion
Strengths of Recommendation	
	Strong positive recommendation: definitely do it
	Weak positive recommendation: probably do it
	No specific recommendation
	Weak negative recommendation: probably don't do it
	Strong negative recommendation: definitely don't do it

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Janet Cuddigan, PhD, RN, CWCN, FAAN, Interim Methodologist (literature update, review and analysis during the interim between formal guideline development activities [2009 to 2012])

Lisette Schoonhoven, PhD (lead organizer and convener of the Guideline Development Group)

Kandis McCafferty, PhD, RNC-OB (preliminary evidence tables)

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Translation

The following experts from the Clinical Research Center for Hair and Skin Science, Department of Dermatology and Allergy, Charité-Universitätsmedizin Berlin, Germany completed translation and data extraction for papers in languages other than English:

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Eva Katharina Barbosa Pfannes, PhD

Jan Kottner, PhD

Stakeholders

Special thanks to the many stakeholders who reviewed the guideline processes and drafts. All stakeholder comments were reviewed by the Guideline Development Group and revisions were made based on the comments received. We appreciate the investment of health professionals, researchers, educators and manufacturers from all over the world who took time to share their expertise and thoughtful critique.

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Platinum Level Sponsors (\$10,000 to \$19,999)

ArjoHuntleigh Inc.

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Gold Level Sponsors (up to \$9,999)

Sage Products LLC

PREVALENCE AND INCIDENCE OF PRESSURE ULCERS

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

Recommendations

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

A rigorous study should include:

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

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

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

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

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

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

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

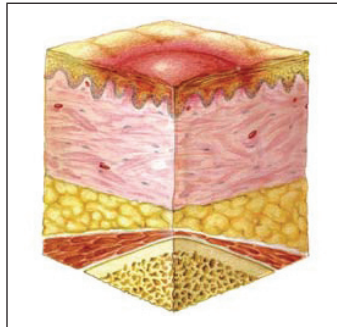
INTERNATIONAL NPUAP/EPUAP PRESSURE ULCER CLASSIFICATION SYSTEM

A pressure ulcer is localized injury to the skin and/or underlying tissue usually over a bony prominence, as a result of pressure, or pressure in combination with shear. A number of contributing or confounding factors are also associated with pressure ulcers; the significance of these factors is yet to be elucidated.

Category/Stage I: Nonblanchable Erythema

Intact skin with non-blanchable redness of a localized area usually over a bony prominence. Darkly pigmented skin may not have visible blanching; its color may differ from the surrounding area.

The area may be painful, firm, soft, warmer or cooler as compared to adjacent tissue. Category/Stage I may be difficult to detect in individuals with dark skin tones. May indicate "at risk" individuals (a heralding sign of risk).

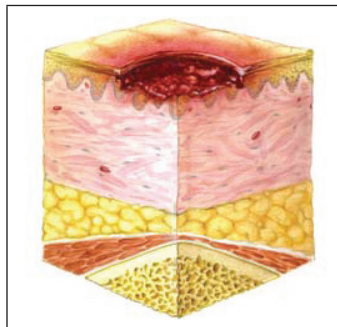


Category/Stage II: Partial Thickness Skin Loss

Partial thickness loss of dermis presenting as a shallow open ulcer with a red pink wound bed, without slough. May also present as an intact or open/ruptured serum-filled blister.

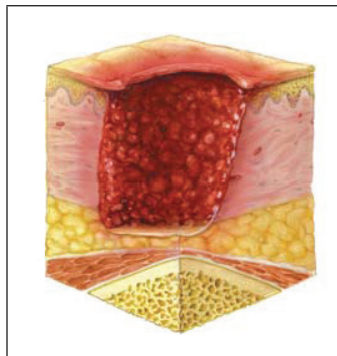
Presents as a shiny or dry shallow ulcer without slough or bruising.* This Category/Stage should not be used to describe skin tears, tape burns, perineal dermatitis, maceration or excoriation.

*Bruising indicates suspected deep tissue injury.



Category/Stage III: Full Thickness Skin Loss

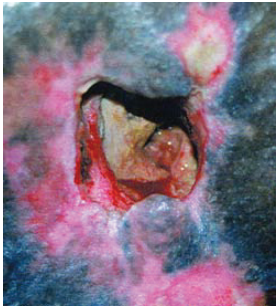
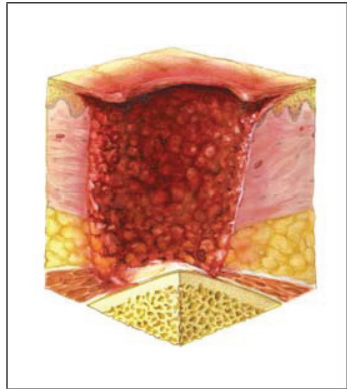
Full thickness tissue loss. Subcutaneous fat may be visible but bone, tendon or muscle are not exposed. Slough may be present but does not obscure the depth of tissue loss. May include undermining and tunneling. The depth of a Category/Stage III pressure ulcer varies by anatomical location. The bridge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



Category/Stage IV: Full Thickness Tissue Loss

Full thickness tissue loss with exposed bone, tendon or muscle. Slough or eschar may be present on some parts of the wound bed. Often include undermining and tunneling.

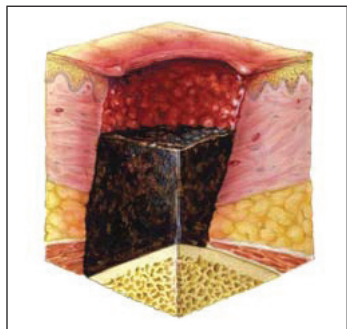
The depth of a Category/Stage IV pressure ulcer varies by anatomical location. The bridge of the nose, ear, occiput and malleolus do not have subcutaneous tissue and these ulcers can be shallow. Category/Stage IV ulcers can extend into muscle and/or supporting structures (e.g., fascia, tendon or joint capsule) making osteomyelitis possible. Exposed bone/tendon is visible or directly palpable.



Unstageable: Depth Unknown

Full thickness tissue loss in which the base of the ulcer is covered by slough (yellow, tan, gray, green or brown) and/or eschar (tan, brown or black) in the wound bed.

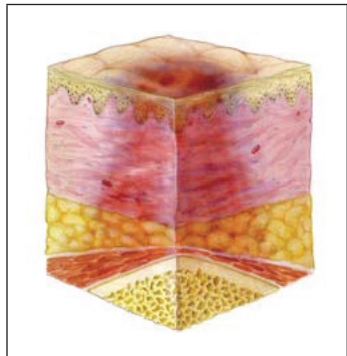
Until enough slough and/or eschar is removed to expose the base of the wound, the true depth, and therefore Category/Stage, cannot be determined. Stable (dry, adherent, intact without erythema or fluctuance) eschar on the heels serves as 'the body's natural (biological) cover' and should not be removed.



Suspected Deep Tissue Injury: Depth Unknown

Purple or maroon localized area of discolored intact skin or blood-filled blister due to damage of underlying soft tissue from pressure and/or shear. The area may be preceded by tissue that is painful, firm, mushy, boggy, warmer or cooler as compared to adjacent tissue.

Deep tissue injury may be difficult to detect in individuals with dark skin tones. Evolution may include a thin blister over a dark wound bed. The wound may further evolve and become covered by thin eschar. Evolution may be rapid exposing additional layers of tissue even with optimal treatment.



PREVENTION OF PRESSURE ULCERS

RISK FACTORS AND RISK ASSESSMENT

Introduction

The *Clinical Practice Guideline* contains an extensive discussion of the theoretical framework underpinning pressure ulcer risk, and also contains a chapter on pressure ulcer *Etiology*, which is closely related to risk factors for pressure ulcers. The *Special Populations: Pediatric Individuals* section of the guideline addresses risk factors and risk assessment in neonates and children.

General Recommendations for Structured Risk Assessment

1. **Conduct a structured risk assessment as soon as possible (but within a maximum of eight hours after admission) to identify individuals at risk of developing pressure ulcers. (Strength of Evidence = C; Strength of Recommendation = 👍👍)**
2. **Repeat the risk assessment as often as required by the individual's acuity. (Strength of Evidence = C; Strength of Recommendation = 👍)**
3. **Undertake a reassessment if there is any significant change in the individual's condition. (Strength of Evidence = C; Strength of Recommendation = 👍👍)**

Due to the burden and impact of pressure ulcer development on both the individual and the health service, it is accepted practice that risk assessment should be undertaken on individuals, with the aim of identifying those who are at potential risk in order that individualized preventive interventions can be planned and initiated.

4. **Include a comprehensive skin assessment as part of every risk assessment to evaluate any alterations to intact skin. (Strength of Evidence = C; Strength of Recommendation = 👍👍)**
5. **Document all risk assessments. (Strength of Evidence = C; Strength of Recommendation = 👍👍)**
6. **Develop and implement a risk based prevention plan for individuals identified as being at risk of developing pressure ulcers. (Strength of Evidence = C; Strength of Recommendation = 👍👍)**

Caution: Do not rely on a total risk assessment tool score alone as a basis for risk based prevention. Risk assessment tool subscale scores and other risk factors should also be examined to guide risk-based planning.

Structured Risk Assessment

1. **Use a structured approach to risk assessment that is refined through the use of clinical judgment and informed by knowledge of relevant risk factors. (Strength of Evidence = C; Strength of Recommendation = 👍👍)**

There is no universally agreed best approach for conducting a risk assessment; however, expert consensus suggests that the approach be 'structured' in order to facilitate consideration of all relevant risk factors.

Risk Factor Assessment

1. **Use a structured approach to risk assessment that includes assessment of activity/mobility and skin status. (Strength of Evidence = B; Strength of Recommendation = 👍👍)**
 - 1.1. **Consider bedfast and/or chairfast individuals to be at risk of pressure ulcer development. (Strength of Evidence = B; Strength of Recommendation = 👍)**

- 1.2. Consider the impact of mobility limitations on pressure ulcer risk. (Strength of Evidence = B; Strength of Recommendation = 👍👍)**

Being bedfast or chairfast are usually described as limitations of activity. A reduction in an individual's frequency of movement or ability to move is usually described as having a mobility limitation.

- 1.3. Complete a comprehensive risk assessment for bedfast and/or chairfast individuals to guide preventive interventions. (Strength of Evidence = C; Strength of Recommendation = 👍👍)**

Mobility and activity limitations can be considered a **necessary condition** for pressure ulcer development. In the absence of these conditions, other risk factors should not result in a pressure ulcer.

- 1.4. Consider individuals with a Category/Stage I pressure ulcer to be at risk of progression or new Category/Stage II and greater pressure ulcers. (Strength of Evidence = B; Strength of Recommendation = 👍)**

- 1.5. Consider individuals with an existing pressure ulcer (any Category/Stage) to be at risk of additional pressure ulcers. (Strength of Evidence = B; Strength of Recommendation = 👍👍)**

- 1.6. Consider the general status of skin on pressure ulcer risk. (Strength of Evidence = B; Strength of Recommendation = 👍)**

- 2. Consider the impact of the following factors on an individual's risk of pressure ulcer development:**

- perfusion and oxygenation;
- poor nutritional status; and
- increased skin moisture. (Strength of Evidence = C; Strength of Recommendation = 👍👍)

- 3. Consider the potential impact of the following factors on an individual's risk of pressure ulcer development:**

- increased body temperature;
- advanced age;
- sensory perception;
- hematological measures and;
- general health status (Strength of Evidence = C; Strength of Recommendation = 👍)

Risk Assessment Tools

If risk assessment tools are selected as a structured approach for risk assessment, additional factors (e.g., perfusion, skin status and other relevant risks) should be considered as part of a comprehensive risk assessment. Regardless of how the risk assessment is structured, **clinical judgment is essential**.

- 1. Recognize additional risk factors and use clinical judgment when using a risk assessment tool. (Strength of Evidence = C; Strength of Recommendation = 👍👍)**

Caution: Do not rely on the results of a risk assessment tool alone when assessing an individual's pressure ulcer risk.

- 2. When using a risk assessment tool, select a tool that is appropriate to the population, is valid and is reliable. (Strength of Evidence = C; Strength of Recommendation = 👍)**

SKIN AND TISSUE ASSESSMENT

Introduction

Skin and tissue assessment is important in pressure ulcer prevention, classification, diagnosis, and treatment. Refer to the *Medical Device Related Pressure Ulcers* section of the guideline for discussion of assessment of mucus membranes and other pressure ulcers associated with medical devices.

Skin Assessment Policy Recommendations

1. **Ensure that a complete skin assessment is part of the risk assessment screening policy in place in all health care settings. (Strength of Evidence = C; Strength of Recommendation = 👍)**
2. **Educate health professionals on how to undertake a comprehensive skin assessment that includes the techniques for identifying blanching response, localized heat, edema, and induration. (Strength of Evidence = B; Strength of Recommendation = 👍👍)**

These assessment techniques should be used in assessing the skin of all individuals. However, there is evidence that Category/Stage I pressure ulcers are under-detected in individuals with darkly pigmented skin because areas of redness are not easily identified.

Conducting Skin and Tissue Assessment

1. **In individuals at risk of pressure ulcers, conduct a comprehensive skin assessment:**
 - as soon as possible but within eight hours of admission (or first visit in community settings),
 - as part of every risk assessment,
 - ongoing based on the clinical setting and the individual's degree of risk, and
 - prior to the individual's discharge. (Strength of Evidence = C; Strength of Recommendation = 👍)
 - 1.1. **Increase the frequency of skin assessments in response to any deterioration in overall condition. (Strength of Evidence = C; Strength of Recommendation = 👍)**

Conduct a head-to-toe assessment with particular focus on skin overlying bony prominences including the sacrum, ischial tuberosities, greater trochanters and heels.^{3, 4} Each time the patient is repositioned is an opportunity to conduct a brief skin assessment.
 - 1.2. **Document the findings of all comprehensive skin assessments. (Strength of Evidence = C; Strength of Recommendation = 👍👍)**
2. **Inspect skin for erythema in individuals identified as being at risk of pressure ulceration. (Strength of Evidence = C; Strength of Recommendation = 👍👍)**

Caution: Avoid positioning the individual on an area of erythema wherever possible.

Ongoing assessment of the skin is necessary in order to detect early signs of pressure damage, especially over bony prominences.

- 2.1. **Differentiate the cause and extent of erythema. (Strength of Evidence = C; Strength of Recommendation = 👍👍)**

Differentiate whether the skin redness is blanchable or nonblanchable.
- 2.2. **Use the finger or the disc method to assess whether skin is blanchable or non-blanchable. (Strength of Evidence = C; Strength of Recommendation = 👍)**
 - finger pressure method — a finger is pressed on the erythema for three seconds and blanching is assessed following removal of the finger; and
 - transparent disk method — a transparent disk is used to apply pressure equally over an area of erythema and blanching can be observed underneath the disk during its application.
3. **Include the following factors in every skin assessment:**
 - skin temperature;
 - edema; and
 - change in tissue consistency in relation to surrounding tissue. (Strength of Evidence = B; Strength of Recommendation = 👍)

- 3.1. When conducting a skin assessment in an individual with darkly pigmented skin prioritize assessment of:**
- skin temperature;
 - edema; and
 - change in tissue consistency in relation to surrounding tissue. (Strength of Evidence = B; Strength of Recommendation = 👍)

As it is not always possible to identify erythema on darkly pigmented skin; localized heat, edema, and change in tissue consistency in relation to surrounding tissue (e.g., induration/hardness) are important indicators of early pressure damage to the skin in individuals of darker skin tone.

- 3.2. Assess localized pain as part of every skin assessment. (Strength of evidence = C; Strength of Recommendation = 👍👍)**

When the individual is able to respond reliably, ask him or her to identify any areas of discomfort or pain that could be attributed to pressure damage. Other strategies for assessing pain associated with pressure ulcers are discussed in detail in the *Pain Assessment and Treatment* section of this guideline.

- 4. Inspect the skin under and around medical devices at least twice daily for the signs of pressure-related injury on the surrounding tissue. (Strength of evidence = C; Strength of Recommendation = 👍👍)**

- 4.1. Conduct more frequent (greater than twice daily) skin assessments at the skin-device interface in individuals vulnerable to fluid shifts and/or exhibiting signs of localized/generalized edema. (Strength of evidence= C; Strength of Recommendation = 👍👍)**

Changes in fluid volume status, or hypoproteinemic states can result in localized or generalized edema causing a medical device that initially fits properly to exert external pressure to the skin that leads to pressure ulcer formation.⁵

PREVENTIVE SKIN CARE

Recommendations

- 1. Avoid positioning the individual on an area of erythema whenever possible. (Strength of Evidence = C; Strength of Recommendation = 👍👍)**

Erythema indicates that the body has not recovered from the previous loading and requires further respite from repeated loading.

- 2. Keep the skin clean and dry. (Strength of Evidence = C; Strength of Recommendation = 👍👍)**

- 2.1. Use a pH balanced skin cleanser. (Strength of Evidence = C; Strength of Recommendation = 👍👍)**

- 3. Do not massage or vigorously rub skin that is at risk of pressure ulcers. (Strength of Evidence = C; Strength of Recommendation = 👍)**

As well as being painful, friction massage can cause mild tissue destruction or provoke inflammatory reactions, particularly in frail older adults.

- 4. Develop and implement an individualized continence management plan. (Strength of Evidence = C; Strength of Recommendation = 👍👍)**

- 4.1. Cleanse the skin promptly following episodes of incontinence (Strength of Evidence = C; Strength of Recommendation = 👍👍)**

- 5. Protect the skin from exposure to excessive moisture with a barrier product in order to reduce the risk of pressure damage. (Strength of Evidence = C; Strength of Recommendation = 👍)**

It is important to note that skin damage from moisture is not a pressure ulcer, but that presence of skin damage from moisture may increase the risk of pressure ulceration.

6. **Consider using a skin moisturizer to hydrate dry skin in order to reduce risk of skin damage. (Strength of Evidence = C; Strength of Recommendation = 👍)**
- 6.1. **Do not use dimethyl sulfoxide (DMSO) cream for the prevention of pressure ulcers. (Strength of Evidence = B; Strength of Recommendation = 👍)**

Caution: DMSO cream is not approved for use on humans in US, but is sometimes used as a topical application in other countries.

EMERGING THERAPIES FOR PREVENTION OF PRESSURE ULCERS

Introduction

This section of the guideline addresses new and emerging therapies, including microclimate manipulation; fabrics designed to reduce shear and friction; prophylactic dressings and electrical stimulation of muscles in individuals with spinal cord injury.

Microclimate Control

1. **Consider the need for additional features such as ability to control moisture and temperature when selecting a support surface. (Strength of Evidence = C; Strength of Recommendation = 👍)**

The use of specialized surfaces that come into contact with the skin may be able to alter the microclimate by changing the rate of evaporation of moisture and the rate at which heat dissipates from the skin.⁶

- 1.1. **Consider the need for moisture and temperature control when selecting a support surface cover. (Strength of Evidence = C; Strength of Recommendation = 👍)**

Any surface that is in contact with the skin will have the potential to affect the microclimate. The overall effect is dependent on the nature of the support surface and its type of cover.⁶

2. **Do not apply heating devices (e.g., hot water bottles, heating pads, built-in bed warmers) directly on skin surfaces or pressure ulcers. (Strength of Evidence = C; Strength of Recommendation = 👍)**

Heat increases the metabolic rate, induces sweating and decreases the tolerance of the tissue for pressure.

Prophylactic Dressings

The use of prophylactic dressings to protect skin from medical devices is discussed in the guideline section *Medical Device Related Pressure Ulcers*.

1. **Consider applying a polyurethane foam dressing to bony prominences (e.g., heels, sacrum) for the prevention of pressure ulcers in anatomical areas frequently subjected to friction and shear. (Strength of Evidence = B; Strength of Recommendation = 👍)**
2. **When selecting a prophylactic dressing consider:**
- **ability of the dressing to manage microclimate;**
 - **ease of application and removal;**
 - **ability to regularly assess the skin;**
 - **anatomical location where the dressing will be applied; and**
 - **the correct dressing size. (Strength of Evidence = C; Strength of Recommendation = 👍)**

Prophylactic dressings differ in their qualities; therefore it is important to select a dressing that is appropriate to the individual and the clinical use.

- 3. Continue to use all other preventive measures necessary when using prophylactic dressings. (Strength of Evidence = C; Strength of Recommendation = 👍)**
- 4. Assess the skin for signs of pressure ulcer development at each dressing change or at least daily, and confirm the appropriateness of the current prophylactic dressing regimen. (Strength of Evidence = C; Strength of Recommendation = 👍)**
- 5. Replace the prophylactic dressing if it becomes damaged, displaced, loosened or excessively moist. (Strength of Evidence = C; Strength of Recommendation = 👍👍)**

Prophylactic dressings do not negate the need for thorough and regular skin assessment, therefore their design often facilitates regular skin assessments (e.g., soft silicone borders that are easy to lift for routine skin checks without creating tape burns or other skin injuries).

Fabrics and Textiles

- 1. Consider using silk-like fabrics rather than cotton or cotton-blend fabrics to reduce shear and friction. (Strength of Evidence = B; Strength of Recommendation = 👍)**

Electrical Stimulation of the Muscles for Prevention of Pressure Ulcers

There is emerging evidence that electrical stimulation (ES) induces intermittent tetanic muscle contractions and reduces the risk of pressure ulcer development in at risk body parts, especially in individuals with spinal cord injury (SCI).

- 1. Consider the use of electrical stimulation for anatomical locations at risk of pressure ulcer development in spinal cord injury patients. (Strength of Evidence = C; Strength of Recommendation = 👍)**

INTERVENTIONS FOR PREVENTION & TREATMENT OF PRESSURE ULCERS

NUTRITION IN PRESSURE ULCER PREVENTION AND TREATMENT

Introduction

The recommendations in this section of the guideline are predominantly for adult individuals and have been derived from evidence conducted in adult populations. Recommendations for nutritional assessment and treatment in pediatric populations are presented in the section *Special Populations: Pediatric Individuals*.

Nutrition Screening

- 1. Screen nutritional status for each individual at risk of or with a pressure ulcer:**
 - at admission to a health care setting;
 - with each significant change of clinical condition; and/or
 - when progress toward pressure ulcer closure is not observed. (Strength of Evidence = C; Strength of Recommendation = 👍)

Nutrition screening is the process used to identify individuals who require a comprehensive nutrition assessment due to characteristics that put them at potential nutritional risk. Any qualified member of the health care team may complete nutrition screening, and it should be conducted on admission to the health care facility, or at first visit in community settings.

- 2. Use a valid and reliable nutrition screening tool to determine nutritional risk. (Strength of Evidence = C; Strength of Recommendation = 👍)**
- 3. Refer individuals screened to be at risk of malnutrition and individuals with an existing pressure ulcer to a registered dietitian or an interprofessional nutrition team for a comprehensive nutrition assessment. (Strength of Evidence = C; Strength of Recommendation = 👍)**

Nutrition Assessment

- 1. Assess the weight status of each individual to determine weight history and identify significant weight loss ($\geq 5\%$ in 30 days or $\geq 10\%$ in 180 days). (Strength of Evidence = C; Strength of Recommendation = 👍)**
- 2. Assess the individual's ability to eat independently. (Strength of Evidence = C; Strength of Recommendation = 👍👍)**
- 3. Assess the adequacy of total nutrient intake (i.e., food, fluid, oral supplements and enteral/parenteral feeds). (Strength of Evidence = C; Strength of Recommendation = 👍👍)**

The focus of nutrition assessment should be on evaluating energy intake, unintended weight change and the effect of psychological stress or neuropsychological problems. Additionally, assessment should include a determination of the individual's caloric, protein and fluid requirements.

Care Planning

- 1. Develop an individualized nutrition care plan for individuals with or at risk of a pressure ulcer. (Strength of Evidence = C; Strength of Recommendation = 👍)**

A registered dietitian, in consultation with the interprofessional team (including, but not limited to, a physician, nurse, speech pathologist, occupational therapist, physical therapist and dentist) should develop and document an individualized nutrition intervention plan based on the individual's nutritional needs, feeding route and goals of care, as determined by the nutrition assessment.

2. **Follow relevant and evidence-based guidelines on nutrition and hydration for individuals who exhibit nutritional risk and who are at risk of pressure ulcers or have an existing pressure ulcer. (Strength of Evidence=C; Strength of Recommendation = 👍)**

Energy Intake

1. **Provide individualized energy intake based on underlying medical condition and level of activity. (Strength of Evidence = B; Strength of Recommendation = 👍)**
2. **Provide 30 to 35 kcalories/kg body weight for adults at risk of a pressure ulcer who are assessed as being at risk of malnutrition. (Strength of Evidence = C; Strength of Recommendation = 👍)**
3. **Provide 30 to 35 kcalories/kg body weight for adults with a pressure ulcer who are assessed as being at risk of malnutrition. (Strength of Evidence = B; Strength of Recommendation = 👍👍)**
4. **Adjust energy intake based on weight change or level of obesity. Adults who are underweight or who have had significant unintended weight loss may need additional energy intake. (Strength of Evidence = C; Strength of Recommendation = 👍👍)**
5. **Revise and modify/liberalize dietary restrictions when limitations result in decreased food and fluid intake. These adjustments should be made in consultation with a medical professional and managed by a registered dietitian whenever possible. (Strength of Evidence = C; Strength of Recommendation = 👍)**

Caloric needs are ideally met by a healthy diet; however, some individuals are unable or unwilling to consume an adequate diet. Overly restricted diets may make food unpalatable and unappealing, and therefore reduce intake.

6. **Offer fortified foods and/or high calorie, high protein oral nutritional supplements between meals if nutritional requirements cannot be achieved by dietary intake. (Strength of Evidence = B; Strength of Recommendation = 👍👍)**

Oral nutritional supplements (ONS), enhanced foods, and food fortifiers can be used to combat unintended weight loss and malnutrition.

7. **Consider enteral or parenteral nutritional support when oral intake is inadequate. This must be consistent with the individual's goals. (Strength of Evidence = C; Strength of Recommendation = 👍)**

If oral intake is inadequate, enteral or parenteral nutrition may be recommended if consistent with the individual's wishes. Enteral (tube) feeding is the preferred route if the gastrointestinal tract is functioning. The risks and benefits of nutrition support should be discussed with the individual and caregivers early on, and should reflect the individual's preferences and goals for care.

Protein Intake

1. **Provide adequate protein for positive nitrogen balance for adults assessed to be at risk of a pressure ulcer. (Strength of Evidence = C; Strength of Recommendation = 👍)**
2. **Offer 1.25 to 1.5 grams protein/kg body weight daily for adults at risk of a pressure ulcer who are assessed to be at risk of malnutrition when compatible with goals of care, and reassess as condition changes. (Strength of Evidence = C; Strength of Recommendation = 👍)**
3. **Provide adequate protein for positive nitrogen balance for adults with a pressure ulcer. (Strength of Evidence = B; Strength of Recommendation = 👍)**
4. **Offer 1.25 to 1.5 grams protein/kg body weight daily for adults with an existing pressure ulcer who are assessed to be at risk of malnutrition when compatible with goals of care, and reassess as condition changes. (Strength of Evidence = B; Strength of Recommendation = 👍)**
5. **Offer high calorie, high protein nutritional supplements in addition to the usual diet to adults with nutritional risk and pressure ulcer risk, if nutritional requirements cannot be achieved by dietary intake. (Strength of Evidence = A; Strength of Recommendation = 👍)**

- 6. Assess renal function to ensure that high levels of protein are appropriate for the individual. (Strength of Evidence = C; Strength of Recommendation = 👍👍)**

Clinical judgment is required to determine the appropriate level of protein for each individual, based on the number of pressure ulcers present, overall nutritional status, co-morbidities, and tolerance to nutritional interventions.

- 7. Supplement with high protein, arginine and micronutrients for adults with a pressure ulcer Category/ Stage III or IV or multiple pressure ulcers when nutritional requirements cannot be met with traditional high calorie and protein supplements. (Strength of Evidence = B; Strength of Recommendation = 👍)**

Hydration

- 1. Provide and encourage adequate daily fluid intake for hydration for an individual assessed to be at risk of or with a pressure ulcer. This must be consistent with the individual's comorbid conditions and goals. (Strength of Evidence = C; Strength of Recommendation = 👍👍)**
- 2. Monitor individuals for signs and symptoms of dehydration including change in weight, skin turgor, urine output, elevated serum sodium, and/or calculated serum osmolality. (Strength of Evidence = C; Strength of Recommendation = 👍)**
- 3. Provide additional fluid for individuals with dehydration, elevated temperature, vomiting, profuse sweating, diarrhea, or heavily exuding wounds. (Strength of Evidence = C; Strength of Recommendation = 👍👍)**

Fluid serves as the solvent for vitamins, minerals, glucose and other nutrients and transports nutrients and waste products through the body. Health professionals should monitor individuals' hydration status, checking for signs and symptoms of dehydration such as: changes in weight, skin turgor, urine output, elevated serum sodium, or calculated serum osmolality.⁷

Vitamins and Minerals

- 1. Provide/encourage individuals assessed to be at risk of pressure ulcers to consume a balanced diet that includes good sources of vitamins and minerals. (Strength of Evidence = C; Strength of Recommendation = 👍👍)**
- 2. Provide/encourage an individual assessed to be at risk of a pressure ulcer to take vitamin and mineral supplements when dietary intake is poor or deficiencies are confirmed or suspected. (Strength of Evidence = C; Strength of Recommendation = 👍)**
- 3. Provide/encourage an individual with a pressure ulcer to consume a balanced diet that includes good sources of vitamins and minerals. (Strength of Evidence = B; Strength of Recommendation = 👍👍)**
- 4. Provide/encourage an individual with a pressure ulcer to take vitamin and mineral supplements when dietary intake is poor or deficiencies are confirmed or suspected. (Strength of Evidence = B; Strength of Recommendation = 👍)**

REPOSITIONING AND EARLY MOBILIZATION

Introduction

Recommendations in this section of the guideline address the role of repositioning and early mobilization in both the prevention and treatment of pressure ulcers. Repositioning in relation to heel pressure ulcers is discussed in a separate section of the guideline, *Repositioning to Prevent and Manage Heel Pressure Ulcers*.

General Repositioning for All Individuals

- 1. Reposition all individuals at risk of, or with existing pressure ulcers, unless contra-indicated. (Strength of Evidence = A; Strength of Recommendation = 👍👍)**

Repositioning of an individual is undertaken to reduce the duration and magnitude of pressure over vulnerable areas of the body and to contribute to comfort, hygiene, dignity, and functional ability.

- 2. Consider the condition of the individual and the pressure redistribution support surface in use when deciding if repositioning should be implemented as a prevention strategy. (Strength of Evidence = C; Strength of Recommendation = 👍)**

Regular positioning is not possible for some individuals because of their medical condition, and an alternative prevention strategy such as providing a high-specification mattress or bed may need to be considered.

Repositioning Frequency

- 1. Consider the pressure redistribution support surface in use when determining the frequency of repositioning. (Strength of Evidence = A; Strength of Recommendation = 👍)**

- 2. Determine repositioning frequency with consideration to the individual's:**

- tissue tolerance,
- level of activity and mobility,
- general medical condition,
- overall treatment objectives,
- skin condition, and
- comfort. (Strength of Evidence = C; Strength of Recommendation = 👍👍)

- 3. Establish pressure relief schedules that prescribe the frequency and duration of weight shifts. (Strength of Evidence = C; Strength of Recommendation = 👍)**

- 3.1. Teach individuals to do 'pressure relief lifts' or other pressure relieving maneuvers as appropriate. (Strength of Evidence = C; Strength of Recommendation = 👍👍)**

- 4. Regularly assess the individual's skin condition and general comfort. Reconsider the frequency and method of repositioning if the individual is not responding as expected to the repositioning regime. (Strength of Evidence = C; Strength of Recommendation = 👍👍)**

Frequent assessment of the individual's skin condition will help to identify the early signs of pressure damage and, as such, her/his tolerance of the planned repositioning schedule. If changes in skin condition should occur, the repositioning care plan needs to be re-evaluated.

Repositioning Techniques

- 1. Reposition the individual in such a way that pressure is relieved or redistributed. (Strength of Evidence = C; Strength of Recommendation = 👍👍)**

When choosing a particular position for the individual, it is important to assess whether the pressure is actually relieved or redistributed.

- 2. Avoid positioning the individual on bony prominences with existing non-blanchable erythema. (Strength of Evidence = C; Strength of Recommendation = 👍👍)**

Non-blanchable erythema is an indication of the early signs of pressure ulcer damage. If an individual is positioned directly onto bony prominences with pre-existing non-blanchable erythema, the pressure and/or shearing forces sustained will further occlude blood supply to the skin, thereby worsening the damage and resulting in more severe pressure ulceration.

- 3. Avoid subjecting the skin to pressure and shear forces. (Strength of Evidence = C; Strength of Recommendation = 👍👍)**

- 3.1. Use manual handling aids to reduce friction and shear. Lift — don't drag — the individual while repositioning. (Strength of Evidence = C; Strength of Recommendation = 👍👍)**

In most situations simple techniques like lift sheets can be used. Principles of safe manual handling should be used to ensure safety of both the individual and the health professional.

- 3.2. Use a split leg sling mechanical lift when available to transfer an individual into a wheelchair or bedside chair when the individual needs total assistance to transfer. Remove the sling immediately after transfer. (Strength of Evidence = C; Strength of Recommendation = 👍)**

- 3.3. Do not leave moving and handling equipment under the individual after use, unless the equipment is specifically designed for this purpose. (Strength of Evidence = C; Strength of Recommendation = 👍👍)**

- 4. Avoid positioning the individual directly onto medical devices, such as tubes, drainage systems or other foreign objects. (Strength of Evidence = C; Strength of Recommendation = 👍👍)**

The *Medical Device Associated Pressure Ulcers* section of the guideline includes comprehensive recommendations on preventing device related pressure ulcers through appropriate positioning of the device and the individual.

- 5. Do not leave the individual on a bedpan longer than necessary. (Strength of Evidence = C; Strength of Recommendation = 👍👍)**

Repositioning Individuals in Bed

- 1. Use the 30° tilted side-lying position (alternately, right side, back, left side) or the prone position if the individual can tolerate this and her/his medical condition allows. (Strength of Evidence = C; Strength of Recommendation = 👍)**

- 1.1. Encourage individuals who can reposition themselves to sleep in a 30° to 40° side-lying position or flat in bed if not contraindicated. (Strength of Evidence = C; Strength of Recommendation = 👍)**

- 1.2. Avoid lying postures that increase pressure, such as the 90° side-lying position, or the semi-recumbent position. (Strength of Evidence = C; Strength of Recommendation = 👍)**

- 2. Limit head-of-bed elevation to 30° for an individual on bedrest unless contraindicated by medical condition or feeding and digestive considerations. (Strength of Evidence = C; Strength of Recommendation = 👍)**

Elevating the head of the bed may be medically necessary to facilitate breathing and/or prevent aspiration and ventilator associated pneumonia. In these cases, semi-Fowler's position is preferred.⁸ Individuals should be positioned and supported to prevent sliding down in bed and creating shear forces.

- 2.1. If sitting in bed is necessary, avoid head-of-bed elevation or a slouched position that places pressure and shear on the sacrum and coccyx. (Strength of Evidence = C; Strength of Recommendation = 👍)**

Prone Position

- 1. Use a pressure redistribution surface to offload pressure points on the face and body while in the prone position. (Strength of evidence = C; Strength of Recommendation = 👍)**

- 2. At each rotation, assess other body areas (i.e., breast region, knees, toes, penis, clavicles, iliac crest, symphysis pubis) that may be at risk when individuals are in the prone position. (Strength of evidence = C; Strength of Recommendation = 👍)**

- 3. At each rotation, assess individuals placed in the prone position for evidence of facial pressure ulcers. (Strength of Evidence = C; Strength of Recommendation = 👍)**

Individuals placed in the prone position may be at increased risk for the development of facial pressure ulcers.

Repositioning Seated Individuals

- 1. Position the individual so as to maintain stability and his or her full range of activities. (Strength of Evidence = C; Strength of Recommendation = 👍👍)**

- 2. Select a seated posture that is acceptable for the individual and minimizes the pressures and shear exerted on the skin and soft tissues. (Strength of Evidence = C; Strength of Recommendation = 👍👍)**

- 2.1. Provide adequate seat tilt to prevent sliding forward in the wheelchair or chair, and adjust footrests and armrests to maintain proper posture and pressure redistribution. (Strength of Evidence = C; Strength of Recommendation = 👍)**

The ischia bear intense pressure when the individual is seated. Pressure remains unrelieved when the individual is paralyzed because small involuntary movements that restore blood flow to the tissues are absent.

- 3. Ensure that the feet are properly supported either directly on the floor, on a footstool, or on footrests when sitting (upright) in a bedside chair or wheelchair. (Strength of Evidence = C; Strength of Recommendation = 👍👍)**

To avoid shear and friction select a seat with an appropriate seat-to-floor height for the individual. If the individual's feet cannot be positioned directly on the ground, footrest height should be adjusted so as to slightly tilt the pelvis forward by positioning the thighs slightly lower than horizontally.

- 3.1. Avoid the use of elevating leg rests if the individual has inadequate hamstring length. (Strength of Evidence = C; Strength of Recommendation = 👍)**

If the hamstring length is inadequate and elevating leg rests are used, the pelvis will be pulled into a sacral sitting posture, causing increased pressure on the coccyx and/or sacrum.

- 4. Limit the time an individual spends seated in a chair without pressure relief. (Strength of Evidence = B; Strength of Recommendation = 👍👍)**

Additional Recommendations for Individuals with Existing Pressure Ulcers

- 1. Do not position an individual directly on a pressure ulcer. (Strength of Evidence = C; Strength of Recommendation = 👍)**

- 1.1. Position the individual off area(s) of suspected deep tissue injury with intact skin. If pressure over the area cannot be relieved by repositioning, select an appropriate support surface. (Strength of Evidence = C; Strength of Recommendation = 👍)**

Pressure reduces perfusion to injured tissues. Continued pressure on an existing pressure ulcer will delay healing and may cause additional deterioration.

- 2. Continue to turn and reposition the individual regardless of the support surface in use. Establish turning frequency based on the characteristics of the support surface and the individual's response. (Strength of Evidence = C; Strength of Recommendation = 👍👍)**

No support surface provides complete pressure relief.

- 3. Inspect the skin for additional damage each time the individual is turned or repositioned. Do not turn the individual onto a body surface that is damaged or still reddened from a previous episode of pressure loading, especially if the area of redness does not blanch (i.e., Category/Stage I pressure ulcer). (Strength of Evidence = C; Strength of Recommendation = 👍👍)**

Ongoing assessment of the skin is necessary in order to detect additional skin damage.

Repositioning the Individual with Existing Pressure Ulcers in a Chair

- 1. Minimize seating time and consult a seating specialist if pressure ulcers worsen on the seating surface selected. (Strength of Evidence = C; Strength of Recommendation = 👍)**

- 2. Consider periods of bed rest to promote ischial and sacral ulcer healing. (Strength of Evidence = C; Strength of Recommendation = 👍)**

- 2.1. Weigh the risks and benefits of supported sitting against benefits to both physical and emotional health. (Strength of Evidence = C; Strength of Recommendation = 👍)**

- 3. If sitting in a chair is necessary for individuals with pressure ulcers on the sacrum/coccyx or ischia, limit sitting to three times a day in periods of 60 minutes or less. Consult a seating specialist to prescribe an appropriate seating surface and/or positioning techniques to avoid or minimize pressure on the ulcer. (Strength of Evidence = C; Strength of Recommendation = ⤴)**

Sitting is important to reducing the hazards of immobility, facilitating eating and breathing, and promoting rehabilitation. While sitting is important for overall health, every effort should be made to avoid or minimize pressure on the ulcer.

- 4. Avoid seating an individual with an ischial ulcer in a fully erect posture (in chair or bed). (Strength of Evidence = C; Strength of Recommendation = ⤴)**
- 5. Modify sitting time schedules and re-evaluate the seating surface and the individual's posture if the ulcer worsens or fails to improve. (Strength of Evidence = C; Strength of Recommendation = ⤴⤴)**

Positioning Devices

- 1. Do not use ring or donut-shaped devices. (Strength of Evidence = C; Strength of Recommendation = ⤴⤴)**

The edges of these devices create areas of high pressure that may damage tissue.

- 2. The following 'devices' should not be used to elevate heels:**
- synthetic sheepskin pads;
 - cutout, ring, or donut-type devices;
 - intravenous fluid bags; and
 - water-filled gloves. (Strength of Evidence = C; Strength of Recommendation = ⤴⤴)

All these products have been shown to have limitations.

- 3. Natural sheepskin pads might assist in preventing pressure ulcers. (Strength of Evidence = B; Strength of Recommendation = ⤴)**

Mobilization

- 1. Develop a schedule for progressive sitting according to the individual's tolerance and pressure ulcer response. (Strength of Evidence = C; Strength of Recommendation = ⤴)**
- 2. Increase activity as rapidly as tolerated. (Strength of Evidence = C; Strength of Recommendation = ⤴)**

Individuals on bedrest should progress to sitting and ambulation as rapidly as they can tolerate. Ambulation schedules may help offset the clinical deterioration often seen in individuals subjected to prolonged bedrest.

Repositioning Documentation

- 1. Record repositioning regimes, specifying frequency and position adopted, and include an evaluation of the outcome of the repositioning regime. (Strength of Evidence = C; Strength of Recommendation = ⤴)**

Documentation provides a written record of care delivery and, as such, serves as evidence that repositioning has occurred.

REPOSITIONING TO PREVENT AND TREAT HEEL PRESSURE ULCERS

Introduction

The reduction of pressure and shear at the heel is an important point of interest in clinical practice. The posterior prominence of the heel sustains intense pressure, even when a pressure redistribution surface is used.

General Recommendations

1. **Inspect the skin of the heels regularly. (Strength of Evidence = C; Strength of Recommendation = 👍👍)**

Repositioning for Preventing Heel Pressure Ulcers

1. **Ensure that the heels are free of the surface of the bed. (Strength of Evidence = C; Strength of Recommendation = 👍👍)**

Ideally, heels should be free of all pressure — a state sometimes called ‘floating heels’.

- 1.1. **Use heel suspension devices that elevate and offload the heel completely in such a way as to distribute the weight of the leg along the calf without placing pressure on the Achilles tendon. (Strength of Evidence = B; Strength of Recommendation = 👍👍)**

Heel suspension devices are preferable for long term use, or for individuals who are not likely to keep their legs on the pillows.

2. **The knee should be in slight (5° to 10°) flexion. (Strength of Evidence = C; Strength of Recommendation = 👍)**

There is indirect evidence that hyperextension of the knee may cause obstruction of the popliteal vein, and this could predispose an individual to deep vein thrombosis (DVT).

3. **Avoid areas of high pressure, especially under the Achilles tendon. (Strength of Evidence = C; Strength of Recommendation = 👍)**

- 3.1. **Use a foam cushion under the full length of the calves to elevate heels. (Strength of Evidence = B; Strength of Recommendation = 👍)**

Pillows or foam cushions used for heel elevation should extend the length of the calf to avoid areas of high pressure, particularly under the Achilles tendon. Flex the knee slightly to avoid popliteal vein compression and increased risk of DVT.

4. **Apply heel suspension devices according to the manufacturer’s instructions. (Strength of Evidence = C; Strength of Recommendation = 👍)**

5. **Remove the heel suspension device periodically to assess skin integrity. (Strength of Evidence = C; Strength of Recommendation = 👍)**

Repositioning for Treating Existing Heel Pressure Ulcers

1. **Relieve pressure under the heel(s) with Category/Stage I or II pressure ulcers by placing legs on a pillow to ‘float the heels’ off the bed or by using heel suspension devices. (Strength of Evidence = B; Strength of Recommendation = 👍)**

2. **For Category/Stage III, IV and unstageable pressure ulcers, place the leg in a device that elevates the heel from the surface of the bed, completely offloading the pressure ulcer. Consider a device that also prevents footdrop. (Strength of Evidence = C; Strength of Recommendation = 👍👍)**

Pressure on Category/Stage III, IV, and unstageable heel pressure ulcers should be completely offloaded as much as possible. Elevation of the heel on a pillow is usually inadequate.

SUPPORT SURFACES

Introduction

Pressure ulcer risk factors vary from person to person. Support surfaces are “specialized devices for pressure redistribution designed for management of tissue loads, microclimate, and/or other therapeutic functions (i.e., any mattress, integrated bed system, mattress replacement, overlay, or seat cushion, or seat cushion overlay)”.⁹ Support

surfaces should be chosen on an individual basis depending on the needs of the individual for pressure redistribution and other therapeutic functions. In all cases, the manufacturer's recommendations for the use and maintenance should be followed. Standards also serve manufacturers as a product development guide and to enhance quality assurance.

General Recommendations for Mattress and Bed Support Surfaces

- 1. Select a support surface that meets the individual's needs. Consider the individual's need for pressure redistribution based on following factors:**
 - level of immobility and inactivity;
 - need for microclimate control and shear reduction;
 - size and weight of the individual;
 - risk for development of new pressure ulcers; and
 - number, severity, and location of existing pressure ulcer(s). (Strength of Evidence = C; Strength of Recommendation = 👍👍)

Selection of a support surface should be individualized based on the factors detailed in the above recommendation statement. See below for recommendations on selecting support surfaces specifically for individuals with existing pressure ulcers.

- 2. Choose a support surface that is compatible with the care setting. (Strength of Evidence = C; Strength of Recommendation = 👍)**

Consider the weight of the bed, the structure of the building, the width of doors, the availability of uninterrupted electrical power, and safe location for the pump/motor, including its ventilation. Plans should be in place for the contingency of power failure.

- 3. Examine the appropriateness and functionality of the support surface on every encounter with the individual. (Strength of Evidence = C; Strength of Recommendation = 👍👍)**
- 4. Identify and prevent potential complications of support surface use. (Strength of Evidence = C; Strength of Recommendation = 👍)**

Proper selection and operation of support surfaces is the key to preventing complications.

- 5. Verify that the support surface is being used within its functional life span, as indicated by the manufacturer's recommended test method (or other industry recognized test method) before use of the support surface. (Strength of Evidence = C; Strength of Recommendation = 👍)**
- 6. Continue to reposition individuals placed on a pressure redistribution support surface. (Strength of Evidence = C; Strength of Recommendation = 👍👍)**

Repositioning is still required for pressure relief and comfort when a support surface is in use. However, the frequency of repositioning may alter as a result of using a support surface.

- 7. Choose positioning devices and incontinence pads, clothing and bed linen that are compatible with the support surface. Limit the amount of linen and pads placed on the bed. (Strength of Evidence = C; Strength of Recommendation = 👍👍)**

Mattress and Bed Support Surfaces for Pressure Ulcer Prevention

Pressure redistributing support surfaces are designed to either increase the body surface area that comes in contact with the support surface (to reduce interface pressure) or to sequentially alter the parts of the body that bear load, thus reducing the duration of loading at any given anatomical site.

- 1. Use a high specification reactive foam mattress rather than a non high specification reactive foam mattress for all individuals assessed as being at risk for pressure ulcer development. (Strength of Evidence = A; Strength of Recommendation = 👍)**

There is no evidence of the superiority of one higher specification foam mattress over any other higher specification foam mattresses.

- 1.1. Review the characteristics of foam mattresses used in the facility for pressure ulcer prevention to ensure they are high specification. (Strength of Evidence = C; Strength of Recommendation = 👍👍)**

Refer to the *Clinical Practice Guideline* for a consensus opinion on the minimum characteristics for a product to be considered a high specification foam mattress.

- 1.2. Consider using other reactive support surfaces for individuals assessed as being at risk for pressure ulcer development. (Strength of evidence = C; Strength of Recommendation = 👍)**
- 2. Use an active support surface (overlay or mattress) for individuals at higher risk of pressure ulcer development when frequent manual repositioning is not possible. (Strength of Evidence = B; Strength of Recommendation = 👍)**
- 2.1. Do not use small cell alternating pressure air mattresses or overlays. (Strength of Evidence = B; Strength of Recommendation = 👍)**

Alternating pressure air mattresses with small air cells (diameter < 10 cm) cannot be sufficiently inflated to ensure pressure relief over the deflated air cells.

Mattress and Bed Support Surfaces for Individuals with Existing Pressure Ulcers

- 1. Wherever possible, do not position an individual on an existing pressure ulcer. (Strength of Evidence = C; Strength of Recommendation = 👍)**
- 2. Consider replacing the mattress with a support surface that provides more effective pressure redistribution, shear reduction, and microclimate control for the individual if he or she:**
- cannot be positioned off the existing pressure ulcer;
 - has pressure ulcers on two or more turning surfaces (e.g. the sacrum and trochanter) that limit turning options;
 - fails to heal or demonstrates ulcer deterioration despite appropriate comprehensive care;
 - is at high risk for additional pressure ulcers; and/or
 - 'bottoms out' on the existing support surface. (Strength of Evidence = C; Strength of Recommendation = 👍)

When pressure ulcers deteriorate or fail to heal, the clinician should consider replacing the existing support surface with one that will provide a properly matched support surface environment in terms of pressure, shear, and microclimate for the individual. Changing the support surface is only one of several strategies to consider. More frequent repositioning, preventive interventions and local wound care should also be intensified as needed.

- 3. Before replacing the existing mattress:**
- evaluate the effectiveness of previous and current prevention and treatment plans; and
 - set treatment goals consistent with the individual's goals, values, and lifestyle. (Strength of Evidence = C; Strength of Recommendation = 👍👍)
- 4. Consider using a high specification reactive foam mattress or nonpowered pressure redistribution support surface for individuals with Category/Stage I and II pressure ulcers. (Strength of Evidence = C; Strength of Recommendation = 👍)**
- 5. Select a support surface that provides enhanced pressure redistribution, shear reduction, and microclimate control for individuals with Category/Stage III, IV, and unstageable pressure ulcers. (Strength of Evidence = B; Strength of Recommendation = 👍)**

There is insufficient evidence on which to base definitive recommendations for using one surface over another.

- 6. Select a support surface that provides enhanced pressure redistribution, shear reduction, and microclimate control for individuals with suspected deep tissue injury if pressure over the area cannot be relieved by repositioning. (Strength of Evidence = C; Strength of Recommendation = 👍)**

For all practical purposes, evolving deep tissue injury should be provided the same level of pressure redistribution as a Category/Stage III or IV pressure ulcer. Offloading and pressure redistribution may allow reperfusion of ischemic and injured tissue, limiting the extent of infarcted or dead tissue. Once the ulcer has fully evolved, support surface needs can be re-evaluated.

General Recommendations on Seating Support Surfaces

1. **Individualize the selection and periodic re-evaluation of a seating support surface and associated equipment for posture and pressure redistribution with consideration to:**
 - **body size and configuration;**
 - **the effects of posture and deformity on pressure distribution; and**
 - **mobility and lifestyle needs. (Strength of Evidence = C; Strength of Recommendation = 👍)**
2. **Select a stretchable/breathable cushion cover that fits loosely on the top surface of the cushion and is capable of conforming to the body contours. (Strength of Evidence = C; Strength of Recommendation = 👍)**

A tight, nonstretch cover will adversely affect cushion performance.

- 2.1. **Assess the cushion and cover for heat dissipation. Select a cushion and cover that permit air exchange to minimize temperature and moisture at the buttock interface. (Strength of Evidence = C; Strength of Recommendation = 👍)**
3. **Inspect and maintain all aspects of a seating support surface to ensure proper functioning and meeting of the individual's needs. (Strength of Evidence = C; Strength of Recommendation = 👍 👍)**

Seating cushions should be inspected for signs of wear on a daily basis. The support surface (chairs and wheelchairs) should be inspected according to the manufacturer's recommendations.
4. **Provide complete and accurate training on use and maintenance of a seating support surface (including wheelchairs) and cushion devices delivered to the individual. (Strength of Evidence = C; Strength of Recommendation = 👍 👍)**

Seating Support Surfaces to Prevent Pressure Ulcers

1. **Use a pressure redistributing seat cushion for individuals sitting in a chair whose mobility is reduced. (Strength of Evidence = B; Strength of Recommendation = 👍 👍)**

Ensure that selection of a pressure redistributing seat cushion is appropriate to the individual.

Seating Support Surfaces for Individuals with Existing Pressure Ulcers

1. **Refer individuals to a specialist seating professional for evaluation if sitting is unavoidable. (Strength of Evidence = C; Strength of Recommendation = 👍 👍)**
2. **Select a cushion that effectively redistributes the pressure away from the pressure ulcer. (Strength of Evidence = C; Strength of Recommendation = 👍)**

Cushion construction achieves pressure redistribution in one of two basic methods: immersion/envelopment or redirection/off-loading.

3. **Use alternating pressure seating devices judiciously for individuals with existing pressure ulcers. Weigh the benefits of off-loading against the potential for instability and shear based on the construction and operation of the cushion. (Strength of Evidence = C; Strength of Recommendation = 👍)**

MEDICAL DEVICE RELATED PRESSURE ULCERS

Risk for Medical Device Related Pressure Ulcers

1. **Consider adults with medical devices to be at risk for pressure ulcers. (Strength of Evidence = B; Strength of Recommendation = 👍 👍)**
 - 1.1. **Consider children with medical devices to be at risk for pressure ulcers. (Strength of Evidence = B; Strength of Recommendation = 👍 👍)**

Recommendations for Selecting and Fitting a Medical Device

- 1. Review and select medical devices available in the facility based on the devices' ability to induce the least degree of damage from the forces of pressure and/or shear. (Strength of Evidence = B; Strength of Recommendation = 👍👍)**

Facilities, with the input of the health professional, should provide medical devices that will minimize skin damage. This may include selection of softer, more flexible devices.

- 2. Ensure that medical devices are correctly sized and fit appropriately to avoid excessive pressure. (Strength of Evidence = C; Strength of Recommendation = 👍👍)**

- 3. Apply all medical devices following manufacturer's specifications. (Strength of Evidence = C; Strength of Recommendation = 👍👍)**

Failure to follow the manufacturer's application instruction can result in harm (e.g., skin damage) to the individual and can be a source of liability.

- 4. Ensure that medical devices are sufficiently secured to prevent dislodgement without creating additional pressure. (Strength of Evidence = C; Strength of Recommendation = 👍👍)**

In situations in which simple repositioning does not relieve pressure, it is important not to create additional pressure by placing excessive dressings beneath tight devices.¹⁰ Consideration for the placement of a prophylactic dressing to protect the skin is further discussed in this section.

Recommendations for Assessment of the Skin and Medical Device

- 1. Inspect the skin under and around medical devices at least twice daily for the signs of pressure related injury on the surrounding tissue. (Strength of Evidence = C; Strength of Recommendation = 👍)**

- 1.1. Conduct more frequent (greater than twice daily) skin assessments at the skin-device interface in individuals vulnerable to fluid shifts and/or exhibiting signs of localized or generalized edema. (Strength of Evidence = C; Strength of Recommendation = 👍👍)**

The health professional should apply any type of medical device cognizant of the potential for tissue expansion and worsening edema. Depending on the type/purpose of the device, loosening, replacement or removal (i.e., compression stockings) may be advised.

- 2. Classify medical device related pressure ulcers using the International NPUAP/EPUAP Pressure Ulcer Classification System, with the exception of mucosal pressure ulcers. (Strength of Evidence = C; Strength of Recommendation = 👍)**

Pressure ulcers related to medical device use are not a new category of pressure ulcer, and should be classified according to level of tissue loss using the International NPUAP/EPUAP Pressure Ulcer Classification System outlined in the *Classification of Pressure Ulcers* section of this guideline. The classification system for pressure ulcers of the skin cannot be used to categorize mucosal pressure ulcers.¹¹

- 3. Educate the individual with a medical device in the community setting and his/her caregivers to perform regular skin inspections. (Strength of Evidence = C; Strength of Recommendation = 👍👍)**

Recommendations for Prevention of Medical Device Related Pressure Ulcers

- 1. Remove medical devices that are potential sources of pressure as soon as medically feasible. (Strength of Evidence = C; Strength of Recommendation = 👍👍)**

- 2. Keep skin clean and dry under medical devices. (Strength of Evidence = C; Strength of Recommendation = 👍👍)**

Moisture underneath a medical device creates an environment in which the skin is more vulnerable to alterations in skin integrity, including irritant dermatitis and ulceration.

- 3. Reposition the individual and/or the medical device to redistribute pressure and decrease shear forces. (Strength of Evidence = C; Strength of Recommendation = 👍👍)**

- 3.1. **Do not position the individual directly on a medical device unless it cannot be avoided. (Strength of Evidence = C; Strength of Recommendation = 👍👍)**
- 3.2. **Reposition the individual to redistribute pressure and shear forces created by the medical device. (Strength of Evidence = C; Strength of Recommendation = 👍👍)**
- 3.3. **Rotate or reposition medical devices when possible. (Strength of Evidence = C; Strength of Recommendation = 👍)**

Caution: always validate that the depth of an ET tube does not change with tube manipulation.

- 3.4. **Provide support for medical devices as needed to decrease pressure and shear forces. (Strength of Evidence = C; Strength of Recommendation = 👍)**
4. **Consider using a prophylactic dressing for preventing medical device related pressure ulcers. (Strength of Evidence = B; Strength of Recommendation = 👍)**

Caution: Avoid excessive layering of prophylactic dressings that may increase pressure at the skin-device interface.

- 4.1. **When selecting a prophylactic dressing consider:**
 - **ability of the dressing to manage moisture and microclimate, especially when used with a medical device that may be in contact with bodily fluids/drainage (e.g. percutaneous endoscopic gastrostomy tube);**
 - **ease of application and removal;**
 - **ability to regularly assess skin condition;**
 - **thickness of the dressing under tightly fitting devices;**
 - **anatomical location of the medical device; and**
 - **type/purpose of the medical device. (Strength of Evidence = C; Strength of Recommendation = 👍👍)**

It is important to select a dressing that is appropriate to the individual and the clinical use.

TREATMENT OF PRESSURE ULCERS

CLASSIFICATION OF PRESSURE ULCERS

Introduction

A pressure ulcer classification system is used to aid in the description of the extent of skin and tissue damage presenting as a pressure ulcer.

Differential Diagnosis

- 1. Differentiate pressure ulcers from other types of wounds. (Strength of Evidence = C; Strength of Recommendation = 👍👍)**

Open wounds from various etiologies (e.g., venous ulcers, neuropathic ulcers, incontinence associated dermatitis, skin tears and intertrigo) may appear similar to a pressure ulcer; however, the treatment of any wound begins with comprehension of its etiology.

Pressure Ulcer Classification Systems

- 1. Use the International NPUAP/EPUAP Pressure Ulcer Classification System to classify and document the level of tissue loss. (Strength of Evidence = C; Strength of Recommendation = 👍👍)**
- 2. Rely on assessment of skin temperature, change in tissue consistency and pain rather than identification of nonblanchable erythema when classifying Category/Stage I pressure ulcers and suspected deep tissue injury in individuals with darkly pigmented skin. (Strength of Evidence = C; Strength of Recommendation = 👍)**

Category/Stage I pressure ulcers and suspected deep tissue injury (SDTI) may be difficult to detect with visual inspection alone in dark skinned individuals.

- 3. Assess skin heat, tenderness, change in tissue consistency and pain to assist in identifying the severity of Category/Stage II to IV and unstageable pressure ulcers in individuals with darkly pigmented skin. (Strength of Evidence = C; Strength of Recommendation = 👍)**

The full extent and severity of open pressure ulcers may be overlooked without a full assessment of the surrounding skin. Inflammatory redness from cellulitis and deeper tissue damage may be difficult to detect in individuals with darkly pigmented skin.

- 4. Use the International NPUAP/EPUAP Pressure Ulcer Classification System to classify and document the level of tissue loss in medical device related pressure ulcers. (Strength of Evidence = C; Strength of Recommendation = 👍)**

Medical device related pressure ulcers should be classified according to the amount of visible tissue loss using the International NPUAP/EPUAP Pressure Ulcer Classification System, as for most other pressure ulcers.

- 5. Do not use the International NPUAP/EPUAP Pressure Ulcer Classification System to describe tissue loss in wounds other than pressure ulcers. (Strength of Evidence = C; Strength of Recommendation = 👍👍)**

Pressure ulcer classification systems should only be used to document tissue loss in ulcers resulting from pressure or pressure in combination with shear.

- 6. Do not categorize/stage pressure ulcers on mucous membranes. (Strength of Evidence = C; Strength of Recommendation = 👍)**

The classification system for pressure ulcers of the skin cannot be used to categorize mucosal pressure ulcers.

- 7. Verify that there is clinical agreement in pressure ulcer classification amongst the health professionals responsible for classifying pressure ulcers. (Strength of Evidence = B; Strength of Recommendation = 👍)**

ASSESSMENT OF PRESSURE ULCERS AND MONITORING OF HEALING

Introduction

Comprehensive assessment of the individual and his or her pressure ulcer informs development of the most appropriate management plan and ongoing monitoring of wound healing. Effective assessment and monitoring of wound healing is based on scientific principles, as described in this section of the guideline.

Assessment of the Individual with a Pressure Ulcer

1. **Complete a comprehensive initial assessment of the individual with a pressure ulcer. An initial assessment includes:**
 - Values and goals of care of the individual and/or the individual's significant others.
 - A complete health/medical and social history.
 - A focused physical examination that includes:
 - factors that may affect healing (e.g., impaired perfusion, impaired sensation, systemic infection);
 - vascular assessment in the case of extremity ulcers (e.g., physical examination, history of claudication, and ankle-brachial index or toe pressure); and
 - laboratory tests and x-rays as needed.
 - Nutrition.
 - Pain related to pressure ulcers.
 - Risk for developing additional pressure ulcers.
 - Psychological health, behavior, and cognition.
 - Social and financial support systems.
 - Functional capacity, particularly in regard to repositioning, posture and the need for assistive equipment and personnel.
 - The employment of pressure relieving and redistributing maneuvers.
 - Resources available to the individual (e.g. pressure redistribution support surfaces).
 - Knowledge and belief about prevention and treatment of pressure ulcers.
 - Ability to adhere to a prevention and management plan. (Strength of Evidence = C; Strength of Recommendation = 👍👍)

Assessment of the individual, his or her ability to heal, the risk for development of additional pressure ulcers, and the ulcer itself are important.

2. **Reassess the individual, the pressure ulcer and the plan of care if the ulcer does not show signs of healing as expected despite appropriate local wound care, pressure redistribution, and nutrition. (Strength of Evidence = C; Strength of Recommendation = 👍👍)**
 - 2.1. **Expect some signs of pressure ulcer healing within two weeks. (Strength of Evidence = B; Strength of Recommendation = 👍)**
 - 2.2. **Adjust expectations for healing in the presence of multiple factors that impair wound healing. (Strength of Evidence = B; Strength of Recommendation = 👍)**

If progress toward healing is not seen within two weeks, the individual, the pressure ulcer, and the plan of care should be re-evaluated.

3. **Teach the individual and his or her significant others about:**
 - the normal healing process,
 - how to identify signs of healing or deterioration, and
 - signs and symptoms that should be brought to the health professional's attention. (Strength of Evidence = C; Strength of Recommendation = 👍👍)

Pressure Ulcer Assessment

1. Assess the pressure ulcer initially and re-assess it at least weekly. (Strength of Evidence = C; Strength of Recommendation = 👍👍)

1.1. Document the results of all wound assessments. (Strength of Evidence = C; Strength of Recommendation = 👍👍)

A two-week period is recommended for evaluating progress toward healing. However, weekly assessments provide an opportunity for the health professional to assess the ulcer more regularly, detect complications as early as possible, and adjust the treatment plan accordingly.

2. With each dressing change, observe the pressure ulcer for signs that indicate a change in treatment is required (e.g., wound improvement, wound deterioration, more or less exudate, signs of infection, or other complications). (Strength of Evidence = C; Strength of Recommendation = 👍👍)

2.1. Address signs of deterioration immediately. (Strength of Evidence = C; Strength of Recommendation = 👍👍)

Signs of deterioration (e.g., increase in wound dimensions, change in tissue quality, increase in wound exudate or other signs of clinical infection) should be addressed immediately.

3. Assess and document physical characteristics including:

- location,
- Category/Stage,
- size,
- tissue type(s),
- color,
- periwound condition,
- wound edges,
- sinus tracts,
- undermining,
- tunneling,
- exudate, and
- odor. (Strength of Evidence = C; Strength of Recommendation = 👍👍)

4. For Category/Stage II to IV and unstageable pressure ulcers in individuals with darkly pigmented skin, prioritize assessment of the following characteristics:

- skin heat,
- skin tenderness,
- change in tissue consistency, and
- pain. (Strength of Evidence = C; Strength of Recommendation = 👍)

Inflammatory redness from cellulitis and deeper tissue damage may be difficult to detect in individuals with darkly pigmented skin.

5. Position the individual in a consistent neutral position for wound measurement. (Strength of Evidence = C; Strength of Recommendation = 👍)

It is possible to distort soft tissue with variations in positioning yielding a larger or smaller measurement depending on position of the individual.

6. Select a uniform, consistent method for measuring wound length and width or wound area to facilitate meaningful comparisons of wound measurements across time. (Strength of Evidence = B; Strength of Recommendation = 👍)

7. Select a consistent, uniform method for measuring depth. (Strength of Evidence = C; Strength of Recommendation = 👍)

Caution: Care should be taken to avoid causing injury when probing the depth of a wound bed or determining the extent of undermining or tunneling.

8. Consider further diagnostic investigations of wound bed tissue when healing does not progress. (Strength of Evidence = C; Strength of Recommendation = 👍)

In some cases tissue biopsies can improve understanding of the healing process and potential for healing. Differential expression levels of specific wound proteins assayed by mass spectrometry and multiplexed microassays are predictive of healing in the wound.

9. Use the findings of a pressure ulcer assessment to plan and document interventions that will best promote healing. (Strength of Evidence = C; Strength of Recommendation = 👍👍)

9.1. Reevaluate the pressure ulcer assessment plan if the pressure ulcer does not show signs of healing within two weeks. (Strength of Evidence = C; Strength of Recommendation = 👍👍)

Methods for Monitoring Healing

Currently in clinical practice pressure ulcers are monitored using the clinical judgment of a health professional supported by pressure ulcer assessment tools and digital photography. In some clinical settings, digital data collection devices are becoming available.

1. Assess progress toward healing using a valid and reliable pressure ulcer assessment scale. (Strength of Evidence = B; Strength of Recommendation = 👍)

Numerous pressure ulcer assessment scales/tools have been designed to aid in assessing the progress of pressure ulcer healing, including the Bates-Jensen Wound Assessment Tool (BWAT), the Pressure Ulcer Scale for Healing (PUSH®), the Pressure Sore Status Tool (PSST) and DESIGN/DESIGN-R.

2. Use clinical judgment to assess signs of healing such as decreasing amount of exudate, decreasing wound size, and improvement in wound bed tissue. (Strength of Evidence = C; Strength of Recommendation = 👍)

3. Consider using baseline and serial photographs to monitor pressure ulcer healing over time. (Strength of Evidence = C; Strength of Recommendation = 👍)

Photographs should not replace bedside assessment, but may serve as a useful documentation strategy. If used, photographic techniques and equipment should be standardized to ensure accurate representation of the pressure ulcer condition that can be reliably compared over time.

PAIN ASSESSMENT AND TREATMENT

Introduction

Pressure ulcers are painful. Individuals with pressure ulcers experience ulcer related pain that can be quantified and differentiated from other pain, and this pain occurs both during procedures and at rest.

Assess for Pressure Ulcer Pain

1. Assess all individuals for pain related to a pressure ulcer or its treatment and document findings. (Strength of Evidence = C; Strength of Recommendation = 👍👍)

An initial pain assessment should include the following four elements:

- a detailed pain history including the character, intensity and duration of pressure ulcer pain;
- a physical examination that includes a neurological component;
- a psychosocial assessment; and
- an appropriate diagnostic work-up to determine the type and cause of the pain.¹²

2. Assess for pressure ulcer related pain in adults using a scale that is valid and reliable. (Strength of Evidence = C; Strength of Recommendation = 👍)

- 2.1. **Incorporate the individual's cognitive ability into the selection of a pain assessment tool. (Strength of Evidence = C; Strength of Recommendation = 👍👍)**
3. **Assess for pain in neonates and children using a validated scale. (Strength of Evidence = C; Strength of Recommendation = 👍)**
 - 3.1. **Use the FLACC (Face, Leg, Activity, Cry, and Consolability) tool for children 2 months to 7 years of age. (Strength of Evidence = C; Strength of Recommendation = 👍)**
 - 3.2. **Use the CRIES (Crying; Requires O2 for Saturation > 95%; Increasing vital signs; Expression; Sleepless) Scale for neonates up to 6 months. (Strength of Evidence = C; Strength of Recommendation = 👍)**
4. **Pain assessment tools may not provide sufficient information to guide interventions. Investigate other aspects of the pain in order to provide more effective, individualized interventions. (Strength of Evidence = C; Strength of Recommendation = 👍👍)**
 - 4.1. **Incorporate the individual's body language and nonverbal cues into the assessment of pain. (Strength of Evidence = C; Strength of Recommendation = 👍👍)**
 - 4.2. **Incorporate the words used by the individual to express pressure ulcer pain character into the assessment of pain. (Strength of Evidence = C; Strength of Recommendation = 👍)**
 - 4.3. **Evaluate factors that increase pain frequency and/or intensity when conducting an assessment of pain. (Strength of Evidence = C; Strength of Recommendation = 👍👍)**
 - 4.4. **Evaluate the duration of the pressure ulcer and associated pain when conducting an assessment of pain. (Strength of Evidence = C; Strength of Recommendation = 👍)**
5. **Assess for deterioration of the ulcer or possible infection when the individual reports increasing intensity of pain over time. (Strength of Evidence = C; Strength of Recommendation = 👍👍)**
6. **Assess the impact of pressure ulcer pain on the individual's quality of life. (Strength of Evidence = C; Strength of Recommendation = 👍)**

Pressure ulcers have measureable and persistent impact on health-related quality of life measures.

Prevent Pressure Ulcer Pain

1. **Use a lift or transfer sheet to minimize friction and/or shear when repositioning an individual, keeping bed linens smooth and unwrinkled. (Strength of Evidence = C; Strength of Recommendation = 👍)**
2. **Position the individual off the pressure ulcer whenever possible. (Strength of Evidence = C; Strength of Recommendation = 👍👍)**

Continued positioning on a pressure ulcer can result in increased pressure, pain and damage to the area.

3. **Avoid postures that increase pressure, such as Fowler's position greater than 30° or 90° side-lying position, or the semi-recumbent position. (Strength of Evidence = C; Strength of Recommendation = 👍)**

Manage Pressure Ulcer Pain

1. **Organize care delivery to ensure that it is coordinated with pain medication administration and that minimal interruptions follow. Set priorities for treatment. (Strength of Evidence = C; Strength of Recommendation = 👍👍)**

Pain management includes performing care after administration of pain medication to minimize pain experienced and interruptions to comfort for the individual.

2. **Encourage individuals to request a 'time out' during any procedure that causes pain. (Strength of Evidence = C; Strength of Recommendation = 👍👍)**
3. **Reduce pressure ulcer pain by keeping the wound bed covered and moist, and using a non-adherent dressing. (Note: Stable dry eschar is usually not moistened). (Strength of Evidence = B; Strength of Recommendation = 👍👍)**

- 4. Select a wound dressing that requires less frequent changing and is less likely to cause pain. (Strength of Evidence = C; Strength of Recommendation = 👍👍)**

Hydrocolloids, hydrogels, alginates, polymeric membrane foams, foam and soft silicone wound dressings should be considered for management of painful pressure ulcers. A wound dressing that allows for less frequent changing is advised.

- 4.1. Where available, consider ibuprofen impregnated wound dressings as a topical analgesic treatment for pressure ulcer pain. (Strength of Evidence = C; Strength of Recommendation = 👍)**

n.b. Ibuprofen-impregnated dressings are not available in the U.S.

- 5. Consider the use of non-pharmacological pain management strategies to reduce pain associated with pressure ulcers. (Strength of Evidence = C; Strength of Recommendation = 👍)**
- 6. Administer pain medication regularly, in the appropriate dose, to control chronic pain following the World Health Organization Pain Dosing Ladder. (Strength of Evidence = C; Strength of Recommendation = 👍👍)**
- 7. Encourage repositioning as a means to reduce pain, if consistent with the individual's wishes. (Strength of Evidence = C; Strength of Recommendation = 👍👍)**

Reduce Procedural Pain

- 1. Use adequate pain control measures, including additional dosing, prior to commencing wound care procedures. (Strength of Evidence = C; Strength of Recommendation = 👍👍)**
- 2. Consider using topical opioids (diamorphine or benzydamine 3%) to reduce or eliminate pressure ulcer pain. (Strength of Evidence = B; Strength of Recommendation = 👍)**

Caution: Topically applied opioids may be associated with increased systemic side effects in individuals taking systemic opioids. Local itching and irritation has been reported, but not more frequently than when a placebo gel is applied.¹³

Availability of these preparations may vary from country to country.

- 3. Consider using topical anesthetics to reduce or eliminate pressure ulcer pain. (Strength of Evidence = C; Strength of Recommendation = 👍)**

Topical anesthetics include eutectic mixture of lidocaine and prilocaine (EMLA®, AstraZeneca, Alderley Park, UK), which is applied to the periwound area.

Manage Chronic Pain

- 1. Refer the individual with chronic pain related to pressure ulceration to the appropriate pain and/or wound clinic resources. (Strength of Evidence = C; Strength of Recommendation = 👍👍)**
- 2. Work with the multi-disciplinary health care team to develop a holistic plan to manage chronic pressure ulcer pain. (Strength of Evidence = C; Strength of Recommendation = 👍👍)**

This should be developed with input from a range of health professionals (e.g., pain specialists, medical professionals, nursing and allied health professionals), the individual and his or her caregivers.

Educate Individuals, Family and Health Care Providers

- 1. Educate the individual, caregivers, and health care providers about causes, assessment and management of pressure ulcer pain. (Strength of Evidence = C; Strength of Recommendation = 👍👍)**

WOUND CARE: CLEANSING

Introduction

Cleansing is an important first step in preparing the pressure ulcer wound bed to heal by removing surface debris and dressing remnants and allowing better wound visualization for assessment.

Recommendations

1. **Cleanse the pressure ulcer at the time of each dressing change. (Strength of Evidence = C; Strength of Recommendation = 👍)**
 - 1.1. **Cleanse most pressure ulcers with potable water (i.e., water suitable for drinking) or normal saline. (Strength of Evidence = C; Strength of Recommendation = 👍)**
 - 1.2. **Consider using an aseptic technique when the individual, the wound or the wound healing environment is compromised. (Strength of Evidence = C; Strength of Recommendation = 👍)**
 - 1.3. **Consider using cleansing solutions with surfactants and/or antimicrobials to clean pressure ulcers with debris, confirmed infection, suspected infection, or suspected high levels of bacterial colonization. (Strength of Evidence = C; Strength of Recommendation = 👍)**
 - 1.4. **Cleanse pressure ulcers with sinus tracts/tunneling/undermining with caution. (Strength of Evidence = C; Strength of Recommendation = 👍)**
2. **Apply cleansing solution with sufficient pressure to cleanse the wound without damaging tissue or driving bacteria into the wound. (Strength of Evidence = C; Strength of Recommendation = 👍)**
 - 2.1. **Contain and properly dispose of used irrigation solution to reduce cross-contamination. (Strength of Evidence = C; Strength of Recommendation = 👍👍)**
3. **Cleanse surrounding skin. (Strength of Evidence = B; Strength of Recommendation = 👍👍)**

WOUND CARE: DEBRIDEMENT

Recommendations

1. **Debride devitalized tissue within the wound bed or edge of pressure ulcers when appropriate to the individual's condition and consistent with overall goals of care. (Strength of Evidence = C; Strength of Recommendation = 👍👍)**

Caution: Debridement should only be performed when there is adequate perfusion to the wound (refer to Recommendation 9).

Devitalized tissue is tissue that is nonviable or necrotic.

2. **Debride the wound bed when the presence of biofilm is suspected or confirmed. (Strength of Evidence = C; Strength of Recommendation = 👍)**

When a wound has delayed healing (i.e., four weeks or more) and fails to respond to standard wound care and/or antimicrobial therapy, have a high index of suspicion of the presence of biofilm.

3. Select the debridement method(s) most appropriate to the individual, the wound bed, and the clinical setting. (Strength of Evidence = C; Strength of Recommendation = 👍👍)

The most common methods used for debriding pressure ulcers are:

- surgical/sharp,
- conservative sharp,
- autolytic,
- enzymatic,
- larval, and
- mechanical (including ultrasound and hydrosurgical).

4. Use mechanical, autolytic, enzymatic, and/or biological methods of debridement when there is no urgent clinical need for drainage or removal of devitalized tissue. (Strength of Evidence = C; Strength of Recommendation = 👍)

5. Surgical/sharp debridement is recommended in the presence of extensive necrosis, advancing cellulitis, crepitus, fluctuance, and/or sepsis secondary to ulcer-related infection. (Strength of Evidence = C; Strength of Recommendation = 👍)

6. Conservative sharp debridement and surgical/sharp debridement must be performed by specially trained, competent, qualified, and licensed health professionals consistent with local legal and regulatory statutes. (Strength of Evidence = C; Strength of Recommendation = 👍👍)

7. Use sterile instruments for conservative sharp and surgical/sharp debridement. (Strength of Evidence = C; Strength of Recommendation = 👍👍)

8. Use conservative sharp debridement with caution in the presence of:

- immune incompetence,
- compromised vascular supply, or
- lack of antibacterial coverage in systemic sepsis (Strength of Evidence = C; Strength of Recommendation = 👍).

Caution: Relative contraindications include anticoagulant therapy and bleeding disorders.

9. Refer individuals with Category/Stage III or IV pressure ulcers with undermining, tunneling/sinus tracts, and/or extensive necrotic tissue that cannot be easily removed by other debridement methods for surgical evaluation as appropriate to the individual's condition and goals of care. (Strength of Evidence = C; Strength of Recommendation = 👍👍)

10. Manage pain associated with debridement. (Strength of Evidence = C; Strength of Recommendation = 👍👍)

11. Perform a thorough vascular assessment prior to debridement of lower extremity pressure ulcers to determine whether arterial status/supply is sufficient to support healing of the debrided wound. (Strength of Evidence = C; Strength of Recommendation = 👍👍)

12. Do not debride stable, hard, dry eschar in ischemic limbs. (Strength of Evidence = C; Strength of Recommendation = 👍)

12.1. Assess stable, hard, dry eschar at each wound dressing change and as clinically indicated. (Strength of Evidence = C; Strength of Recommendation = 👍👍)

Assessment of an ulcer covered with dry, stable eschar should be performed at each dressing change and as clinically indicated to detect the first signs of any developing infection. Clinical indications that the dry, stable eschar requires assessment and intervention include signs of erythema, tenderness, edema, purulence, fluctuance, crepitus, and/or malodor (i.e., signs of infection) in the area around the dressing.

12.2. Consult a medical practitioner/vascular surgeon urgently in the presence of the above symptoms. (Strength of Evidence = C; Strength of Recommendation = 👍)

12.3. Debride the pressure ulcer urgently in the presence of the above symptoms (i.e, erythema, tenderness, edema, purulence, fluctuance, crepitus, and/or malodour). (Strength of Evidence = C; Strength of Recommendation = 👍)

- 13. Perform maintenance debridement on a pressure ulcer until the wound bed is free of devitalized tissue and covered with granulation tissue. (Strength of Evidence = C; Strength of Recommendation = 👍)**

ASSESSMENT AND TREATMENT OF INFECTION AND BIOFILMS

Introduction

Bacteria are present on all skin surfaces. When the primary defense provided by intact skin is lost, bacteria will reside on the wound surface. When the bacteria (by numbers or virulence in relation to host resistance) cause damage to the body, infection is present. Wound infection may also be associated with biofilms.

System Consideration

- 1. Follow local infection control policies to prevent self-contamination and cross-contamination in individuals with pressure ulcers. (Strength of Evidence = C; Strength of Recommendation = 👍)**

Assessment of High Risk Individuals with Pressure Ulcers

- 1. Have a high index of suspicion of local infection in a pressure ulcer in the presence of:**
- lack of signs of healing for two weeks;
 - friable granulation tissue;
 - malodor;
 - increased pain in the ulcer;
 - increased heat in the tissue around the ulcer;
 - increased drainage from the wound;
 - an ominous change in the nature of the wound drainage (e.g., new onset of bloody drainage, purulent drainage);
 - increased necrotic tissue in the wound bed; and/or
 - pocketing or bridging in the wound bed. (Strength of Evidence = B; Strength of Recommendation = 👍👍)

Wound healing is delayed and/or may be abnormal when pressure ulcers have significant bacterial burden and infection.

- 2. Have a high index of suspicion for the likelihood of infection in pressure ulcers that:**
- have necrotic tissue or a foreign body present;
 - have been present for a long period of time;
 - are large in size or deep; and/or
 - are likely to be repetitively contaminated (e.g., near the anus). (Strength of Evidence = C; Strength of Recommendation = 👍)
- 3. Have a high index of suspicion for local wound infection in individuals with:**
- diabetes mellitus,
 - protein-calorie malnutrition,
 - hypoxia or poor tissue perfusion,
 - autoimmune disease, or
 - immunosuppression. (Strength of Evidence = B; Strength of Recommendation = 👍)
- 4. Have a high index of suspicion of biofilm in a pressure ulcer that:**
- has been present for more than 4 weeks;
 - lacks signs of any healing in the previous 2 weeks;
 - displays clinical signs and symptoms of inflammation;
 - does not respond to antimicrobial therapy. (Strength of Evidence = C; Strength of Recommendation = 👍)

Diagnosis of Infection

1. Consider a diagnosis of spreading acute infection if the pressure ulcer has local and/or systemic signs of acute infection, such as:
 - erythema extending from the ulcer edge;
 - induration;
 - new or increasing pain or warmth;
 - purulent drainage;
 - increase in size;
 - crepitus, fluctuance, or discoloration in the surrounding skin;
 - fever, malaise, and lymph node enlargement; or
 - confusion/delirium and anorexia (particularly in older adults). (Strength of Evidence = C; Strength of Recommendation = 👍👍)
2. Determine the bacterial bioburden of the pressure ulcer by tissue biopsy or quantitative swab technique. (Strength of Evidence = B; Strength of Recommendation = 👍)

In the absence of clinical signs of infection, the quantity of organisms (microbial load) is believed to be the best indicator of wound infection. The gold standard method for examining microbial load is quantitative culture of viable biopsied wound tissue.

- 2.1. Consider using tissue biopsy and microscopy to determine the presence of biofilm. (Strength of Evidence = C; Strength of Recommendation = 👉)
3. Consider a diagnosis of pressure ulcer infection if the culture results indicate bacterial bioburden of $\geq 10^5$ CFU/g of tissue and/or the presence of beta hemolytic streptococci. (Strength of Evidence = B; Strength of Recommendation = 👍)

Treatment

1. Optimize the host response by:
 - evaluating nutritional status and addressing deficits;
 - stabilizing glycemic control;
 - improving arterial blood flow; and/or
 - reducing immunosuppressant therapy if possible. (Strength of Evidence = C; Strength of Recommendation = 👍👍)

Many systemic factors contribute to the development of pressure ulcers. If these same factors can be improved, the individual's intrinsic ability to fight infection can usually also be improved.

2. Prevent contamination of the pressure ulcer. (Strength of Evidence = C; Strength of Recommendation = 👍👍)
3. Reduce bacterial load and biofilm in the pressure ulcer as outlined in the *Wound Care: Cleansing* and *Wound Care: Debridement* sections. (Strength of Evidence = C; Strength of Recommendation = 👍)
4. Consider the use of tissue appropriate strength, non-toxic topical antiseptics for a limited time period to control bacterial bioburden. (Strength of Evidence = C; Strength of Recommendation = 👍)

Warning: Hydrogen peroxide is highly toxic to tissues even at low concentrations^{14, 15} and should not be used as a preferred topical antiseptic. Its use should be totally avoided in cavity wounds due to the risk of surgical emphysema and gas embolus.¹⁵⁻¹⁷

Caution: Iodine products should be avoided in patients with impaired renal failure, history of thyroid disorders or known iodine sensitivity.^{18, 19} Sodium hypochlorite (Dakin's solution) is cytotoxic at all concentrations and should be used with caution, at concentrations no greater than 0.025%, for short periods only when no other appropriate option is available.²⁰⁻²² There is a risk of acidosis when acetic acid is used for extended periods over large wound surface areas.²³

Antiseptics commonly used in wounds include:

- iodine compounds (povidone iodine and slow-release cadexomer iodine),
- silver compounds (including silver sulfadiazine),
- polyhexanide and betaine (PHMB),
- chlorhexidine,
- sodium hypochlorite, and
- acetic acid.

5. Consider the use of topical antiseptics in conjunction with maintenance debridement to control and eradicate suspected biofilm in wounds with delayed healing. (Strength of Evidence = C; Strength of Recommendation = 👍)
6. Consider the use of topical antiseptics for pressure ulcers that are not expected to heal and are critically colonized/topically infected. (Strength of Evidence = C; Strength of Recommendation = 👍)
7. Consider use of silver sulfadiazine in heavily contaminated or infected pressure ulcers until definitive debridement is accomplished. (Strength of Evidence = C; Strength of Recommendation = 🤔)

Caution: Silver may have toxic properties, especially to keratinocytes and fibroblasts; the extent of the toxicities is not fully described. Topical silver products should not be used on individuals with silver sensitivities, and silver sulfadiazine products are not recommended for people with sulfur sensitivities.²⁴

8. Consider the use of medical-grade honey in heavily contaminated or infected pressure ulcers until definitive debridement is accomplished. (Strength of Evidence = C; Strength of Recommendation = 🤔)

Caution: Before applying a honey dressing, ensure the individual is not allergic to honey. Individuals who have bee or bee stings allergies are usually able to use properly irradiated honey products.²⁵

9. Limit the use of topical antibiotics on infected pressure ulcers, except in special situations where the benefit to the patient outweighs the risk of antibiotic side effects and resistance. (Strength of Evidence = C; Strength of Recommendation = 👍)

In general, topical antibiotics are not recommended for treating pressure ulcers.

10. Use systemic antibiotics for individuals with clinical evidence of systemic infection, such as positive blood cultures, cellulitis, fasciitis, osteomyelitis, systemic inflammatory response syndrome (SIRS), or sepsis. (Strength of Evidence = C; Strength of Recommendation = 👍)

Judicious use of systemic antibiotics remains an important consideration.

11. Drain local abscesses. (Strength of Evidence = C; Strength of Recommendation = 👍👍)
12. Evaluate the individual for osteomyelitis if exposed bone is present, the bone feels rough or soft, or the ulcer has failed to heal with prior therapy. (Strength of Evidence = C; Strength of Recommendation = 👍)

Permanent healing of the pressure ulcer is unlikely until osteomyelitis is controlled.

WOUND DRESSINGS FOR TREATMENT OF PRESSURE ULCERS

General Recommendations

1. Select a wound dressing based on the:
 - ability to keep the wound bed moist;
 - need to address bacterial bioburden;
 - nature and volume of wound exudate;
 - condition of the tissue in the ulcer bed;
 - condition of periulcer skin;
 - ulcer size, depth and location;
 - presence of tunneling and/or undermining;
 - goals of the individual with the ulcer. (Strength of Evidence = C; Strength of Recommendation = 👍👍)
2. Protect peri-ulcer skin. (Strength of Evidence = C; Strength of Recommendation = 👍👍)
3. Assess pressure ulcers at every wound dressing change and confirm the appropriateness of the current dressing regimen. (Strength of Evidence = C; Strength of Recommendation = 👍👍)

4. **Follow manufacturer recommendations, especially related to frequency of dressing change. (Strength of Evidence = C; Strength of Recommendation = 👍)**
5. **Change the wound dressing if feces seep beneath the dressing. (Strength of Evidence = C; Strength of Recommendation = 👍👍)**
6. **The plan of care should guide usual dressing wear times and contain provisional plans for dressing changes as needed (for family, the individual, and staff) due to soilage, loosening, etc. (Strength of Evidence = C; Strength of Recommendation = 👍👍)**
7. **Ensure all wound dressing products are completely removed with each dressing change. (Strength of Evidence = C; Strength of Recommendation = 👍)**

Hydrocolloid Dressings

1. **Use hydrocolloid dressings for clean Category/Stage II pressure ulcers in body areas where they will not roll or melt. (Strength of Evidence = B; Strength of Recommendation = 👍)**
2. **Consider using hydrocolloid dressing on noninfected, shallow Stage III pressure ulcers. (Strength of Evidence = B; Strength of Recommendation = 🤔)**
3. **Consider using filler dressings beneath hydrocolloid dressings in deep ulcers to fill in dead space. (Strength of Evidence = B; Strength of Recommendation = 👍)**
4. **Carefully remove hydrocolloid dressings on fragile skin to reduce skin trauma. (Strength of Evidence = B; Strength of Recommendation = 👍👍)**

Transparent Film Dressings

1. **Consider using film dressings for autolytic debridement when the individual is not immunocompromised. (Strength of Evidence = C; Strength of Recommendation = 🤔)**
2. **Consider using film dressings as a secondary dressing for pressure ulcers treated with alginates or other wound filler that will likely remain in the ulcer bed for an extended period of time (e.g., 3 to 5 days). (Strength of Evidence = C; Strength of Recommendation = 🤔)**
3. **Carefully remove film dressings on fragile skin to reduce skin trauma. (Strength of Evidence = C; Strength of Recommendation = 👍👍)**
4. **Do not use film dressings as the tissue interface layer over moderately to heavily exuding ulcers. (Strength of Evidence = C; Strength of Recommendation = 👍)**
5. **Do not use film dressings as the cover dressing over enzymatic debriding agents, gels, or ointments. (Strength of Evidence = C; Strength of Recommendation = 👍)**

Hydrogel Dressings

1. **Consider using hydrogel dressings on shallow, minimally exuding pressure ulcers. (Strength of Evidence = B; Strength of Recommendation = 👍)**
2. **Consider using amorphous hydrogel for pressure ulcers that are not clinically infected and are granulating. (Strength of Evidence = B; Strength of Recommendation = 👍)**
3. **Consider using hydrogel dressings for treatment of dry ulcer beds. (Strength of Evidence = C; Strength of Recommendation = 👍)**
4. **Consider using hydrogel dressings for painful pressure ulcers. (Strength of Evidence = C; Strength of Recommendation = 👍)**
5. **Consider using hydrogel sheet dressings for pressure ulcers without depth and contours and/or on body areas that are at risk for wound dressing migration. (Strength of Evidence = C; Strength of Recommendation = 👍)**
6. **Consider using amorphous hydrogel for pressure ulcers with depth and contours and/or on body areas that are at risk for dressing migration. (Strength of Evidence = C; Strength of Recommendation = 👍)**

Alginate Dressings

1. Consider using alginate dressings for the treatment of moderately and heavily exuding pressure ulcers. (Strength of Evidence = B; Strength of Recommendation = 👍)
2. Consider using alginate dressings in clinically infected pressure ulcers when there is appropriate concurrent treatment of infection. (Strength of Evidence = C; Strength of Recommendation = 👍)
3. Gently remove the alginate dressing, irrigating it first to ease removal if necessary. (Strength of Evidence = C; Strength of Recommendation = 👍👍)
4. Consider lengthening the interval between wound dressing changes or changing the type of wound dressing if the alginate dressing is still dry at the scheduled time for dressing change. (Strength of Evidence = C; Strength of Recommendation = 👍)

Foam Dressings

1. Consider using foam dressings on exuding Category/Stage II and shallow Category/Stage III pressure ulcers. (Strength of Evidence = B; Strength of Recommendation = 👍)
2. Avoid using single small pieces of foam in exuding cavity ulcers. (Strength of Evidence = C; Strength of Recommendation = 👍)
3. Consider using gelling foam dressing in highly exuding pressure ulcers. (Level of Evidence C; Strength of Recommendation = 👍)

Silver-Impregnated Dressings

1. Consider using silver-impregnated dressings for pressure ulcers that are clinically infected or heavily colonized. (Strength of Evidence = B; Strength of Recommendation = 👍)
2. Consider using silver-impregnated dressings for ulcers at high risk of infection. (Strength of Evidence = B; Strength of Recommendation = 👍)
3. Avoid prolonged use of silver-impregnated dressings. Discontinue silver dressings when wound infection is controlled. (Strength of Evidence = C; Strength of Recommendation = 👍👍)

Caution: Topical silver products should not be used on patients with silver sensitivities. Silver may have toxic properties, especially to keratinocytes and fibroblasts; the extent of the toxicities has not been fully described.

Honey Impregnated Dressings

1. Consider using dressings impregnated with medical-grade honey for the treatment of Category/Stage II and III pressure ulcers. (Strength of Evidence = C; Strength of Recommendation = 👍)

Caution: Before applying a honey dressing, ensure the individual is not allergic to honey. Individuals who have bee or bee stings allergies are usually able to use properly irradiated honey products.²⁵

Cadexomer Iodine Dressings

1. Consider using cadexomer iodine dressings in moderately to highly exuding pressure ulcers. (Strength of Evidence = C; Strength of Recommendation = 👍)

Caution: Iodine products should be avoided in individuals with impaired renal failure, history of thyroid disorders or known iodine sensitivity.^{18, 19} It is not recommended for individuals taking lithium, or for pregnant or breast-feeding women. Iodine toxicity has been reported in a few case studies, especially in those individuals with large wounds, in whom dressings were changed often. The risk of systemic absorption increases when iodine products are used on larger, deeper wound or for prolonged periods.

Gauze Dressings

1. **Avoid using gauze dressings for open pressure ulcers that have been cleansed and debrided because they are labor-intensive, cause pain when removed if dry, and lead to desiccation of viable tissue if they dry. (Strength of Evidence = C; Strength of Recommendation = ⬇)**

Caution: Avoid use of wet-to-dry gauze dressings.

2. **When other forms of moisture-retentive dressing are not available, continually moist gauze is preferable to dry gauze. (Strength of Evidence = C; Strength of Recommendation = ⬆)**
3. **Use gauze dressings as the cover dressing to reduce evaporation when the tissue interface layer is moist. (Strength of Evidence = C; Strength of Recommendation = ⬆)**
4. **Use loosely woven gauze for highly exuding ulcers; use tightly woven gauze for minimally exuding ulcers. (Strength of Evidence = C; Strength of Recommendation = ⬆)**
5. **Loosely fill (rather than tightly pack) ulcers with large tissue defects and dead space with saline-moistened gauze when other forms of moisture-retentive dressing are not available, to avoid creating pressure on the wound bed. (Strength of Evidence = C; Strength of Recommendation = ⬆)**
6. **Change gauze packing often enough to manage exudate. (Strength of Evidence = C; Strength of Recommendation = ⬆)**
7. **Use a single gauze strip/roll to fill deep ulcers; do not use multiple gauze dressings, because retained gauze in the ulcer bed can serve as a source of infection. (Strength of Evidence = C; Strength of Recommendation = ⬆)**
8. **Consider using impregnated forms of gauze to prevent evaporation of moisture from continuously moist gauze dressings. (Strength of Evidence = C; Strength of Recommendation = ⬆)**

Silicone Dressings

1. **Consider using silicone dressings as a wound contact layer to promote atraumatic dressing changes. (Strength of Evidence = C; Strength of Recommendation = ⬆)**
2. **Consider using silicone dressings to prevent periwound tissue injury when periwound tissue is fragile or friable. (Strength of Evidence = B; Strength of Recommendation = ⬆)**

Collagen Matrix Dressings

1. **Consider using collagen matrix dressings for nonhealing Category/Stage III and IV pressure ulcers. (Strength of Evidence = C; Strength of Recommendation = ⬆)**

BIOLOGICAL DRESSINGS FOR THE TREATMENT OF PRESSURE ULCERS

Introduction

Biological dressings include skin substitutes, xenografts, allografts or collagen dressings.

Recommendations

1. **Due to insufficient evidence to support or refute the use of biological dressings in the treatment of pressure ulcers, biological dressings are not recommended for routine use at this time. (Strength of Evidence = C; Strength of Recommendation = ⬆)**

GROWTH FACTORS FOR THE TREATMENT OF PRESSURE ULCERS

Recombinant Platelet-Derived Growth Factor

1. Consider using platelet-derived growth factors for treatment of Category/Stage III and IV pressure ulcers that have delayed healing. (Strength of Evidence = B; Strength of Recommendation = \Rightarrow)

Other Growth Factors

1. Due to insufficient evidence to support or refute the use of growth factors (other than recombinant platelet-derived growth factor) in the treatment of pressure ulcers they are not recommended for routine use at this time. (Strength of Evidence = C; Strength of Recommendation = \Rightarrow)

BIOPHYSICAL AGENTS IN PRESSURE ULCER TREATMENT

Introduction

A number of biophysical agents have been studied in the management of pressure ulcers. All provide some form of biophysical energy with the goal of promoting healing. Common forms of biophysical agents include energy from the electromagnetic spectrum (e.g., electrical stimulation, electromagnetic fields, pulsed radio frequency energy and phototherapy), acoustic energy (high and low frequency ultrasound) and mechanical energy (e.g., subatmospheric energy [negative pressure wound therapy, suction], kinetic energy [whirlpool, pulsatile lavage, vibration] and atmospheric energy [hyperbaric and topical oxygen].

Electrical Stimulation

1. Consider the use of direct contact (capacitive) electrical stimulation to facilitate wound healing in recalcitrant Category/Stage II pressure ulcers as well as any Category/Stage III and IV pressure ulcers. (Strength of Evidence = A; Strength of Recommendation = \Rightarrow)

Electromagnetic Agents

1. Consider the use of pulsed electromagnetic field (PEMF) treatment for recalcitrant Category/Stage II pressure ulcers as well as any Category/Stage III and IV pressure ulcers. (Strength of Evidence = C; Strength of Recommendation = \Rightarrow)

Caution: No major adverse effects of electromagnetic therapy were reported in the research included in this review. Manufacturers of devices used to administer electromagnetic therapy do not recommend their use in individuals with pacemakers or other electrical implants, pregnancy or organ transplant. Caution is recommended for individuals with fever, active bleeding, seizures or dehydration.^{26, 27}

Pulsed Radio Frequency Energy

1. Consider the use of PRFE in the treatment of recalcitrant Category/Stage II pressure ulcers as well as any Category/Stage III and IV pressure ulcers (Strength of Evidence = C; Strength of Recommendation = \Rightarrow)

Caution: No major adverse effects of electrotherapy were reported in the research included in this review. Electrotherapy is contraindicated in individuals with electrical implants (e.g., pacemakers) or who are pregnant. Electrotherapy is contraindicated in local anatomical areas of the eye, testes and any malignancy. Electrotherapy should be used with caution in individuals with impaired circulation or devitalized tissue.²⁸

Phototherapy: Laser, Infrared and Ultraviolet

Infrared Therapy

1. Due to current insufficiency of evidence to support or refute the use of infrared therapy in the treatment of pressure ulcers, infrared therapy is not recommended for routine use at this time. (Strength of Evidence = C; Strength of Recommendation = ⊖)

Laser

1. Due to current insufficiency of evidence to support or refute the use of laser therapy in the treatment of pressure ulcers, laser therapy is not recommended for routine use at this time. (Strength of Evidence = C; Strength of Recommendation = ⊖)

Ultraviolet Light Therapy

1. Consider a short term application of ultraviolet C light (UVC) if traditional therapies fail. (Strength of Evidence = C; Strength of Recommendation = ⊖)
2. Consider a course of ultraviolet light as an adjunctive therapy to reduce bacterial burden in critically colonized Category/Stage III and IV pressure ulcers that have been debrided and cleansed. (Strength of Evidence = C; Strength of Recommendation = ⊖)

Acoustic Energy (Ultrasound)

1. Due to current insufficiency of evidence to support or refute the use of noncontact low frequency (40 kHz) ultrasound spray (NC-LFUS) in the treatment of pressure ulcers, NC-LFUS is not recommended for routine use at this time. (Strength of Evidence = C; Strength of Recommendation = ⊖)

Caution: Noncontact low frequency ultrasound spray should not be used near prostheses, near electronic implanted devices (e.g., cardiac pacemakers), over the lower back or uterus in pregnant women; or over areas of malignancy; or on the face/head.²⁹

2. Consider use of low frequency (22.5, 25 or 35 kHz) ultrasound for debridement of necrotic soft tissue (not eschar). (Strength of Evidence = C; Strength of Recommendation = ⊖)
3. Consider use of high frequency (MHz) ultrasound as an adjunct for the treatment of infected pressure ulcers. (Strength of Evidence = C; Strength of Recommendation = ⊖)

Caution: No major adverse effects of ultrasound were reported in the research included in this review. Its use is not recommended over anatomical areas with implanted materials or devices.

Negative Pressure Wound Therapy

1. Consider NPWT as an early adjuvant for the treatment of deep, Category/Stage III and IV pressure ulcers. (Strength of Evidence = B; Strength of Recommendation = 👍)

Caution: Negative pressure wound therapy is not recommended in inadequately debrided, necrotic or malignant wounds; where vital organs are exposed; in wounds with no exudate; or in individuals with untreated coagulopathy, osteomyelitis or local or systemic clinical infection. Cautious use by an experienced health professional is recommended for individuals on anticoagulant therapy; in actively bleeding wounds; or where the wound is in close proximity to major blood vessels.³⁰

2. Debride the pressure ulcer of necrotic tissue prior to the use of NPWT. (Strength of Evidence = C; Strength of Recommendation = 👍👍)

Negative pressure wound therapy is intended for use in pressure ulcers free of necrotic tissue.

3. Follow a safe regimen in applying and removing the NPWT system. (Strength of Evidence = C; Strength of Recommendation = 👍👍)
4. Evaluate the pressure ulcer with each dressing change. (Strength of Evidence = C; Strength of Recommendation = 👍)

The optimal dressing change interval is not well-established, and should be based on characteristics of the individual and the wound.

5. **If pain is anticipated or reported consider:**
 - placing a nonadherent interface dressing on the wound bed, underneath the foam;
 - lowering the level of pressure, and/or changing type of pressure (continuous or intermittent); and/or
 - using a moist gauze filler instead of foam. (Strength of Evidence = C; Strength of Recommendation = 👍)
6. **Educate the individual and his/her significant others about negative pressure wound therapy when used in the community setting. (Strength of Evidence = C; Strength of Recommendation = 👍👍)**

Hydrotherapy: Whirlpool and Pulsatile Lavage with and without Suction

Whirlpool

1. **Whirlpool should not be considered for routine use in treating pressure ulcers due to the potential for contamination and the emergence of newer hydrotherapies. (Strength of Evidence = C; Strength of Recommendation = 🙅)**

Caution: Individuals with dependent lower extremity edema or peripheral vascular disease,³¹ immunocompromised individuals, those who are mechanically ventilated and lethargic, and incontinent individuals should never be immersed.

Pulsed Lavage with/ without Suction

1. **Consider a course of pulsed lavage with suction for wound cleansing and debridement. (Strength of Evidence = C; Strength of Recommendation = 🙅)**

Vibration Therapy

1. **Due to current insufficiency of evidence to support or refute the use of vibration therapy in the treatment of pressure ulcers, vibration therapy is not recommended for routine use at this time. (Strength of Evidence = C; Strength of Recommendation = 🙅)**

Oxygen for the Treatment of Chronic Wounds

Hyperbaric Oxygen Therapy (HBOT)

1. **Due to current insufficiency of evidence to support or refute the use of hyperbaric oxygen therapy in the treatment of pressure ulcers, hyperbaric oxygen therapy is not recommended for routine use at this time. (Strength of Evidence = C; Strength of Recommendation = 👍)**

Topical Oxygen Therapy

1. **Due to insufficient evidence to support or refute the use of topical oxygen in the treatment of pressure ulcers, topical oxygen is not recommended for routine use at this time. (Strength of Evidence = C; Strength of Recommendation = 🙅)**

SURGERY FOR PRESSURE ULCERS

Introduction

This section focuses on preoperative, intraoperative, and postoperative recommendations for surgical management of pressure ulcers. It does not address specific surgical techniques; those decisions are more appropriately made by an experienced surgeon who has an understanding of the unique needs of the individual requiring surgical management of a pressure ulcer.

Preoperative Recommendations

- 1. Obtain a surgical consultation for possible urgent drainage and/or debridement if the pressure ulcer has advancing cellulitis or is a suspected source of sepsis. (Strength of Evidence = C; Strength of Recommendation = 👍)**

In the presence of clinical signs of infection, dry, stable eschar requires assessment by a medical practitioner/vascular surgeon and possible urgent surgical sharp debridement. These signs include:

- erythema,
- tenderness,
- edema,
- purulence,
- fluctuance,
- crepitance, and/or
- malodor.

- 2. Obtain a surgical consultation for possible surgical sharp debridement for individuals with undermining, tunneling/sinus tracts, and/or extensive necrotic tissue that cannot be easily removed by other debridement methods as appropriate to the individual's condition and goals of care. (Strength of Evidence = C; Strength of Recommendation = 👍👍)**

- 3. Obtain a surgical consultation for possible operative repair in individuals with Category/Stage III or IV pressure ulcers that are not closing with conservative treatment as appropriate to the individual's condition and goals of care, or for individuals who desire more rapid closure of the ulcer. (Strength of Evidence = C; Strength of Recommendation = 👍👍)**

- 3.1. Evaluate the risk of surgery for the individual. (Strength of Evidence = C; Strength of Recommendation = 👍👍)**

- 4. Confirm the individual's end-of-life preferences if anticipating surgery. (Strength of Evidence = C; Strength of Recommendation = 👍👍)**

- 5. Evaluate and optimize factors that may influence surgical healing and long term recurrence prior to surgery. (Strength of evidence = C; Strength of Recommendation = 👍👍)**

- 5.1. Evaluate and promote the individual's ability to adhere to a postoperative management plan. (Strength of Evidence = C; Strength of Recommendation = 👍👍)**

- 5.2. Evaluate and optimize physical factors that may impair surgical wound healing. (Strength of Evidence = B; Strength of Recommendation = 👍👍)**

- 5.3. Procure and maintain equipment for the prevention and treatment of pressure ulcers. (Strength of Evidence = C; Strength of Recommendation = 👍👍)**

Optimally, the individual should be cared for on the high specification pressure redistribution support surface prior to surgery to determine tolerance of the bed (e.g., dyspnea and weightlessness).

- 5.4. Evaluate and optimize psychosocial factors that often impair surgical wound healing. (Strength of Evidence = B; Strength of Recommendation = 👍)**

- 6. Evaluate the individual for osteomyelitis if exposed bone is present, the bone feels rough or soft, or the ulcer has failed to heal with contemporary therapy. (Strength of Evidence = C; Strength of Recommendation = 👍👍)**

- 6.1. Resect infected bone prior to or during surgical closure unless bone involvement is too extensive. (Strength of Evidence = C; Strength of Recommendation = 👍)**

Permanent healing of the pressure ulcer or successful surgical closure are unlikely until osteomyelitis is controlled.

Intraoperative Recommendations

During surgery, patients are immobile, positioned on a relatively hard surface, unable to feel the pain caused by pressure and shear forces, and are unable to change their position in order to relieve pressure. These factors increase the risk of pressure ulcer development in the intra-operative period.

1. **Excise the ulcer, including abnormal skin, granulation and necrotic tissue, sinus tracts, bursa and involved bone to the extent possible at surgical closure. (Strength of Evidence = C; Strength of Recommendation = 👍)**
2. **Design flaps with composite tissues to improve durability. When possible, choose a flap that will not violate adjacent flap territories to preserve all future options for flap coverage. (Strength of Evidence = C; Strength of Recommendation = 👍)**
3. **Use a flap that is as large as possible, placing the suture line away from an area of direct pressure. Minimize tension on the incisions at the time of closure. Consider possible functional loss and rehabilitation needs, especially in ambulatory individuals. (Strength of Evidence = C; Strength of Recommendation = 👍)**
4. **Transfer the individual from the operating table with adequate assistance to avoid disruption of the flap. (Strength of Evidence = C; Strength of Recommendation = 👍👍)**

Immediately following surgery it is important to avoid manual handling techniques that involve moving individuals from one surface to another by pulling on the buttocks and hips. Instead, lift the individual from the operating room table onto the bed rather than sliding or pulling.

Postoperative Recommendations

1. **Select a high specification support surface that provides enhanced pressure redistribution, shear reduction, and microclimate control for individuals with who have undergone pressure ulcer surgery. (Strength of Evidence = B; Strength of Recommendation = 👍)**

- 1.1. **Avoid transferring the post-surgical individual onto a non-high specification support surface unless clinically indicated. (Strength of Evidence = C; Strength of Recommendation = 👍)**

2. **Avoid pressure, shear and friction in order to protect the blood supply to the flap. (Strength of Evidence = C; Strength of Recommendation = 👍👍)**

Expert opinion on the use of bedpans for individuals with new pelvic flaps varies. They should be used with extreme caution, as they create pressure on the pelvic flap.

- 2.1. **Assess the associated benefits and risks before elevating the head of the bed. (Strength of Evidence = C; Strength of Recommendation = 👍👍)**

Elevating the head of the bed can have unintended consequences on flap healing and shear and should only be undertaken with a full understanding of the associated risks and benefits.

- 2.2. **Reposition the individual using proper manual handling technique and equipment. (Strength of Evidence = C; Strength of Recommendation = 👍👍)**

- 2.3. **Dress the individual in appropriate clothing to prevent injury to the flap when using slide boards. (Strength of Evidence = C; Strength of Recommendation = 👍)**

3. **Regularly monitor wound drainage systems. (Strength of Evidence = C; Strength of Recommendation = 👍👍)**

4. **Report signs of flap failure to the surgeon immediately, including:**

- pallor,
- mottling,
- incision separation,
- Increased drainage from the incision,
- edema, and
- bluish-purple tissue. (Strength of Evidence = C; Strength of Recommendation = 👍👍)

5. **Prevent hazards of immobility. (Strength of Evidence = C; Strength of Recommendation = 👍👍)**

6. **Initiate a program of progressive sitting according to the surgeon's orders. (Strength of Evidence = C; Strength of Recommendation = 👍👍)**
 - 6.1. **Position the individual on a pressure redistributing support surface when sitting out of bed. (Strength of Evidence = C; Strength of Recommendation = 👍👍)**
7. **Confirm the presence of healthy lifestyle choices and a supportive social network prior to discharging the individual from a facility. (Strength of Evidence = B; Strength of Recommendation = 👍)**
8. **Provide or facilitate access to pressure ulcer prevention education for the individual and his or her caregivers prior to discharge from the facility. (Strength of Evidence = C; Strength of Recommendation = 👍👍)**

SPECIAL POPULATIONS

BARIATRIC (OBESE) INDIVIDUALS

Introduction

The recommendations below highlight important considerations in the care of bariatric individuals and should be considered in conjunction with the recommendations in the main sections of this guideline.

Recommendations for the Organization

1. **Provide safe, respectful care and avoid injuries to both the individual and health professionals. (Strength of Evidence = C; Strength of Recommendation = 👍👍)**
2. **Maximize workplace safety by implementing organization-wide bariatric management strategies that address manual handling techniques. (Strength of Evidence = C; Strength of Recommendation = 👍👍)**
3. **Provide pressure redistribution support surfaces and equipment appropriate to the size and weight of the individual. (Strength of Evidence = C; Strength of Recommendation = 👍👍)**

Assessing the Bariatric Individual

1. **Calculate BMI and classify obesity. (Strength of Evidence = C; Strength of Recommendation = 👍)**
2. **Assess all skin folds regularly. (Strength of Evidence = C; Strength of Recommendation = 👍👍)**
 - 2.1. **Access adequate assistance to fully inspect all skin surfaces and folds. (Strength of Evidence = C; Strength of Recommendation = 👍👍)**

Pressure ulcers develop over bony prominences, but may also result from tissue pressure across the buttocks and other areas of high adipose tissue concentration.
 - 2.2. **Differentiate intertriginous dermatitis from Category/Stage I and II pressure ulcers. (Strength of Evidence = C; Strength of Recommendation = 👍)**
3. **Refer bariatric individuals to a registered dietitian or an interprofessional nutrition team for a comprehensive nutrition assessment and weight management plan. (Strength of Evidence = C; Strength of Recommendation = 👍👍)**

The bariatric individual can be malnourished despite the appearance of being well fed.

Bed Selection

1. **Ensure the individual is provided with a bed of appropriate size and weight capacity specifications. (Strength of Evidence = C; Strength of Recommendation = 👍👍)**
 - 1.1. **Use beds that adequately support the weight of the individual. (Strength of Evidence = C; Strength of Recommendation = 👍)**
 - 1.2. **Check routinely for 'bottoming out' of the support surface. (Strength of Evidence = C; Strength of Recommendation = 👍)**
 - 1.3. **Ensure that the bed surface area is sufficiently wide to allow turning of the individual without contact with the side rails of the bed. (Strength of Evidence = C; Strength of Recommendation = 👍)**
2. **Consider selecting a support surface with enhanced pressure redistribution, shear reduction and microclimate control for bariatric individuals. (Strength of Evidence = C; Strength of Recommendation = 👍)**

Equipment Selection

1. Use wheelchairs and chairs that are wide and strong enough to accommodate the individual's girth and weight. (Strength of Evidence = C; Strength of Recommendation = 👍)

 - 1.1. Use a pressure redistribution cushion designed for the bariatric individual on seated surfaces. (Strength of Evidence = C; Strength of Recommendation = 👍)
 - 1.2. Check routinely for 'bottoming out' of the cushion. (Strength of Evidence = C; Strength of Recommendation = 👍)

2. Where appropriate, provide bariatric walkers, overhead trapezes on beds, and other devices to support continued mobility and independence. (Strength of Evidence = C; Strength of Recommendation = 👍👍)

Repositioning

1. Avoid pressure on skin from tubes, other medical devices and foreign objects. (Strength of Evidence = C; Strength of Recommendation = 👍👍)
2. Use pillows or other positioning devices to offload the pannus or other large skin folds and prevent skin-on-skin pressure. (Strength of Evidence = C; Strength of Recommendation = 👍)
3. Check the bed for foreign objects. (Strength of Evidence = C; Strength of Recommendation = 👍)

Pressure Ulcer Care

1. Provide adequate nutrition to support healing. (Strength of Evidence = C; Strength of Recommendation = 👍👍)

Bariatric individuals, despite their size, may lack adequate nutrients to support healing of pressure ulcers.

2. Assess pressure ulcers carefully for signs of infection and delays in healing. (Strength of Evidence = C; Strength of Recommendation = 👍👍)
3. Monitor wound dressing materials closely, especially in large cavity wounds. (Strength of Evidence = C; Strength of Recommendation = 👍👍)

CRITICALLY ILL INDIVIDUALS

Introduction

Critically ill individuals have unique pressure ulcer prevention and treatment needs that are addressed within the following recommendations. These recommendations are intended to supplement and not replace the general recommendations outlined in this guideline.

Support Surfaces

1. Evaluate the need to change the pressure redistributing support surface for individuals with poor local and systemic oxygenation and perfusion to improve pressure redistribution, shear reduction, and microclimate control. Utilize additional features (e.g., turn assistance, percussion) as needed. (Strength of Evidence = C; Strength of Recommendation = 👍)
2. Evaluate the need to change the support surface for individuals who cannot be turned for medical reasons, including a temporary oral-pharyngeal airway, spinal instability and hemodynamic instability. (Strength of Evidence = C; Strength of Recommendation = 👍)

Repositioning

There is extensive guidance on repositioning in the *Repositioning and Early Mobilization* section of the guideline.

- 1. Initiate a repositioning schedule as soon as possible after admission. (Strength of Evidence = C; Strength of Recommendation = 👍)**

- 1.1. Revise the repositioning schedule in response to assessment of the individual's tolerance to repositioning. (Strength of Evidence = C; Strength of Recommendation = 👍👍)**

- 2. Consider slow, gradual turns allowing sufficient time for stabilization of hemodynamic and oxygenation status. (Strength of Evidence = C; Strength of Recommendation = 👍)**

Few individuals are truly too unstable to turn. Turning the individual more slowly or in small increments that allow adequate time for stabilization of vital signs should be considered when possible.^{32, 33}

- 3. Consider more frequent small shifts in position to allow some reperfusion in individuals who cannot tolerate frequent major shifts in body position. (Strength of Evidence = C; Strength of Recommendation = 👍)**

Caution: Small shifts do not replace selection of a more appropriate pressure redistribution support surface when needed or turning (major shifts in body position) when possible.

- 4. Resume routine repositioning as soon as these conditions stabilize. (Strength of Evidence = C; Strength of Recommendation = 👍)**

A trial repositioning every eight hours should be conducted to determine if frequent repositioning can be re-established.³²

- 5. Use a foam cushion under the full length of the calves to elevate heels. (Strength of Evidence = B; Strength of Recommendation = 👍👍)**

Pressure can be relieved by elevating the lower leg and calf from the mattress by placing a foam cushion under the lower legs, or by using a heel suspension device that floats the heel. Pillows placed under the full length of the calves to elevate heels may be appropriate for short-term use in alert and cooperative individuals. The knee should be in slight flexion to prevent obstruction of the popliteal vein and caution should be taken to place no pressure on the Achilles tendon.

Prone Positioning

- 1. Assess critically ill individuals placed in the prone position for evidence of facial pressure ulcers with each rotation. (Strength of Evidence = C; Strength of Recommendation = 👍)**

- 2. Assess other body areas (i.e., breast region, knees, toes, penis, clavicles, iliac crest, symphysis pubis) that may be at risk when individuals are in the prone position with each rotation. (Strength of evidence = C; Strength of Recommendation = 👍)**

- 3. Offload pressure points on the face and body while in the prone position. (Strength of evidence = C; Strength of Recommendation = 👍👍)**

Lateral Rotation

Individuals who are too unstable to reposition frequently using standard repositioning may tolerate lateral rotation, which also provides opportunity to train the body to tolerate side-to-side movement.

- 1. Minimize shear strain when lateral rotation features are used. (Strength of Evidence = C; Strength of Recommendation = 👍)**

- 2. Secure the individual with bolster pads (provided by the manufacturer) to prevent sacral shearing when lateral rotation features are selected for individuals without existing pressure ulcers. The individual should be aligned properly in the center of the surface. (Strength of Evidence = C; Strength of Recommendation = 👍)**

- 3. Assess skin frequently for shear injury. (Strength of Evidence = C; Strength of Recommendation = 👍👍)**

Whenever lateral rotation features are used, the risk for shear injury exists.

- 4. Continue to reposition the individual when using lateral rotation features. (Strength of Evidence = C; Strength of Recommendation = 👍)**

Lateral rotation features do not replace the need for repositioning.

- 5. Re-evaluate the need for lateral rotation at the first sign of tissue injury. If indicated and consistent with medical needs, change to a support system with improved pressure redistribution, shear reduction, and microclimate control. (Strength of Evidence = C; Strength of Recommendation = 👍)**

Lateral Rotation in Individuals with Pressure Ulcers

- 1. Position the individual off the pressure ulcer as much as possible. (Strength of Evidence = C; Strength of Recommendation = 👍)**
- 2. Consider alternative methods of pressure redistribution (or avoid lateral rotation beds) in individuals with sacral or buttock pressure ulcers. (Strength of Evidence = C; Strength of Recommendation = 👍)**
- 3. Inspect the pressure ulcer and the periulcer skin for shear injury with every dressing change. Shear injury may appear as deterioration of the ulcer edge, undermining, and/or as increasing inflammation of periulcer skin or the ulcer. (Strength of Evidence = C; Strength of Recommendation = 👍)**

Nutrition Management

- 1. Due to insufficient evidence to support or refute the use of specific additional nutrition interventions in critical care patients, specific additional nutrition interventions are not recommended for routine use in this population. (Strength of Evidence = C ; Strength of Recommendation = 👍)**

OLDER ADULTS

Introduction

The recommendations in *Special Populations: Older Adults* are intended to supplement and not replace the general recommendations outlined in this guideline.

Assessment and Care Planning

- 1. Consider the individual's cognitive status when conducting a comprehensive assessment and developing a pressure ulcer prevention and/or treatment plan. (Strength of Evidence = C; Strength of Recommendation = 👍👍)**

- 1.1. Incorporate the individual's cognitive ability into the selection of a pain assessment tool. (Strength of Evidence = C; Strength of Recommendation = 👍👍)**

- 2. Ensure pressure ulcers are correctly differentiated from other skin injuries, particularly incontinence-associated dermatitis or skin tears. (Strength of evidence = C; Strength of Recommendation = 👍)**

The guideline sections *Classification of Pressure Ulcers* and *Assessment of Pressure Ulcers and Monitoring of Healing* include recommendations on differentiation and classification.

- 3. Set treatment goals consistent with the values and goals of the individual. (Strength of Evidence = C; Strength of Recommendation = 👍)**

- 3.1. Engage the family or legal guardian when establishing goals of care and validate their understanding of these goals. (Strength of Evidence = C; Strength of Recommendation = 👍)**

Goals of care should be established in collaboration with the individual and his or her significant others and should be reflective of the older adult's values and goals of care, particularly as end-of-life approaches.

- 4. Educate the individual and his or her significant others regarding skin changes in aging and at end of life. (Strength of Evidence = C; Strength of Recommendation = 👍👍)**

Care of Vulnerable Aged Skin

1. **Protect aged skin from skin injury associated with pressure and shear forces. (Strength of Evidence = C; Strength of Recommendation = 👍👍)**
2. **Use a barrier product to protect aged skin from exposure to excessive moisture in order to reduce the risk of pressure damage. (Strength of Evidence = C; Strength of Recommendation = 👍)**
3. **Select atraumatic wound dressings to prevent and treat pressure ulcers in order to reduce further injury to frail older skin. (Strength of Evidence = C; Strength of Recommendation = 👍)**

When the adhesive attachment to the individual's skin of a wound dressing has greater strength than the cell attachment within the skin there is a risk that attempted removal of the wound dressing may separate the epidermal layers, or separate the epidermis from the dermis.

4. **Develop and implement an individualized continence management plan. (Strength of Evidence = C; Strength of Recommendation = 👍)**

Repositioning

The *Repositioning and Early Mobilization* section outlines general recommendations for repositioning that remain appropriate for older adults.

1. **Regularly reposition the older adult who is unable to reposition independently. (Strength of Evidence = A; Strength of Recommendation = 👍👍)**
2. **Consider the condition of the individual and the pressure redistribution support surface in use when deciding if repositioning should be implemented as a prevention strategy. (Strength of Evidence = C; Strength of Recommendation = 👍👍)**
3. **Exercise caution in position selection and manual handling technique when repositioning the older adult. (Strength of Evidence = C; Strength of Recommendation = 👍)**
4. **Frequently reposition the head of older adults who are sedated, ventilated or immobile. (Strength of Evidence = C; Strength of Recommendation = 👍)**

Medical Device Related Pressure Ulcers

1. **Consider older adults with medical devices to be at risk for pressure ulcers. (Strength of Evidence = C; Strength of Recommendation = 👍👍)**
2. **Ensure that medical devices are correctly sized and fit appropriately to avoid excessive pressure. (Strength of Evidence = C; Strength of Recommendation = 👍👍)**
3. **Consider using a prophylactic dressing for preventing medical device related pressure ulcers. (Strength of Evidence = C; Strength of Recommendation = 👍)**

INDIVIDUALS IN THE OPERATING ROOM

Introduction

During surgery, patients are immobile, positioned on a relatively hard surface, are not able to feel the pain caused by pressure and shearing forces, and are unable to change their position in order to relieve pressure.

Recommendations

1. **Consider additional risk factors specific to individuals undergoing surgery including:**
 - duration of time immobilized before surgery;
 - length of surgery;
 - increased hypotensive episodes during surgery;
 - low core temperature during surgery; and
 - reduced mobility on day one postoperatively. (Strength of Evidence = C; Strength of Recommendation = 👍👍)

2. **Use a high specification reactive or alternating pressure support surface on the operating table for all individuals identified as being at risk of pressure ulcer development. (Strength of Evidence = B; Strength of Recommendation = 👍)**

Additional recommendations on high specification support surfaces, including their maintenance, are found in the guideline section *Support Surfaces*.

3. **Position the individual in such a way as to reduce the risk of pressure ulcer development during surgery. (Strength of Evidence = C; Strength of Recommendation = 👍👍)**

- 3.1. **Use additional support surfaces (e.g. facial pads) to offload pressure points on the face and body while in the prone position. (Strength of evidence = C; Strength of Recommendation = 👍👍)**

- 3.2. **Do not position the individual directly on a medical device unless it cannot be avoided. (Strength of Evidence = C; Strength of Recommendation = 👍👍)**

The guideline section on *Medical Device Related Pressure Ulcers* includes additional recommendations for reducing risk associated with external devices.

4. **Ensure that the heels are free of the surface of the operating table. (Strength of Evidence = C; Strength of Recommendation = 👍👍)**

Ideally, heels should be free of all pressure — a state sometimes called ‘floating heels’.

- 4.1. **Use heel suspension devices that elevate and offload the heel completely in such a way as to distribute the weight of the leg along the calf without placing pressure on the Achilles tendon. (Strength of Evidence = B; Strength of Recommendation = 👍👍)**

Heel suspension devices are preferable for immobilized individuals in the operating room.

5. **Position the knees in slight flexion when offloading the heels. (Strength of Evidence = C; Strength of Recommendation = 👍)**

Positioning the knees in slight flexion prevents popliteal vein compression and decreases the risk of perioperative DVT.

6. **Consider pressure redistribution prior to and after surgery. (Strength of Evidence = C; Strength of Recommendation = 👍👍)**

- 6.1. **Place the individual on a high specification reactive or alternating pressure support surface both prior to and after surgery. (Strength of Evidence = C; Strength of Recommendation = 👍)**

- 6.2. **Document the individual's position and the anatomical areas under increased interface pressure during surgery. (Strength of Evidence = C; Strength of Recommendation = 👍👍)**

- 6.3. **Position the individual in a different posture preoperatively and postoperatively than the posture adopted during surgery. (Strength of Evidence = C; Strength of Recommendation = 👍)**

INDIVIDUALS IN PALLIATIVE CARE

Introduction

It is important to implement preventive and treatment interventions in accordance with the individual's wishes, and with consideration to overall health status. The goals of palliative wound care are comfort for the individual and limiting the impact of the wound on quality of life, without the overt intent of healing.³⁴

Patient and Risk Assessment

1. Complete a comprehensive assessment of the individual. (Strength of Evidence = C; Strength of Recommendation = 👍👍)

1.1. Consider using the Marie Curie Centre Hunters Hill Risk Assessment Tool, specific to adult individuals in palliative care. (Strength of Evidence = C; Strength of Recommendation = 👍)

The Marie Curie Centre Hunters Hill Risk Assessment Tool was developed specifically for the palliative care population.

Pressure Redistribution

1. Reposition and turn the individual at periodic intervals, in accordance with the individual's wishes, comfort and tolerance. (Strength of Evidence = C; Strength of Recommendation = 👍👍)

The *Repositioning and Early Mobilization* section outlines general recommendations for repositioning that remain appropriate for individuals receiving palliative care.

1.1. Pre-medicate the individual 20 to 30 minutes prior to a scheduled position change for individuals who experience significant pain on movement. (Strength of Evidence = C; Strength of Recommendation = 👍)

1.2. Consider the individual's choices in turning, including whether she/he has a position of comfort, after explaining the rationale for turning. (Strength of Evidence = C; Strength of Recommendation = 👍👍)

1.3. Consider changing the support surface to improve pressure redistribution and comfort. (Strength of Evidence = C; Strength of Recommendation = 👍👍)

1.4. Strive to reposition an individual receiving palliative care at least every 4 hours on a pressure redistributing mattress such as viscoelastic foam, or every 2 hours on a regular mattress. (Strength of Evidence = B; Strength of Recommendation = 👍)

See the *Support Surfaces* section for more evidence on support surfaces and their use in prevention and treatment of pressure ulcers.

1.5. Document turning and repositioning, as well as the factors influencing these decisions (e.g., individual wishes or medical needs). (Strength of Evidence = C; Strength of Recommendation = 👍👍)

Nutrition and Hydration

1. Strive to maintain adequate nutrition and hydration compatible with the individual's condition and wishes. Adequate nutritional support is often not attainable when the individual is unable or refuses to eat, based on certain disease states. (Strength of Evidence = C; Strength of Recommendation = 👍👍)

2. Offer nutritional protein supplements when ulcer healing is the goal. (Strength of Evidence = C; Strength of Recommendation = 👍👍)

See *Nutrition for Preventing and Treating Pressure Ulcers* section for more information on nutritional requirements to support healing.

Pressure Ulcer Care

An individual receiving palliative care whose body systems are shutting down often lacks the physiological resources necessary for complete healing of the pressure ulcer. As such, the goal of care may be to maintain or improve the status of the pressure ulcer rather than heal it.³⁵

1. **Set treatment goals consistent with the values and goals of the individual, while considering input from the individual's significant others. (Strength of Evidence = C; Strength of Recommendation = 🍌🍌)**
 - 1.1. **Assess the impact of the pressure ulcer on quality of life for the individual and his/her significant others. (Strength of Evidence = C; Strength of Recommendation = 🍌)**
 - 1.2. **Set a goal to enhance quality of life, even if the pressure ulcer cannot be healed or treatment does not lead to closure/healing. (Strength of Evidence = C; Strength of Recommendation = 🍌)**
 - 1.3. **Assess the individual initially and at any change in their condition to re-evaluate the plan of care. (Strength of Evidence = C; Strength of Recommendation = 🍌🍌)**
2. **Assess the pressure ulcer initially and with each dressing change, but at least weekly (unless death is imminent), and document findings. (Strength of Evidence = C; Strength of Recommendation = 🍌🍌)**

See the guideline section *Assessment of Pressure Ulcers and Monitoring of Healing* for general recommendations related to pressure ulcer assessment.

- 2.1. **Monitor the pressure ulcer in order to continue to meet the goals of comfort and reduction in wound pain, addressing wound symptoms that impact quality of life such as malodor and exudate. (Strength of Evidence = C; Strength of Recommendation = 🍌🍌)**
3. **Control wound odor. (Strength of Evidence = C; Strength of Recommendation = 🍌🍌)**
 - 3.1. **Manage malodor through regular wound cleansing; assessment and management of infection; and debridement of devitalized tissue, with consideration to the individual's wishes and goals of care. (Strength of Evidence = C; Strength of Recommendation = 🍌🍌)**
 - 3.2. **Consider use of topical metronidazole to effectively control pressure ulcer odor associated with anaerobic bacteria and protozoal infections. (Strength of Evidence = C; Strength of Recommendation = 🍌)**
 - 3.3. **Consider use of charcoal or activated charcoal dressings to help control odor. (Strength of Evidence = C; Strength of Recommendation = 🍌)**
 - 3.4. **Consider use of external odor absorbers or odor maskers for the room (e.g., activated charcoal, kitty litter, vinegar, vanilla, coffee beans, burning candle, and potpourri). (Strength of Evidence = C; Strength of Recommendation = 🍌)**
4. **Manage the pressure ulcer and periwound area on a regular basis as consistent with the individual's wishes. (Strength of Evidence = C; Strength of Recommendation = 🍌)**

Pain Assessment and Management

1. **Do not under treat pain in individuals receiving palliative care. (Strength of Evidence = C; Strength of Recommendation = 🍌🍌)**

See the *Pain Assessment and Management* section of this guideline for recommendations on management of pressure ulcer related pain.

2. **Select a wound dressing that requires less frequent changing and is less likely to cause pain. (Strength of Evidence = C; Strength of Recommendation = 🍌🍌)**

Resource Assessment

1. **Assess psychosocial resources initially and at routine periods thereafter (psychosocial consultation, social work, etc.). (Strength of Evidence = C; Strength of Recommendation = 🍌)**
2. **Assess environmental resources (e.g., ventilation, electronic air filters, etc.) initially and at routine periods thereafter. (Strength of Evidence = C; Strength of Recommendation = 🍌)**

3. **Educate the individual and his or her significant others regarding skin changes at end of life. (Strength of Evidence = C; Strength of Recommendation = 👍)**
4. **Validate that family care providers understand the goals and plan of care. (Strength of Evidence = C; Strength of Recommendation = 👍👍)**

PEDIATRIC INDIVIDUALS

Introduction

The recommendations outlined in other sections of this guideline are generally appropriate for the prevention and treatment of pressure ulcers in pediatric populations. Of particular relevance to children is the guideline section *Medical Device related Pressure Ulcers*. An exception is the chapter *Nutrition in Prevention and Treatment*, which provides recommendations for nutritional intake for adult populations, based on research conducted in adults.

Pressure Ulcer Risk Assessment

1. **Perform an age appropriate risk assessment that considers risk factors of specific concern for pediatric and neonate populations, including:**
 - activity and mobility levels,
 - body mass index and/or birth weight,
 - skin maturity,
 - ambient temperature and humidity,
 - nutritional indicators,
 - perfusion and oxygenation,
 - presence of an external device, and
 - duration of hospital stay. (Strength of Evidence = B; Strength of Recommendation = 👍👍)
- 1.1. **Consider children with medical devices to be at risk for pressure ulcers. (Strength of Evidence = B; Strength of Recommendation = 👍👍)**
2. **Consider using a reliable and valid pediatric pressure ulcer risk assessment tool to facilitate a structured assessment. (Strength of Evidence = C; Strength of Recommendation = 👍)**

Assessment and Monitoring

1. **Engage the family or legal guardian involved in the individual's care when establishing goals of care. (Strength of Evidence = C; Strength of Recommendation = 👍👍)**
2. **Conduct and document a skin assessment at least daily and after procedures for changes related to pressure, friction, shear, moisture. (Strength of Evidence = C; Strength of Recommendation = 👍👍)**
 - 2.1. **Assess the skin on occiput for neonate and pediatric individuals. (Strength of Evidence = C; Strength of Recommendation = 👍👍)**
 - 2.2. **Inspect the skin under and around medical devices at least twice daily for the signs of pressure related injury on the surrounding tissue. (Strength of Evidence = C; Strength of Recommendation = 👍👍)**

Nutritional Management

The recommendations in the *Nutrition in Pressure Ulcer Prevention and Treatment* section of the guideline have been developed based on evidence in adult populations and are generally not appropriate for pediatric individuals.

1. **Conduct an age appropriate nutritional assessment for neonates and children. (Strength of Evidence = C; Strength of Recommendation = 👍👍)**

1.1. Regularly reassess the nutritional requirements of critically ill neonates and children who have, or are at risk of, a pressure ulcer. (Strength of Evidence = C; Strength of Recommendation = 👍👍)

A pediatrician, dietitian or other qualified health professional should conduct an age appropriate nutritional assessment to identify nutritional requirements for neonates and children with or at risk of pressure ulcers.

- 2. Develop an individualized nutrition care plan for neonates and children with, or at risk of, a pressure ulcer. (Strength of Evidence = C; Strength of Recommendation = 👍)**
- 3. Ensure all neonates and children maintain adequate hydration. (Strength of Evidence = C; Strength of Recommendation = 👍👍)**
- 4. When oral intake is inadequate, consider age appropriate nutritional supplements for neonates and children who are at risk of a pressure ulcer and are identified as being at risk of malnutrition. (Strength of Evidence = C; Strength of Recommendation = 👍)**
- 5. When oral intake is inadequate, consider age appropriate nutritional supplements for neonates and children who have an existing pressure ulcer and are identified as being at risk of malnutrition. (Strength of Evidence = C; Strength of Recommendation = 👍)**
- 6. When oral intake is inadequate, consider enteral or parenteral nutritional support in neonates and children who are at risk of a pressure ulcer or have an existing pressure ulcer and who are also identified as being at risk of malnutrition. (Strength of Evidence= C; Strength of Recommendation = 👍)**

A pediatrician, pediatric dietitian or other qualified health professional should be involved in planning an appropriate, individualized nutrition plan, and providing caregivers with strategies to promote nutritional intake.³⁶

Selection of Support Surfaces

1. Select an age appropriate, high specification support surface for children at high risk of pressure ulcers. (Strength of Evidence = C; Strength of Recommendation = 👍)

The efficacy and safety of using a support surface designed for an adult individual for preventing pressure ulcers in the pediatric population has not been investigated thoroughly. When selecting a pressure redistribution support surface for children, consideration should be given to the specific bony prominences most at risk.=

- 1.1. Select a high specification support surface for premature infants and younger children to prevent occipital pressure ulcers. (Strength of Evidence = C; Strength of Recommendation = 👍)**
- 2. Ensure that the individual's height, weight and age are consistent with the manufacturer's recommendations when placing a pediatric individual on a low-air-loss bed or alternating pressure support surface. (Strength of Evidence = C; Strength of Recommendation = 👍)**

This recommendation is based on expert opinion. The manufacturer's weight recommendations for low-air-loss beds should be followed.

Repositioning

The *Repositioning and Early Mobilization* section of the guideline outlines general recommendations on the frequency and principles for repositioning for prevention and treatment of pressure ulcers. In addition, the following recommendations should be considered for pediatric individuals.

- 1. Ensure that the heels are free of the surface of the bed. (Strength of Evidence = C; Strength of Recommendation = 👍)**
- 2. Frequently reposition the head of neonates and infants when they are sedated and ventilated. (Strength of Evidence = C; Strength of Recommendation = 👍👍)**

INDIVIDUALS WITH SPINAL CORD INJURY

Introduction

The recommendations included in other sections of the guideline are generally appropriate to individuals with spinal cord injury (SCI). This population-specific section of the guideline includes recommendations specific to, or of particular relevance for individuals with SCI.

Preventing Pressure Ulcers During the Acute Care Phase

- 1. Transfer the individual off a spinal hardboard/backboard as soon as feasible after admission to an acute care facility in consultation with a qualified health professional. (Strength of Evidence = C; Strength of Recommendation = 👍)**
- 2. Replace an extrication cervical collar with an acute care rigid collar as soon as feasible in consultation with a qualified health professional. (Strength of Evidence = C; Strength of Recommendation = 👍)**

Seating Surfaces

The *Support Surfaces* section of the guideline outlines comprehensive recommendations on pressure redistribution support surfaces for the bed and chair to both prevent pressure ulcers and promote their healing. The majority of these recommendations are also appropriate for individuals with SCI. The recommendations below are those that are of specific significance to individuals with SCI.

- 1. Individualize the selection and periodic re-evaluation of a wheelchair/seating support surface and associated equipment for posture and pressure redistribution with consideration to:**
 - **body size and configuration;**
 - **the effects of posture and deformity on pressure distribution; and**
 - **mobility and lifestyle needs. (Strength of Evidence = C; Strength of Recommendation = 👍👍)**
 - 1.1. Refer individuals to a seating professional for evaluation. (Strength of Evidence = C; Strength of Recommendation = 👍)**
- 2. Select a pressure redistribution cushion that:**
 - **provides contour, uniform pressure distribution, high immersion or offloading;**
 - **promotes adequate posture and stability;**
 - **permits air exchange to minimize temperature and moisture at the buttock interface; and**
 - **has a stretchable cover that fits loosely on the top cushion surface and is capable of conforming to the body contours (Strength of Evidence = C; Strength of Recommendation = 👍👍)**
- 3. Assess other seating surfaces commonly used by the individual and minimize the risk they may pose to skin. (Strength of Evidence = C; Strength of Recommendation = 👍)**

Additional Support Surface Recommendations for Individuals with Existing Pressure Ulcers

- 1. Seat individuals with pressure ulcers on a seating support surface that provides contour, uniform pressure distribution, and high immersion or offloading. (Strength of Evidence = B; Strength of Recommendation = 👍👍)**
- 2. Use alternating pressure seating devices judiciously for individuals with existing pressure ulcers. Weigh the benefits of off-loading against the potential for shear based on the construction and operation of the cushion. (Strength of Evidence = C; Strength of Recommendation = 👍)**

Repositioning and Mobility

The *Repositioning and Early Mobilization* section of the guideline outlines comprehensive recommendations on positioning individuals to both prevent pressure ulcers and promote their healing. The majority of these recommendations are also appropriate for individuals with SCI. The recommendations below are those that are of specific significance to individuals with SCI.

- 1. Maintain proper positioning and postural control. (Strength of Evidence = C; Strength of Recommendation = 👍👍)**
 - 1.1. Provide adequate seat tilt to prevent sliding forward in the wheelchair/chair, and adjust footrests and armrests to maintain proper posture and pressure redistribution. (Strength of Evidence = C; Strength of Recommendation = 👍👍)**
 - 1.2. Avoid the use of elevating leg rests if the individual has inadequate hamstring length. (Strength of Evidence = C; Strength of Recommendation = 👍)**

If the hamstring length is inadequate and elevating leg rests are used, the pelvis will be pulled into a sacral sitting posture, causing increased pressure on the coccyx/sacrum.
- 2. Use variable-position seating (tilt-in-space, recline, and standing) in manual or power wheelchairs to redistribute load off of the seat surface. (Strength of Evidence = C; Strength of Recommendation = 👍)**
 - 2.1. Tilt the wheelchair before reclining. (Strength of Evidence = C; Strength of Recommendation = 👍)**
- 3. Encourage the individual to reposition regularly while in bed and seated. (Strength of Evidence = C; Strength of Recommendation = 👍)**
 - 3.1. Provide appropriate assistive devices to promote bed and seated mobility. (Strength of Evidence = C; Strength of Recommendation = 👍👍)**
- 4. Establish pressure relief schedules that prescribe the frequency and duration of weight shifts. (Strength of Evidence = C; Strength of Recommendation = 👍)**
 - 4.1. Teach individuals to do 'pressure relief lifts' or other pressure relieving maneuvers as appropriate. (Strength of Evidence = C; Strength of Recommendation = 👍)**
 - 4.2. Identify effective pressure relief methods and educate individuals in performance of methods consistent with the ability of the individual. (Strength of Evidence = C; Strength of Recommendation = 👍)**

Additional Repositioning Recommendations For Individuals With Existing Pressure Ulcers

- 1. Weigh the risks and benefits of supported sitting versus bed rest against benefits to both physical and emotional health. (Strength of Evidence = C; Strength of Recommendation = 👍)**
 - 1.1. Consider periods of bed rest to promote ischial and sacral ulcer healing. (Strength of Evidence = C; Strength of Recommendation = 👍)**

Ideally, ischial ulcers should heal in an environment where the ulcers are free of pressure and other mechanical stress.
 - 1.2. Develop a schedule for progressive sitting according to the individual's tolerance and pressure ulcer response in conjunction with a seating professional. (Strength of Evidence = C; Strength of Recommendation = 👍)**
- 2. Avoid seating an individual with an ischial ulcer in a fully erect posture in chair or bed. (Strength of Evidence = C; Strength of Recommendation = 👍👍)**

The ischia bear intense pressure when the individual is seated.

Electrical Stimulation for Preventing Pressure Ulcers

There is emerging evidence that electrical stimulation induces intermittent tetanic muscle contractions and reduces the risk of pressure ulcer development in at-risk body parts, especially in individuals with SCI.

- 1. Consider the use of electrical stimulation for anatomical locations at risk of pressure ulcer development in individuals with spinal cord injury. (Strength of Evidence = C; Strength of Recommendation = 👍)**

Education and the Individual's Involvement in Care

In addition to the recommendations below, the *Patient Consumers and Their Caregivers* section of the guideline provides additional recommendations specifically for individuals with SCI.

- 1. Promote and facilitate self-management for individuals with SCI. (Strength of Evidence = C; Strength of Recommendation = 👍👍)**
- 2. Provide individuals with SCI and their caregivers with structured and ongoing education on prevention and treatment of pressure ulcers at a level appropriate to their education background. (Strength of Evidence = C; Strength of Recommendation = 👍👍)**

IMPLEMENTING THE GUIDELINE

FACILITATORS, BARRIERS AND IMPLEMENTATION STRATEGY

Introduction

The recommendations in this section address actions that can be implemented at the organization level or professional level in order to facilitate the introduction of and adherence to clinical guidelines that outline optimal strategies for the prevention and treatment of pressure ulcers.

Recommendations

1. **Assess barriers and facilitators for guideline implementation at professional and organizational levels before implementing a pressure ulcer prevention initiative within the organization. (Strength of Evidence = C; Strength of Recommendation = 👍)**
 - 1.1. **Assess knowledge and attitudes of professional staff regularly using validated assessment tools. (Strength of Evidence = C; Strength of Recommendation = 👍)**

The Implementing the Guideline: Health Professional Education section of the guideline details comprehensive recommendations on training and education.
 - 1.2. **At an organizational level, assess the availability, quality and standards for use of available equipment for the prevention and treatment of pressure ulcers. (Strength of Evidence = C; Strength of Recommendation = 👍👍)**
 - 1.3. **At an organizational level, review availability of and access to support surfaces and establish protocols for procurement that ensure timely access for individuals at risk of, or with an existing pressure ulcer. (Strength of Evidence = C; Strength of Recommendation = 👍👍)**
 - 1.4. **At an organizational level, review and select medical devices available in the facility based on the devices' ability to induce the least degree of damage from the forces of pressure and/or shear. (Strength of evidence = C; Strength of Recommendation = 👍👍)**
 - 1.5. **Assess staffing characteristics (e.g. nursing care hours, qualifications of staff) and staff cohesion at an organizational level. (Strength of evidence = C; Strength of Recommendation = 👍)**
2. **Conduct regular evaluation of organizational performance in pressure ulcer prevention and treatment and provide this information as feedback to the stakeholders. (Strength of evidence = C; Strength of Recommendation = 👍👍)**
 - 2.1. **Use appropriate quality indicators to monitor pressure ulcer prevention and treatment. (Strength of Evidence = C; Strength of Recommendation = 👍👍)**

The Implementing the Guideline: Quality Indicators section of this guideline details a set of quality indicators that can be used to audit organizational performance.
 - 2.2. **Conduct regular monitoring of facility-acquired pressure ulcer rates as part of pressure ulcer prevention and treatment initiatives. (Strength of evidence = C; Strength of Recommendation = 👍👍)**
 - 2.3. **Introduce an electronic system to report and track pressure ulcer prevalence. (Strength of evidence = C; Strength of Recommendation = 👍)**
 - 2.4. **Regularly inform staff members, patients and caregivers of pressure ulcer rates. (Strength of evidence = C; Strength of Recommendation = 👍👍)**

3. **Develop a structured, tailored and multi-faceted approach to overcome barriers and enhance facilitators for protocol implementation. (Strength of evidence = B; Strength of Recommendation = 👍👍)**
 - 3.1. **Consider optimizing work procedures at a professional level through the introduction of:**
 - tailored staff education,
 - role models or designated wound care “champions”,
 - nurse-led quality improvement programs, and
 - cues to perform pressure ulcer prevention. (Strength of evidence = C; Strength of Recommendation = 👍)
 - 3.2. **Consider optimizing work procedures at an organizational level through the introduction of:**
 - an awareness campaign,
 - standardized documentation,
 - standardized repositioning regimens (where the individual’s needs will be met),
 - multidisciplinary meetings, and
 - on-site consultations. (Strength of evidence = C; Strength of Recommendation = 👍)

Organization level support is a key component of pressure ulcer prevention programs.
4. **Consider developing a computerized algorithm to assist clinicians in their selection of appropriate care strategies and equipment for treating pressure ulcers. (Strength of evidence = C; Strength of Recommendation = 👍)**

HEALTH PROFESSIONAL EDUCATION

Recommendations

1. **Assess knowledge and attitudes of professional staff regularly using reliable and valid assessment tools appropriate to the clinical setting. (Strength of Evidence = C; Strength of Recommendation = 👍)**
2. **Develop an education policy for pressure ulcer prevention and treatment at an organizational level. (Strength of Evidence = C; Strength of Recommendation = 👍👍)**
3. **Provide regular evidence-based pressure ulcer prevention and treatment education. (Strength of Evidence = C; Strength of Recommendation = 👍👍)**
 - 3.1. **Evaluate learning outcomes before and after implementing an education program. (Strength of Evidence = C; Strength of Recommendation = 👍)**
4. **Tailor training and education on pressure ulcer prevention and treatment to both the needs of members of the healthcare team as well as the organization. (Strength of Evidence = C; Strength of Recommendation = 👍👍)**
5. **Utilize interactive and innovative learning in the design and implementation of a pressure ulcer prevention and treatment education program (Strength of Evidence = C; Strength of Recommendation = 👍)**

- 6. Consider incorporating the following components into the pressure ulcer prevention and treatment educational/training program:**
- **etiology and risk factors for pressure ulcers;**
 - **classification of pressure ulcers;**
 - **differential diagnosis;**
 - **risk assessment;**
 - **skin assessment;**
 - **documentation of risk assessment and a preventive care plan;**
 - **selection and use of pressure redistribution support surfaces;**
 - **repositioning, including manual handling and use of equipment;**
 - **nutrition;**
 - **the importance of an interprofessional approach; and**
 - **education of the individual and his or her informal caregivers. (Strength of Evidence = C; Strength of Recommendation = 👍👍)**

Education should be informed by current evidence-based guidelines.

- 6.1. Educate health care professionals on how to conduct an accurate and reliable risk assessment. (Strength of Evidence = C; Strength of Recommendation = 👍)**
- 6.2. Educate health professionals in the use of the International NPUAP/EPUAP Pressure Ulcer Classification System. (Strength of Evidence = B; Strength of Recommendation = 👍👍)**
- 6.3. Educate health professionals in differentiating pressure ulcers from other types of wounds. (Strength of Evidence = C; Strength of Recommendation = 👍👍)**

PATIENT CONSUMERS AND THEIR CAREGIVERS

Introduction

A simplified version of this section, written in basic English, is available from the guideline website (<http://www.internationalguideline.com>) for use as a patient consumer education resource.

Recommendations for Individuals With, or at High Risk of Pressure Ulcers

- 1. Obtain information about pressure ulcers and their prevention as part of your routine care (Strength of evidence = C; Strength of Recommendation = 👍👍)**
 - 1.1 Seek information from your health care team to address your individual pressure ulcer prevention and treatment needs. (Strength of Evidence = C); Strength of Recommendation = 👍)**
 - 1.2 Read printed material and use e-learning materials to enhance your knowledge of pressure ulcers and pressure ulcer prevention. (Strength of Evidence = C; Strength of Recommendation = 👍)**
 - 1.3 Use internet sources recommended by health professionals to provide current information about pressure ulcers and their prevention. (Strength of Evidence = C; Strength of Recommendation = 👍)**
- 2. Work with the health care team to develop your individualized pressure ulcer prevention and management plan. (Strength of Evidence = C; Strength of Recommendation = 👍👍)**
 - 2.1. Seek information on how to prevent and treat pressure ulcers, including information on positioning in bed and chair, support surfaces, activity, and nutrition. (Strength of Evidence = C; Strength of Recommendation = 👍)**

- 2.2. **Work with your health care team to establish a pressure redistribution schedule including frequency and duration of weight shifts, using pressure relief methods that are consistent with your ability. (Strength of Evidence = C; Strength of Recommendation = 👍👍)**
Use 'pressure relief lifts' or other pressure relieving or redistributing maneuvers as appropriate.
- 2.3. **Use variable position seating (tilt-in-space, recline, and standing) in manual or power wheelchairs to redistribute load off of the seat surface. (Strength of Evidence = C; Strength of Recommendation = 👍👍)**
- 2.4. **Use a bed and chair surface that is compatible with your care setting. (Strength of Evidence = C; Strength of Recommendation = 👍)**
- 2.5. **Evaluate the functionality of your support surfaces daily. (Strength of Evidence = C; Strength of Recommendation = 👍)**
- 2.6. **Consider your overall health status and how prevention and treatment of pressure ulcers contribute to it (e.g. activity and mobility, nutrition, and other diseases or injuries that affect your overall wellbeing). (Strength of evidence = C; Strength of Recommendation = 👍)**
3. **Identify concerns that you have about how to cope with having a pressure ulcer (Strength of evidence = C; Strength of Recommendation = 👍👍)**
 - 3.1. **Consider concerns in all aspects of wellbeing (physical, psychological, social, and spiritual) and their interaction. (Strength of evidence = C; Strength of Recommendation = 👍)**
 - 3.2. **Determine if there are gaps in your knowledge and/or ability to address your concerns. (Strength of evidence = C; Strength of Recommendation = 👍)**
 - 3.3. **Mobilize resources (health professionals, family, support groups, and community resources) to enhance your ability to cope with having a pressure ulcer. (Strength of evidence = C; Strength of Recommendation = 👍)**

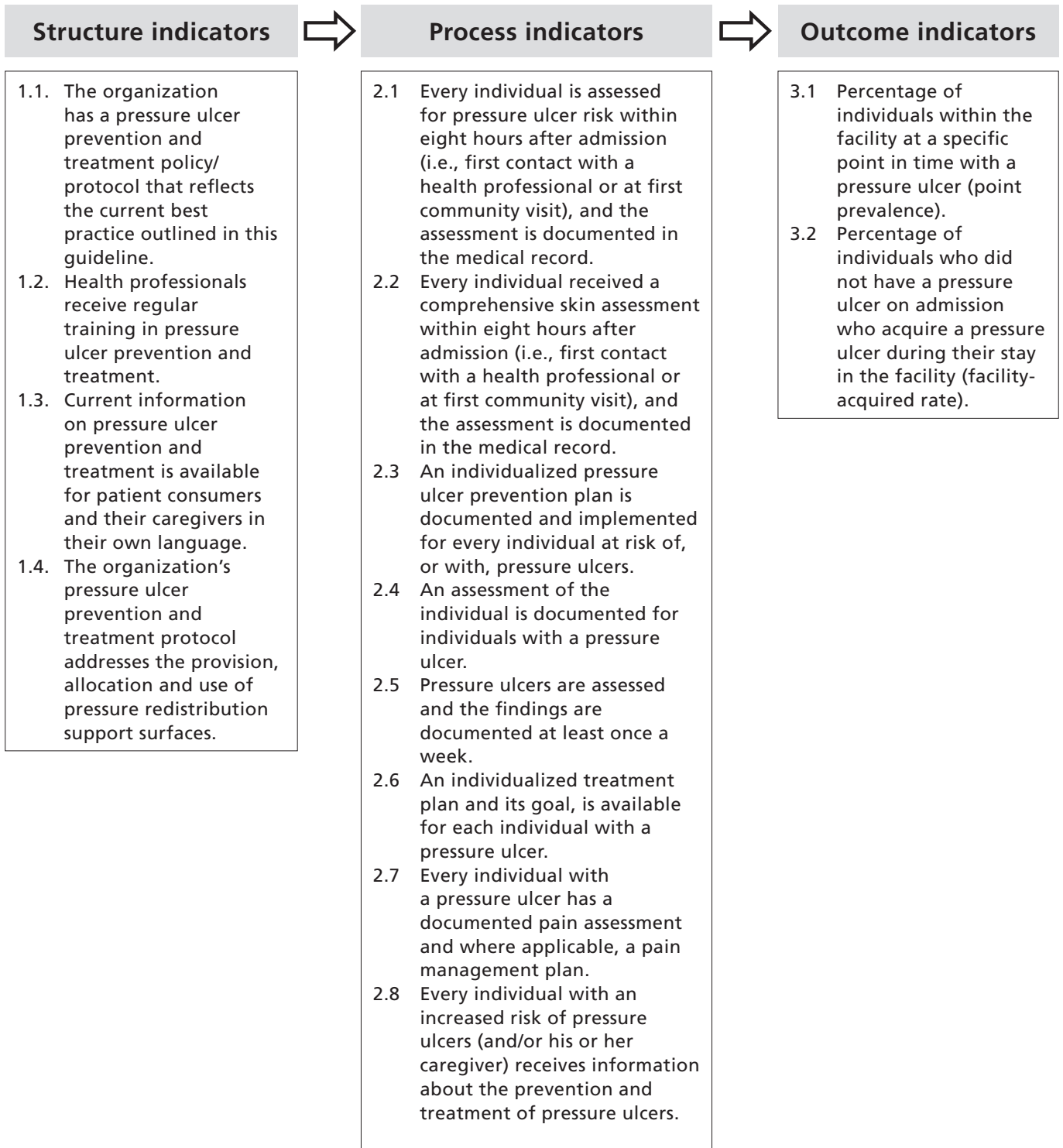
Additional Recommendations for Individuals with Spinal Cord Injury

1. **Ensure that you have knowledge of pressure ulcer prevention and self-care. (Strength of evidence = C; Strength of Recommendation = 👍👍)**
2. **Consider seeking e-learning opportunities to increase your pressure ulcer knowledge. (Strength of evidence = C; Strength of Recommendation = 👍)**
3. **Empower yourself with knowledge about pressure ulcer risk factors and prevention; how to alter your home environment for care; and how to access care through the health system. (Strength of evidence = C; Strength of Recommendation = 👍👍)**

QUALITY INDICATORS FOR THIS GUIDELINE

Introduction

The quality indicators presented in this section of the guideline are intended to assist health care organizations to implement and monitor the strategies recommended in this clinical guideline. The quality indicators have been developed to reflect the recommendations and current best practice outlined in this clinical guideline. Specific guidance for quality improvement audits is provided in the *Clinical Practice Guideline*.



REFERENCES

Nb: Only those references explicitly cited in the *Quick Reference Guide* are listed. The body of work contained in the guideline is underpinned by extensive research, as cited in the full *Clinical Practice Guideline*.

1. Sackett DL. Evidence based medicine: how to practice and teach EBM. New York, NY: Churchill Livingstone; 1997.
2. Sackett DL. Rules of evidence and clinical recommendations on the use of antithrombotic agents. *Chest*. 1989;95(2 Suppl):25-4s.
3. AWMA. Pan Pacific Clinical Practice Guideline for the Prevention and Management of Pressure Injury. Osborne Park, WA: Cambridge Media; 2012.
4. European Pressure Ulcer Advisory Panel. Pressure Ulcer Treatment Guidelines. Oxford, England: EPUAP, 1998. Available from: <http://www.epuap.org/gltreatment.html>.
5. Murray J, Noonan C, Quigley S, Curley M. Medical device-related hospital-acquired pressure ulcers in children: an integrative review. *Journal of Pediatric Nursing*. 2013:e-publication.
6. Wounds International. International Review. Pressure ulcer prevention: pressure, shear, friction and microclimate in context. A consensus document. London: Wounds International 2010.
7. Thomas DR, Cote TR, Lawhorne L, Levenson SA, Rubenstein LZ, Smith DA, Stefanacci RG, Tangalos EG, Morley JE. Understanding clinical dehydration and its treatment. *Journal of the American Medical Directors Association*. 2008;9(5):292-301.
8. Defloor T. The effect of position and mattress on interface pressure. *Applied Nursing Research*. 2000;13(1):2-11.
9. NPUAP. 2007. National Pressure Ulcer Advisory Panel Support Surface Standards Initiative - Terms and Definitions Related to Support Surfaces. Available from: http://www.npuap.org/NPUAP_S3I_TD.pdf. [Accessed January 6, 2009].
10. Black J, Alves P, Brindle CT, Dealey C, Santamaria N, Call E, Clark M. Use of wound dressings to enhance prevention of pressure ulcers caused by medical devices. *International Wound Journal*. 2013: doi: 10.1111/iwj.12111.
11. Mucous Membrane Task Force of the NPUAP. undated. Mucosal Pressure Ulcers: An NPUAP Position Statement. Available from: http://www.npuap.org/wp-content/uploads/2012/03/Mucosal_Pressure_Ulcer_Position_Statement_final.pdf. [Accessed 2013 November].
12. Jacox A, Carr D.B., Payne, R., et al. . Management of cancer pain. Rockville, MD: The Agency for Health Care Policy and Research (AHCPR), now Agency for Healthcare Research and Quality (AHRQ); 1994.
13. Jacobsen J. 2007. Topical Opioids for Pain. Fast Facts and Concepts #185. Available from: http://www.eperc.mcw.edu/EPERC/FastFactsIndex/ff_185.htm. [Accessed August 2013].
14. Gruber R, Vistnes L, Pardoe R. The effect of commonly used antiseptics on wound healing. *Plastic and Reconstructive Surgery*. 1975;55(4):472-6.
15. Reid C, Alcock M, Penn D. Hydrogen peroxide - a party trick from the past? *Anaesthesia and Intensive Care Journal*. 2011;39:1004-8.
16. Hussain-Khan Z, Soleimani A, Farzan M. Fatal gas embolism following the use of intraoperative hydrogen peroxide as an irrigation fluid. *Acta Medica Iranica*. 2004;42(2):151-3.
17. Echague C, Hair P, Cunnion K. A comparison of antibacterial activity against Methicillin-Resistant *Staphylococcus aureus* and gram-negative organisms for antimicrobial compounds in a unique composite wound dressing. *Advances in Skin & Wound Care*. 2010;23(9):406-13.
18. Leaper DJ, Durani P. Topical antimicrobial therapy of chronic wounds healing by secondary intention using iodine products. *International Wound Journal*. 2008;5(2):361-8.
19. Sibbald RG, Leaper DJ, Queen D. Iodine made easy. *Wounds International*. 2011;2(2):S1-6.
20. Lineaweaver W, Howard R, Soucy D, McMorris S, Freeman J, Crain C, Robertson J, . ea. Topical antimicrobial toxicity. *Archives of Surgery*. 1985;120(3):267-70.
21. Wilson J, Mills J, Prather I, Dimitrijevic S. A toxicity index of skin and wound cleansers used on in vitro fibroblasts and keratinocytes. *Advances in Skin & Wound Care*. 2005;18(7):373-8.
22. Heggors J, Sazy J, Stenberg B, Strock L, McCauley R, Hernom D, Robson M. Bacterial and wound healing properties of sodium hypochlorite solutions: The 1991 Lindberg Award. *Journal of Burn Care & Research*. 1991;12(5):420-4.
23. Ward R, Saffle J. Topical agents in burn and wound care. *Physical Therapy*. 1995;75:526-38.
24. Toy L, Macera L. Evidence-based review of silver dressing use on chronic wounds. *Journal of the American Academy of Nurse Practitioners*. 2011;23:183-92.
25. Comvicta. Medihoney FAQs. <http://www.comvicta.com>: Comvicta2011.
26. Magnopro. 2013. The product: Contraindications. Available from: <http://www.magnopro-usa.com/contraindications.htm>. [Accessed 2013 May].
27. Northwest Neuro-Cranial Medicine. 2013. Pulsed electromagnetic field therapy: Contraindication & cautions. Available from: <http://www.nwncr.com/index.cfm/page/pulsed-electromagnetic-field-therapy-healing-services-dr-oz-pemft/#sect7-contraindication-cautions>. [Accessed 2013 May].
28. Watson T. 2007. Electrotherapy on the web: educational resources for practitioners, students and educators: contraindications. . Available from: <http://www.electrotherapy.org/contraindications>. [Accessed 2013 May].

29. Honaker JS, Forston MR, Davis EA, Wiesner MM, Morgan JA. Effects of non contact low-frequency ultrasound on healing of suspected deep tissue injury: A retrospective analysis. *International Wound Journal*. 2013 Feb;10(1):65-72.
30. Sullivan N, Snyder D, Tipton K, Uhl S, Schoelles K. Negative Pressure Wound Therapy Devices Technology Assessment Report. Rockville, MD: Agency for Healthcare Research and Quality (AHRQ)2009.
31. McCulloch J, Boyd VB. The effects of whirlpool and the dependent position on lower extremity volume. *Journal of Orthopaedic and Sports Physical Therapy*. 1992;16(4):169-73.
32. Brindle CT, Malhotra R, O'Rourke S, Currie L, Chadwick D, Falls P, Adams C, Swenson J, Tuason D, Watson S, Creehan S. Turning and repositioning the critically ill patient with hemodynamic instability: A literature review and consensus recommendations. *Journal of Wound, Ostomy and Continence Nursing*. 2013;40(3):254-67.
33. Almirall S, Leiva R, Gabasa P. Apache III Score: A prognostic factor in pressure ulcer development in an intensive care unit. *Enferm Intensiva*. 2009;20(3):95-103.
34. Bates-Jensen B, Early, L, Seeman, S. Skin Disorders. In: Ferrell BR, Coyle N, editors. *Textbook of Palliative Nursing*. 2nd ed. New York, NY: Oxford University Press, Inc; 2004.
35. Masaki F, Riko K, Seiji H, Shuhei Y, Aya Y. Evaluation of pressure ulcers in 202 patients with cancer -- do patients with cancer tend to develop pressure ulcers? Once developed, are they difficult to heal? *Wounds: A Compendium of Clinical Research & Practice*. 2007;19(1):13-9.
36. Ranade D, Collins N. Children with wounds: the importance of nutrition. *Ostomy Wound Management*. 2011;October:14-24.

