



Best Practice Guideline

RISK ASSESSMENT & PREVENTION OF PRESSURE ULCERS *Guideline Supplement*

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Supplement Integration

Similar to the original guideline publication, this document needs to be reviewed and applied, based on the specific needs of the organization or practice setting/environment, as well as the needs and wishes of the client. This supplement should be used in conjunction with the guideline as a tool to assist in decision making for individualized client care as well as ensuring that appropriate structures and supports are in place to provide the best possible care.

Background

Pressure ulcers continue to be a significant health concern as the population ages and the complexity of care increases across all care settings. Several additional research studies have been published regarding pressure ulcer prevention since the publication of the first revision of the *Risk Assessment and Prevention of Pressure Ulcer Guideline* in 2005.



This revision supports current recommendations, provides increased levels of evidence for some recommendations, and includes several additional recommendations that reflect current research findings.

Early identification of persons at risk for pressure ulcer development and prompt interventions remains key to pressure ulcer prevention. Risk factors specific to various care settings, populations and sectors as well as timelines for pressure ulcer development have now been identified by the literature. Issues related to palliative care and skin changes at the end of life have also been highlighted and included in this revision supplement.

In addition, strategies for pressure prevention have been updated to reflect current terminology and recommendations specific to pressure ulcer management in critical care areas, emergency departments, operating rooms and seating are featured in this revision.

Revision Process

The Registered Nurses' Association of Ontario (RNAO) has made a commitment to ensure that this practice guideline is based on the best available evidence. In order to meet this commitment, a monitoring and revision process has been established for each guideline every three to five years.

An interprofessional panel comprised of members from the original development panel as well as other recommended individuals with particular expertise in this practice area (including nurses, an occupational therapist, a physiotherapist and a dietitian) were assembled for this review. A structured evidence review based on the scope of the original guideline and supported by seven clinical questions was conducted to capture the relevant literature and guidelines published since the original publication. The following research questions were established to guide the literature review:

1. What are the risk factors/ contributing factors or predictors for the development of pressure ulcers in the adult population?
2. What is the evidence for pressure ulcer prevention?
3. What interventions do nurses need to initiate to prevent pressure ulcers?
4. How effective are the following in the prevention of pressure ulcers:
 - a. Assessment of risk factors; and
 - b. Pressure redistribution/ management (surfaces, seating and heel devices).
5. What education do nurses need regarding strategies for the prevention of pressure ulcer?

6. What support does the organization need to provide to ensure nurses have the knowledge and skills for pressure ulcer prevention?

7. What supports are needed for successful implementation of a pressure ulcer prevention program?

Initial findings regarding the impact of the current evidence on the original recommendations were summarized and circulated to the review panel. Additional hand searches of the literature were conducted to supplement the results of the literature review as directed by the review panel. In addition, the review panel members were given a mandate to review the original guideline in light of the new evidence, specifically to ensure the validity, appropriateness and safety of the guideline recommendations as published in 2005.

Literature Review

One individual searched an established list of websites for guidelines and other relevant documents. The list was compiled based on existing knowledge of evidence-based practice websites and recommendations from the literature.

Members of the panel critically appraised ten international guidelines, published since 2004, using the "Appraisal of Guidelines for Research and Evaluation II" instrument (AGREE Next Steps Consortium, 2009).

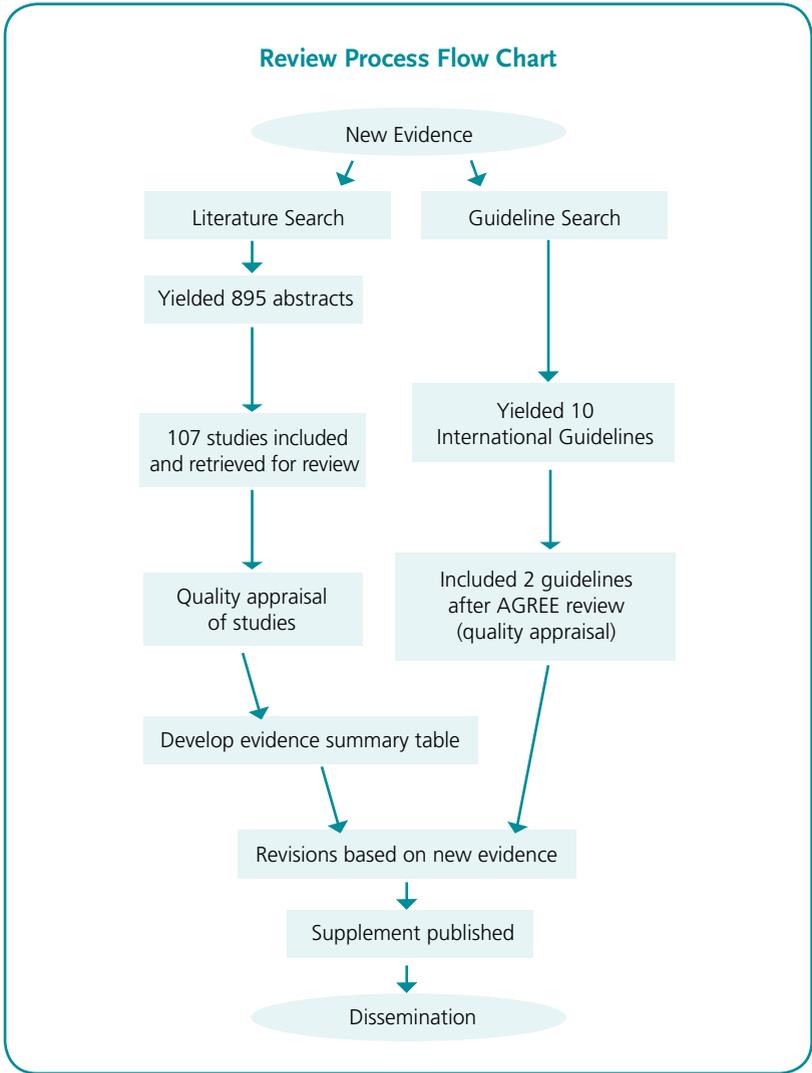
From this review, two guidelines were identified to inform the review process:

- National Pressure Ulcer Advisory Panel (NPUAP) and European Pressure Ulcer Advisory Panel (EPUAP) (2009). *Prevention and Treatment of Pressure Ulcer: Clinical Practice Guideline*. Washington, DC: National Pressure Ulcer Advisory Panel.
- Wound, Ostomy and Continence Nurses Society (2010). *Guideline for Prevention and Management of Pressure Ulcers*. Mount Laurel, NJ: Wound, Ostomy and Continence Nurses Society.

Concurrent with the review of existing guidelines, a search for recent literature relevant to the scope of the guideline was conducted with guidance from the Team Leader. A search of electronic databases, CINAHL, Medline, EMBASE, Web of Science and the Cochrane library, was conducted by a health sciences librarian. A research assistant (Master's prepared nurse) completed the inclusion/exclusion review, quality appraisal and data extraction of the retrieved articles, and prepared a summary of the literature findings. The comprehensive data tables and references were provided to all panel members.

Review Findings

In October 2010, the panel was convened to achieve consensus on the need to revise the existing set of recommendations. A review of recent studies since the guideline was reviewed in 2005 does not support dramatic changes to the recommendations, but rather suggests some refinements and stronger evidence in the guideline's approach. A summary of the evidence review process is provided in the flow chart:



Definition of Terms

The following terms are addition/update to the “Definition of Terms” found on page 18 of the 2005 guideline.

Alternating Pressure: “A feature of a support surface that provides pressure redistribution via cyclic changes in loading and unloading as characterized by frequency, duration, amplitude, and rate of change parameters” (NPUAP, 2006, p.4).

Envelopment: The “ability of a support surface to conform to irregularities in the body” (NPUAP & EPUAP, 2009, p. 127).

Friction: “The resistance to motion in a parallel direction relative to the common boundary of two surfaces.” (National Pressure Ulcer Advisory Panel, 2007, p.124).

Immersion: The “depth of penetration (sinking) into a support surface” (NPUAP & EPUAP, 2009, p. 127).

Incidence of Pressure Ulcer: New pressure ulcer cases appearing during a specified period in the “at risk” population identified in the prevalence survey. For instance, a surgical nursing unit that had admitted 100 patients over a period of a month and showed documentation of 10 ulcers would have an incidence rate of 10 per cent. Definition of quality improvement purposes may take into account all new occurrences even if it is a multiple occurrence during the time-frame for an individual. For example, if five of the 10 cases on the surgical unit had two ulcers during the one-month period, the incidence rate would be 15 per cent. It is important to make the formula used explicit (RNAO, 2007).

Interface Pressure (tissue): “The force per unit area that acts perpendicularly between the body and a support surface. This parameter is affected by the stiffness of the support surface, the composition of body tissue, and the geometry of the body being supported” (NPUAP & EPUAP, 2009, p. 125).

Low Air Loss: A series of interconnected woven fabric air pillows that allow some air to escape through the support surface. The pillows can be variably inflated to adjust the level of pressure relief (RNAO, 2007).

Offload: Removal of pressure from an area and spreading it over a larger area away from the bony prominence.

Overlay: An “additional support surface designed to be placed directly on top of an existing surface” (NPUAP & EPUAP, 2009, p. 125).

Pressure: “The force per unit area exerted perpendicular to the plane of interest” (NPUAP, 2007, p. 127).

Prevalence of Pressure Ulcer: A cross-sectional count of the number of cases at a specific point in time. The rate includes all old and new cases during the defined prevalence period (e.g. 12 hours). The formula for prevalence is based on one ulcer per case, thus the highest stage of ulcer is counted on those with multiple ulcers. The results are expressed as a percentage of the total number of clients assessed (RNAO, 2007).

Prevalence Study: The number of cases of a disease in a population at a given point in time. This survey represents a “snapshot” of the pressure ulcer population. It measures the presence or existence of pressure ulcers (admitted and hospital acquired) on the day surveyed with the population that is currently being managed by an organization (RNAO, 2007).

Standard Hospital Mattress: A non-pressure reducing institutional mattress usually constructed of cold foam with 10 to 20 per cent of the body being supported (Defloor et al., 2005).

Support Surfaces: Special beds, mattresses, mattress overlays or seat cushions for pressure redistribution (NPAUP & EPUAP, 2009):
Active Support Surface - “A powered surface with the capability to change its load distribution properties, with or without applied load” (NPAUP, 2007, p. 5).
Reactive Support Surface - “A powered or non-powered support surface with the capability to change its load distribution properties only in response to applied load” (NPAUP, 2007, p. 5).

Shear: “The force per unit area exerted parallel to the plane of interest” (NPAUP, 2007, p.127). Mechanical force that acts on a unit area of skin in a direction parallel to the body’s surface. Shear is affected by the amount of pressure exerted, the coefficient of friction between the materials contacting each other (i.e. how easily one surface slides over another), and the extent to which the body makes contact with the support surface (RNAO, 2007).

Summary of Evidence

The following content reflects the changes made to the RAO Risk Assessment and Prevention of Pressure Ulcers (2005) best practice guideline based on the consensus of the review panel. The literature review does not support dramatic changes to the recommendations, but rather suggests refinements and stronger evidence for the approach. Changes to the 2005 guideline recommendations are highlighted in **bold**.

-  unchanged
-  changed
-  additional information
-  new recommendation

New recommendations have been added to further expand assessment of pressure ulcers to vulnerable populations. Furthermore, new recommendations related to pressure management were also added under the Intervention Section, which resulted in changes to the original numbering of the recommendations.

Practice Recommendations

<p>Recommendation 1.1</p> <p>A comprehensive head-to-toe skin assessment should be carried out with all clients at admission, and daily thereafter for those identified at risk for skin breakdown. Particular attention should be paid to vulnerable areas, especially over bony prominences and skin adjacent to external devices.</p> <p style="text-align: right;">Level Ia Evidence</p>	
<p><i>The discussion of evidence for this recommendation found on page 22 of the 2005 guideline has been revised to reflect new emerging literature supports related to new pressure ulcer sites. The following information has been added:</i></p> <p>Since the last revised edition of <i>Risk Assessment and Prevention of Pressure Ulcers</i> (2005) a change in clinical critical care practices has given rise to a new set of pressure ulcer sites. De Laat et al. (2006) conducted a review of the literature of pressure ulcer development in critically ill patients. Three randomized control trials identified new locations of pressure ulcer development as a result of introducing prone positioning and non-invasive facemask ventilation. The anterior weight bearing sites identified in this review included the face, thorax, iliac crest, breast and knee. These studies also indicated statistical significance in the number of pressure ulcers grade II or worse in patients placed in a prone position for six hours or more. In addition, Sahin et al. (2009) identified the most common sites for pressure ulcer development in Intensive Care Unit patients to be the sacrum, coccyx and heels. Accordingly, a comprehensive head to toe skin assessment should include the anterior and posterior body surfaces, particularly when prone or semi-prone patient positioning is implemented.</p> <p>A number of studies cited as secondary sources by the <i>Guideline for Prevention and Management of Pressure Ulcers</i> (WOCN, 2010, p. 6) reinforce the importance of reassessment to minimize the risk of pressure ulcer development following admission to specific clinical settings. The following notes the timeline for when pressure ulcers can develop in specific clinical settings:</p> <p>Acute Care: Within the first two weeks of hospitalization Intensive Care Unit: 72 hours from admission Home Health Care: First four weeks of admission to agency Long Term Care: First four weeks of admission Palliative Care: Within two weeks prior to death Elderly Clients: First week of hospitalization Critically Ill Children: First day of admission to hospital</p>	

<p>Although this best practice guideline is focused on risk assessment and prevention of pressure ulcers in the adult client, the panel has included reference to the child in recognition of the child as a vulnerable population. Also, as the care of a critically ill child may cross several care settings, the importance of this information is one to be shared amongst all care settings and care providers.</p>	
<p>Additional Literature Support Brink et al. (2006).</p>	
<p><i>Recommendation 1.2 of the 2005 guideline (pg. 27) has been divided into two sub-recommendations for clarity.</i></p>	
<p>Recommendation 1.2a</p> <p>The client's risk for pressure ulcer development is determined by the combination of clinical judgment and the use of a valid reliable risk assessment tool. The use of a structured tool that has been tested for validity and reliability, such as the Braden Scale for Predicting Pressure Sore Risk, the Norton Pressure Sore Risk Assessment Scale and the Waterlow Pressure Ulcer Risk Assessment Tool are recommended.</p> <p style="text-align: right;">Level III Evidence</p>	
<p><i>The discussion of evidence for this recommendation found on page 23 of the 2005 guideline has been revised to reflect new emerging literature supports for pressure ulcer risk assessment tools. The following information has been added:</i></p> <p>Discussion of Evidence</p> <p>Shukla et al. (2008) conducted a prospective study which assessed surgical and medical patients using the Waterlow Pressure Ulcer Risk Assessment Tool. Their investigation supported the use of structured assessment tools for: 1) identifying multiple risk factors which need to be addressed in a preventative plan of care; and 2) for identifying risk factors for clinicians less experienced in considering all relevant factors related to pressure ulcer risk. Several studies using other risk assessment tools assisted in the identification of risk factors for various care settings (Banks et al., 2010; Gunningberg, 2004a; Lindgren et al., 2004; Terekeci et al., 2009). Some of these studies implemented structured pressure ulcer risk assessment tools along with other assessments specific to a clinical area such as the Subjective Global Assessment that categorizes nutritional status (Banks et al., 2010). However, a systematic review by Moore and Cowman (2008) revealed that there is no high quality evidence to support that the use of a structured pressure ulcer risk assessment reduces the incidence of pressure ulcers. What is encouraging though is the use of standardized assessment tools to gain a better understanding of risk factors for specific clinical settings and client populations. These tools, along with clinical judgment, increase the ability to identify risk factors that are then incorporated into a client specific prevention plan of care (Defloor & Grypdonck, 2005; Vanderwee et al., 2007).</p> <p>Magna and Makleburst (2009) conducted a descriptive correlational study analyzing Braden subscale ratings and preventive nursing interventions. In this study, they found that nurses were more likely to endorse and use preventive interventions that were identified by a decrease in Braden subscale scores indicating increased risk. They described how the subscales for sensory perception, activity and mobility assessed the degree of risk associated with intense and prolonged pressure, while moisture, nutrition, friction and shear assessed risks associated with decreased tissue tolerance. They concluded that the Braden Scale for Predicting Pressure Sore Risk should be conducted for the purpose of planning preventive interventions and that the prevention plan should be based on assessment of individual Braden subscale scores (see Appendix J).</p>	

Additional Literature Support
Capon et al. (2007).

Recommendation 1.2b

Assess for intrinsic/extrinsic risk factors **that are associated with the development of pressure ulcers.**

Level III Evidence



The discussion of evidence for this recommendation found on page 24 of the 2005 guideline has been revised to reflect new emerging literature supports related to those intrinsic and extrinsic risk factors that influence pressure ulcer development. The following information has been added:

Discussion of Evidence

As identified in Recommendation 1.2a, additional research conducted using standardized pressure ulcer risk assessment tools in specific clinical settings and client populations has yielded a greater number of probable intrinsic and extrinsic risk factors. The following risk factors specific to client populations are being included for consideration:

Clinical Setting	Risk Factors	Reference
Intensive Care Unit	<ul style="list-style-type: none"> organ failure, sepsis interface pressure, skin moisture, smoking, body temperature level of consciousness, activity, cooperation, bowel incontinence, length of stay, C-reactive protein level intermittent hemodialysis, mechanical ventilation, vasopressor therapy and pain impaired perfusion/hemodynamic instability, pharmacologic or mechanical support to maintain normal blood pressure or adequate cardiac output, global or regional perfusion that is not adequate to support normal organ function including the skin 	Fogerty et al., 2008 Suriadi et al., 2007 Sayar et al., 2009 Nijs et al., 2009 Black et al., 2011
Medical/Surgical	<ul style="list-style-type: none"> having two co-morbidities, neuropsychiatric disorder, infection 	Reddy et al., 2006; Terekeci et al., 2009
Medical Client	<ul style="list-style-type: none"> length of time of hospitalization 	Lindgren et al., 2004
Surgical Client	<ul style="list-style-type: none"> weight, serum albumin 	Lindgren et al., 2004
Acute Care (surgery, internal medicine, neurology, geriatric)	<ul style="list-style-type: none"> age greater than 75 years, weight on admission, abnormal appearance of skin, planned surgery in coming week presence of malignant tumor, arterial obstructive disease of abdominal and pelvic arteries 	Schoonhoven et al., 2007 Nonnemacher et al., 2009
Orthopedic	<ul style="list-style-type: none"> age greater than 71 years, pulmonary disease, diabetes cerebral vascular accident 	Lindholm, 2008 Walsh & Plonczynski, 2007



These additional risk factors are adding to the understanding of specific risk factors and the predisposition to the development of pressure ulcers for specific client populations and care settings.

Additional Literature Supports
Schoonhoven et al. (2002).
Wolverton et al. (2005).

Recommendation 1.3

Assessment scales to assess and re-assess risk for skin breakdown and overall skin condition specific to vulnerable populations such as the elderly, palliative patients, the neonate/the child, spinal cord injured patients, and bariatric patients should be considered.

Level III Evidence

NEW

Discussion of Evidence

While key risk factors that predispose the general population to pressure ulcers have been identified by several standardized assessment tools, specific factors may need to be considered in certain vulnerable patient populations. For instance, a study of patients with spinal cord injuries identified an 85 per cent lifetime risk of pressure ulcer development, with socioeconomic, neurological and behavioral factors being important elements in the occurrence (New et al., 2004). Concerns regarding pressure or friction from equipment and skin texture are more relevant in the pediatric and neonate populations (Fuji, et al., 2010). Bariatric, palliative patients and the frail elderly may also benefit from specific assessment (NPUAP & EPUAP, 2009).

A number of studies cited as secondary sources by the *Guideline for Prevention and Management of Pressure Ulcers* (WOCN, 2010) have suggested the following risk assessment tools specific to the palliative patients and the pediatric population:

- Palliative Population
 - Performance Palliation Scale www.cancercare.on.ca/common/pages/UserFile.aspx?fileId=13380
- Pediatric Population
 - Neonate Skin Risk Assessment Scale (NSRAS) www.chca.com/thekidscampaign/Documents/Preventing%20Pressure%20Ulcers/Additional%20Resources/NICU%20Skin%20assessment%20scale.doc
 - Neonatal Skin Condition Score www.oumedicine.com/workfiles/College%20of%20Medicine/AD-OBGYN/AWHONN-NSCS.pdf
 - Starkid Skin Scale www.infermieristicapediatrica.it/pdf/StarkidSkinBreakdown.pdf

A risk assessment tool specific to spinal cord injured patient is also available:

- Spinal Cord Injured Population
 - o Spinal Cord Injury Pressure Ulcer Scale (SCIPUS) www.scireproject.com/outcome-measures/spinal-cord-injury-pressure-ulcer-scale-scipus-measure

Furthermore, the interRAI Pressure Ulcer Risk Scale (PURS) based on the Minimum Data Set (MDS) assessment has been shown to be useful in identifying risk for pressure ulcer development among residents in long-term care homes and home care recipients (Poss et al., 2010). This tool is detailed in Appendix K.

Although a validated assessment tool to determine and compare pressure ulcer risk among obese and bariatric individuals remains elusive, high body mass index (BMI) has been demonstrated to be a significant predictor for pressure ulcer development (Elsner & Gefen, 2008). People with BMIs of more than 40 were almost three times more likely to have a pressure ulcer compared to those with BMIs of 40 or less (Drake et al., 2010).

NEW

Recommendation 1.4

Assessment and documentation of skin changes amongst palliative patients at the end of life should be conducted as recommended by the consensus statement Skin Changes At Life's End (SCALE).

Level IV Evidence

NEW

Discussion of Evidence

The Skin Changes at Life's End (SCALE) consensus statement was developed to facilitate implementation for knowledge-transfer-into-practice for quality patient outcomes (Sibbald et al., 2009). Not to be considered or used as a skin assessment tool, it does however, provide 10 valuable consensus statements which discuss changes of the skin as a result of the dying process. It also identifies risks of injury such as pressure ulcers and the Kennedy Terminal Ulcer, a pressure ulcer "usually shaped like a pear, butterfly, a horseshoe, and are located predominantly in the coccyx or sacrum" (Sibbald et al., 2009, p 4).

In light of these revisions to RNAO's *Risk Assessment and Prevention of Pressure Ulcers*, the following statements have specific relevance:

Source: Sibbald, R., Krasner, D., & Lutz, J., SCALE: Skin Changes at Life's End: Final Consensus Statement, *Advances in Skin & Wound Care*, Vol. 23, Issue 5, 225-236.

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Statement 1

Physiologic changes that occur as a result of the dying process (days to weeks) may affect the skin and soft tissues and may manifest as observable (objective) changes in skin color, turgor (integrity), or as subjective symptoms such as localized pain. These changes can be unavoidable and may occur with the application of appropriate interventions that meet or exceed the standard of care. (Sibbald et al., 2009, p 6).

Statement 4

Skin changes at life's end are a reflection of compromised skin (reduced soft tissue perfusion, decreased tolerance to external insults, and impaired removal of metabolic wastes) (Sibbald et al., 2009, p 7).

Statement 6

Risk factors, symptoms, and signs associated with SCALE have not been fully elucidated, but may include: weakness and progressive limitation of mobility, suboptimal nutrition including loss of appetite, weight loss, cachexia and wasting, low serum albumin/pre-albumin, and low hemoglobin as well as dehydration; diminished tissue perfusion, impaired skin oxygenation, decreased local skin temperature, mottled discoloration, and skin necrosis; loss of skin integrity from any of a number of factors including equipment or devices, incontinence, chemical irritants, chronic exposure to body fluids, skin tears, pressure, shear, friction and infections; and impaired immune function. (Sibbald et al., 2009, p 8).

Statement 7

A total skin assessment should be performed regularly and document all areas of concern consistent with the wishes and condition of the patient. Pay special attention to bony prominences and skin areas with underlying cartilage. Areas of special concern include the sacrum, coccyx, ischial tuberosities, trochanters, scapulae, occiput, heels, digits, nose and ears. Describe the skin or wound abnormality exactly as assessed. (Sibbald et al., 2009, p 9).

The RNAO review panel believes that the use of the SCALE consensus statements adds to the body of knowledge which helps to differentiate the skin care needs of the dying client from the client receiving palliative care. Although, there are similarities, there are also differences and it is these differences that facilitate the identification of skin at risk and subsequent preventative plans of care for this vulnerable population.

NEW

<p>Recommendation 1.5</p> <p>All sectors of the health care system, programs, and services should conduct risk assessments and re-assessments to plan prevention strategies that will minimize the risk of pressure ulcer development.</p> <p style="text-align: right;">Level IV Evidence</p>	<p>NEW</p>
<p>Discussion of Evidence</p> <p>Patients are at risk for pressure ulcer development across the entire spectrum of health care settings including acute care, intensive care, home care, long-term care, palliative and others (refer to Recommendation 1.1 for information on the timeline for when pressure ulcers can develop in these clinical settings). Various programs and services such as nursing, medicine, rehabilitation, social work, and support services are responsible for pressure ulcer prevention. Clinicians, administrators, risk managers, and other leaders in quality assurance should be involved in addressing pressure ulcers.</p>	<p>NEW</p>
<p>Recommendation 1.6a</p> <p>All pressure ulcers should be identified and described using standardized systems and language (e.g. National Pressure Ulcer Advisory Panel and European Pressure Ulcer Advisory Panel pressure ulcer classification system).</p> <p style="text-align: right;">Level IV Evidence</p>	
<p><i>Recommendation 1.6a originally was recommendation 1.4a. The discussion of evidence for this recommendation found on page 25 of the 2005 guideline has been revised to reflect new emerging literature supports related to the use of standardize systems and changes in the language for pressure ulcer identification. The following information is added:</i></p> <p>Although adopted by several practice guidelines, validity and reliability of the current classification systems of pressure ulcers remain contentious. The accuracy of grading a pressure ulcer can be affected by skin pigmentation, presence of moisture associated skin damage, deep tissue injury and deep ulcers that are progressively becoming shallower.</p> <p>Misuse and misinterpretation of the current pressure ulcer classification systems is common. Staging/Grading connotes a faulty assumption that pressure ulcers progress from I to III or IV. Some clinicians advocate the description of skin damage as superficial (partial thickness) versus deep (full thickness). The revised National Pressure Ulcer Advisory Panel (NPUAP) and European Pressure Ulcer Advisory Panel (EPUAP) (2009) guideline suggests “Category” to replace “stage” or “grade”, Appendix E. The term category is neutral and does not imply a hierarchical designation.</p>	<p>+</p>
<p>Recommendation 1.6b</p> <p>If pressure ulcers are identified, utilization of the RAO best practice guideline <i>Assessment and Management of Stage I to IV Pressure Ulcers</i> along with other related guidelines is recommended.</p> <p style="text-align: right;">Level IV Evidence</p>	
<p>Recommendation 1.7</p> <p>All findings should be documented at the time of assessment and reassessment.</p> <p style="text-align: right;">Level IV Evidence</p>	

Planning

<p>Recommendation 2.1</p> <p>An individualized plan of care should be developed in collaboration with the client, significant others and an interdisciplinary team, including consulting health care providers as appropriate. The team uses assessment and reassessment data in combination with clinical judgment to identify risk factors and to recommend the plan of care. Client centered care aligns with the recommendations and the client’s choice of goals.</p> <p style="text-align: right;">Level IV Evidence</p>	
<p><i>This recommendation is an amalgamation of both recommendations 2.1 and 2.2 of the 2005 guideline. Discussion of evidence found on pgs. 27-28 of the original guideline is still reflective of the current evidence. The guideline review panel encourages the use of other RNAO guidelines such as the “Establishing Therapeutic Relationship”, “Client Centered Care”, and “Strategies to Support Self-Management in Chronic Conditions: Collaboration with Clients” to gain better understanding of the importance of collaboration in the development of individualized plan of care and interventions according to the risk factors identified by the Braden Risk Assessment Tools, Appendix C.</i></p>	

Interventions

<p>Recommendation 3.1a</p> <p>Clients identified to be at risk for developing a pressure ulcer should be resting on a pressure management surface such as a high-specification foam pressure redistribution mattress.</p> <p style="text-align: right;">Level Ia Evidence</p>	
<p><i>Recommendation 3.5 of the 2005 guideline now becomes 3.1a.</i></p> <p>Discussion of Evidence</p> <p>A systematic review conducted by Cullum et al. (2004) examined the extent to which therapeutic support surfaces, in comparison with standard support surfaces, reduced the incidence of pressure ulcers and compared how effective different pressure-management surfaces were in preventing pressure ulcers. From the 41 randomized controlled trials included in the review it was concluded that for those at high risk of pressure ulcers, the use of a higher specification foam mattress (low interface pressure) should be considered rather than the standard hospital foam mattress (non-powered foam or spring-based mattress). Standard hospital mattresses have been consistently outperformed by a range of foam-based, low pressure mattresses and overlays, and by “higher-tech” pressure-relieving beds and mattresses in the prevention of pressure ulcers.</p> <p>The Cullum et al. (2004) review also indicates that the relative merits of higher-tech constant low pressure and alternating pressure for prevention are unclear, and suggests that alternating air mattresses are more effective than alternating air overlays. However, other studies have shown that there are no significant differences between the types of pressure reducing mattresses used (i.e. low air loss and alternating pressure air mattresses), in the reduction of pressure ulcer incidence (Theaker et al., 2005; Weststrate, 2005). Nevertheless, the De Laat et al. (2007) study found a decrease in pressure ulcer incidence with the increased use of pressure reducing mattresses for critically ill patients in the Intensive Care Unit (ICU).</p>	

<p>The NPUAP (2007) has created standard terminology for the discussion of support surfaces. The terms pressure reduction, pressure relief, static and dynamic are no longer used to describe support surfaces. Support surfaces are now divided into two main categories:</p> <ul style="list-style-type: none"> • Reactive support surface: <i>“A powered or non-powered support surface with the capability to change its load distribution properties only in response to applied load”</i> (p. 5). • Active support surface: <i>“A powered surface with the capability to change its load distribution properties, with or without applied load”</i> (p. 5). <p>The NPUAP has also created standard definitions for support surface features such as low air loss, alternating air, envelopment and immersion.</p> <p>Norton et al. (2008) have created a support surface selection tool for the prevention and management of pressure ulcers (see Appendix L for further discussion of support surface selection). Regardless of the type of surfaces used for high-risk clients, thorough and frequent skin assessments should be conducted for evidence of tissue damage (Cullum et al., 2004; WOCN, 2003).</p>	
<p>Recommendation 3.1b</p> <p>A re-positioning schedule of at least every two hours should be promptly implemented when using a standardized mattress, emergency stretcher or operating table surface. When using a pressure management surface (re-distribution mattress or cushion) use a re-positioning schedule of at least every four hours or as required by the patient’s condition. Consider other patient factors such as the development of redness to increase the frequency of repositioning.</p> <p style="text-align: right;">Level Ia Evidence</p>	<p>NEW</p>
<p>Discussion of Evidence</p> <p>Repositioning is a key component in preventing pressure ulcers for patients at risk. Prior to the revision of this guideline, little research existed to help guide a re-positioning schedule for clinicians other than clinical assessment.</p> <p>Defloor et al. (2005) investigated the effect of four different preventative regimes and their effect on pressure ulcer development in 838 geriatric long-term care patients. They compared frequent turning every two or three hours on a standard mattress to less frequent turning every four or six hours on a pressure management surface. It was found that turning every four hours on a support surface, a high-specification mattress or bed, was associated with the occurrence of significantly less pressure ulcers than the second group on a standard mattress, a non-powered foam or spring-based mattress. The study also suggested that patients at risk of breakdown who were placed on a standard mattress must still be turned every two hours for prevention. The Vanderwee et al. (2007) study of 235 long-term care patients, all lying on viscoelastic foam mattresses, yielded similar results. In their study, the experimental group had patients repositioned alternately two hours in a lateral position and four hours in a supine position. The control group patients were repositioned every four hours, first in lateral and then in supine. The study also found that more frequent repositioning on a pressure-reducing mattress did not lead to fewer pressure ulcers.</p> <p>Rich et al. (2010) studied the incidence of pressure ulcers among bed-bound elderly hip fracture patients and found no association between frequent repositioning of bed-bound patients and lower pressure ulcer incidence, regardless of being on a standard mattress or pressure-reducing mattress. Furthermore, Westrate (2005) also found that regular repositioning alone as a measure of pressure reduction is unlikely to be successful in the ICU. The findings from these two studies support the need for an individualized plan of care tailored to each patient based on characteristics such as mobility and general medical condition, regardless of the surface they are on.</p>	<p>NEW</p>

<p>The NPUAP & EPUAP (2009) also supports the use of repositioning as a prevention strategy that must take into consideration the patient and the support surface in use.</p> <p>Entrapment <i>Reproduced with permission: Norton L. (2010). Support Surface Selection Guide. Shoppers Home Health Care. Toronto. Revised June 2011.</i></p> <p>When choosing a therapeutic support surface, special attention needs to be given to the issue of entrapment. Between 1980 and 2008, 54 per cent of the 67 life-threatening entrapments reported to Health Canada lead to death. The risk of entrapment may be increased when using a therapeutic support surface as it may not have exactly the same dimensions as the original mattress. Although Health Canada does provide guidance as to the maximum measurements for the seven zones of entrapment, standard measurements are not available for powered active support surfaces as the air bladders on some of these surfaces compress, making valid measurement difficult.</p> <div style="border: 1px solid black; padding: 5px;"> <p>Seven Zones of Entrapment</p> <ol style="list-style-type: none"> 1. Within the rail. 2. Under the rail (between the rail supports or next to a single rail support). 3. Between the rail and the mattress. 4. Under the rail at the ends of the rail. 5. Between split bed rails. 6. Between the end of the rail and the side edge of the headboard or footboard. 7. Between the head board or footboard and the mattress end. </div> <p>To minimize the risk of entrapment consider:</p> <ul style="list-style-type: none"> • Selecting a surface that has a transfer boarder as it may be less likely to compress as the client approaches the side of the surface; • Evaluating the use of bed rails – the client may be at less risk when these are not in place; • Implementing other devices, such as positioning wedges or a mattress cover with built in bolsters; and/or • Consulting with an occupational or physical therapist skilled in this area to complete a client assessment and make specific recommendations. 	
<p>Additional Literature Support Kaitani et al. (2010).</p>	
<p>Recommendation 3.2</p> <p>Heels must be completely off loaded in all positions. If not feasible, reason(s) must be documented, the heels must be monitored, and other prevention strategies implemented.</p> <p style="text-align: right;">Level III Evidence</p>	<p>NEW</p>
<p><i>In the 2005 guideline, use of devices to totally relieve pressure on the heels and bony prominences of the feet was included within recommendation 3.7 for individuals restricted to bed. Given the unique vulnerability of the heels and that heel pressure ulcers are the second most prevalent location of pressure ulcer, heel ulcer prevention warrants to be a recommendation on its own.</i></p> <p>Discussion of Evidence</p> <p>Multiple factors make offloading (complete elevation of the heel off a surface) important in heel ulcer prevention. These include the small amount of subcutaneous tissue covering the calcaneous bone, the shape of the calcaneous bone, and the risk for ischemia with minimal pressure and shear forces.</p>	<p>NEW</p>

<p>Nicosia et al. (2007) published a meta analysis on the effect of pressure relieving surfaces for the prevention of heel ulcers. This study found that pressure management surfaces were associated with a significantly lower incidence of heel ulcers as compared with a standard hospital mattress. There is also evidence to support the use of certain air or foam mattresses or overlays in prevention of heel pressure ulcers. However, there exists insufficient research to determine if heel-protective devices could prevent heel pressure ulcers (Nicosia et al., 2007). Similarly, a systematic review conducted by Junkin and Gray (2009) found that pressure redistribution surfaces vary in their ability to prevent heel pressure ulcers, but there was insufficient evidence to determine which surfaces were optimal for this purpose. Insufficient evidence also exists in the determination of whether heel protection devices were more effective than a standard hospital foam pillow (Junkin and Gray, 2009).</p> <p>Campbell et al. (2010) recognized the significant impact heel pressure ulcers have in the acute orthopedic population and implemented a heel pressure ulcer prevention program. Development of the program included consensus exercises with clinical staff and administrators and use of a two-inch foam wedge covered in washable vinyl to offload patient's heels in bed. This device allowed elevation of the heel while distributing the weight of the leg along the calf to avoid pressure on the Achilles tendon and allow for maximum heel perfusion. The incidence of heel ulcers in the orthopedic program decreased from 13.8 to 0 per cent over a four-week period.</p>	
<p>Additional Literature Support Schoonhoven et al. (2006).</p>	
<p>Recommendation 3.3</p> <p>Use proper positioning, transferring and turning techniques. Consult an Occupational or Physical Therapist (OT/PT) regarding transfer and positioning techniques and strategies, as well as devices to reduce pressure friction and shear in all positions, and how to optimize client independence.</p> <p style="text-align: right;">Level Ib Evidence</p>	
<p><i>Recommendation 3.3 is a combination of Recommendation 3.2 and 3.7 of the 2005 guideline.</i></p> <p>Discussion of Evidence</p> <p>All surfaces upon which the client sits or lies, the transfers to and from these surfaces and the repositioning techniques used need to be assessed regarding pressure, friction and shear forces (Kaitani et al., 2010). The NPUAP (2007) has created standard definitions for these terms. They are:</p> <ul style="list-style-type: none"> • Pressure as: <i>“the force per unit area exerted perpendicular to the plane of interest”</i> (p. 127). • Friction as: <i>“the resistance to motion in a parallel direction relative to the common boundary of two surfaces”</i> (p.124). • Shear as: <i>“the force per unit area exerted parallel to the plane of interest”</i> (p.127). <p>Efforts need to focus on reducing the forces of pressure, friction and shear. Particular attention should be paid to reducing shearing forces, as shear force doubles the impact of pressure (Ohura et al., 2008).</p> <p>Use devices to enable independent positioning, lifting and transfers (e.g. trapeze, transfer board, bed rails). Lifting devices or low friction sheets should be used to avoid dragging clients during transfers and position changes. The use of safe patient handling techniques has been shown to decrease staff injuries, but also to decrease skin tears and pressure ulcers (Kaitani et al., 2010).</p>	

Refer to Appendix F for further discussion on force management.

Chair

Skin protection cushions (i.e. cushions which reduce pressure, friction and shearing forces) should be used when clients are using a wheelchair to help prevent pressure ulcers. In a randomized clinical trial on preventing pressure ulcers with wheelchair cushions, it was found that skin protection cushions used with fitted wheelchairs lower pressure ulcer incidence for elderly nursing home residents (Brienza et al., 2010). Brienza et al. (2010) goes on to say that residents who are identified to be at high risk as determined by their Braden Scale score and who use a wheelchair as their primary means of mobility should be provided with a wheeled mobility and seating assessment, and properly fitted wheelchair with a skin protection cushion.

An Occupational or Physical Therapist with expertise in seating and mobility should conduct a wheeled mobility and seating assessments. When prescribing the wheelchair and cushion, consideration should be given not only to pressure, friction and shear but also to issues such as postural alignment, impact on function, cost, maintenance, comfort, distribution of weight, balance, stability, support of the feet, client goals and cognitive status.

Ensure that that wheelchair and cushion are prescribed for that individual client sitting in the wheelchair, that the components of the wheelchair are assembled appropriately and that the cushion is in the chair correctly. If the cushion has bottomed out, is leaking, the wheelchair is in disrepair or the client's condition has changed, a reassessment by the Occupational or Physical Therapist is recommended (see Appendix M for more information).

Bed

When the client is restricted to bed, it is essential to utilize an interdisciplinary approach to prevent pressure ulcers. Use of pillows or foam wedges to avoid contact between bony prominences had been shown to minimize pressure ulcer incidence (NPUAP/EPUAP, 2009).

A 30 degree turn to either side is also recommended to avoid positioning directly on the trochanter, as this results in the lowest interface pressure. Young (2004) however found that 78 per cent of at risk medical patients could not tolerate this type of position. Accordingly, use of specialty pillows to help patients maintain this position is suggested (Vanderwee et al., 2007).

A 30 degree elevation or lower (maintaining the head of the bed at the lowest elevation consistent with medical conditions and restrictions) was a recommended position for reducing shearing forces. A prone position may also result in low interface pressure measurements if medically appropriate (NPUAP & EPUAP, 2009).

An advanced dressing could be used to further decrease friction or shear in individuals who are restricted to bed. A study by Bots and Apotheker (2004) found a 76.7 per cent reduction of heel pressure among surgical patients with use of an adhesive foam dressing. Similarly, Nakagami et al. (2006) also found a reduction of shear force on the heel with use of a low-friction dressing. The study also stipulated that although dressings reduce friction or shear, they couldn't be a substitute for heel offloading in the immobile patient.

Recommendation 3.4

Assess, document and effectively manage pain to enable implementation of the most appropriate plan of care for pressure ulcer prevention without compromising comfort and quality of life.



Level IV Evidence

<p><i>This recommendation replaces recommendation 3.3c found on pg. 30 of the 2005 guideline to emphasize pain assessment, management and documentation. The following information is an addition to the discussion of evidence found on pg. 30 of the guideline.</i></p> <p>Pressure ulcer prevention includes pain management. Pain interferes with patients' mobility and their acceptance of potentially painful procedures such as turning and repositioning, thereby increasing their risk for pressure ulcer development. Accordingly, adequate pain assessment, management and documentation are critical to pressure ulcer prevention and should be incorporated into the plan of care.</p> <p>The guideline review panel strongly recommends the use of the RAO <i>Assessment and Management of Pain</i> (2002; 2007S) best practice guideline for guidance related to pain assessment and interventions.</p>	+
<p>Recommendation 3.5</p> <p>Massaging over bony prominences and reddened areas should be avoided</p> <p style="text-align: right;">Level IV Evidence</p>	
<p><i>The discussion of evidence for this recommendation (formally 3.4) found on page 30 of the 2005 guideline has been revised to include subsequent literature related to the use of massage for pressure ulcer prevention.</i></p> <p>The NPUAP and EPUAP (2009) provided a succinct review of seven articles on the utilization of therapeutic massage to prevent pressure ulcers. These articles in aggregate suggested massage to be contraindicated in the presence of acute inflammation, as this indicate the possibility of damaged blood vessels or fragile skin. Because the majority of pressure ulcers occur over areas of bony prominence where tissue thickness is already minimized and cushioning of blood vessels is not optimal, reddened areas suggest presence of inflammation. Accordingly, such areas should not be massaged.</p>	+
<p>Additional Literature Support WOCN (2010)</p>	
<p>Recommendation 3.6</p> <p>Implementation of intraoperative pressure management devices is recommended for surgical procedures lasting more than 90 minutes.</p> <p style="text-align: right;">Level Ib Evidence</p>	
<p><i>The discussion of evidence for this recommendation will be congruent to the information provided on pgs. 31-32 of the original guideline (under recommendation 3.6). However, changes to the last sentence of the second paragraph is made to reflect the following information:</i></p> <p>Individuals undergoing surgery face multiple risks for pressure ulcer development. These risks include the length of time of the procedure, any hypotensive episodes during the surgery, low core temperature during surgery and limited mobility on the first post-operative day (NPUAP & EPUAP, 2009). It is important to note that pressure ulcers are not always visible immediately and can develop three to five days after surgery, making it difficult to clearly identify causative factors (Defloor et al., 2005; Nijs et al., 2009; Schoonhoven et al., 2002). Nevertheless, pressure ulcers continue to occur more frequently in surgical patients during the first week of admission than in medical, neurological and geriatric patients (Schoonhoven et al., 2006). Hence, the use of a pressure-distributing mattress on the operating table is suggested (Nixon et al., 2006). In particular, a quality support surface</p>	+

<p>(foam or gel) is recommended for those individuals undergoing surgery greater than 90 minutes in length (Medical Advisory Secretariat, 2009). A study conducted by Pham et al. (2011) found a 0.51 per cent decrease in intraoperative incidence of pressure ulcers with use of pressure redistribution overlays on operating tables. The study also found that though the average cost of operating table overlays is \$1.66 per patient, its use improves patient’s health and yields a cost saving of \$46 per patient – ranging from \$13 to \$116 by different surgical populations. Intentional positioning such as elevating heels completely off the surface without increasing pressure on the Achilles tendon and deliberate positioning pre- and post-surgery that would be different than the positioning used in the operating theatre could also prevent pressure ulcer development for this patient population (NPUAP & EPUAP, 2009). Ultimately, the high incidence of pressure ulcer development in surgical patients suggests that prevention interventions focus on the preoperative and immediate postoperative period must be implemented immediately on admission to prevent pressure ulcer occurrence during the first week of hospitalization (Schoonhoven et al., 2006).</p>	
<p>Additional Literature Support WOCN (2010).</p>	
<p><i>Note: For recommendations 3.7a and 3.7b, consider referral to occupational or physical therapist (OT/PT) for seating assessment, pressure management selection and adaptations for special needs (Appendix L).</i></p>	
<p>Recommendation 3.7 a</p> <p>Before implementing localized pressure management devices (e.g. heel boots, wedges, etc.) consider:</p> <ul style="list-style-type: none"> • Potential for increased pressure over surrounding areas of the skin by the device; • Caregiver training and education to ensure correct use of the device; and/or • Factors that enable client adherence. <p style="text-align: right;">Level IV Evidence</p>	<p>NEW</p>
<p>Discussion of Evidence</p> <p>When implementing a pressure management device, it is imperative to consider the consequences of focal pressure that can inadvertently be caused from improper use or application. Techniques such as offloading patient’s heels with an intravenous solution bag, or having patients sit on a donut device to off load the ischial tuberosities can potentially increase pressure of the surrounding skin and cause ischemia resulting in further breakdown of the vulnerable area. It is important to use a pressure redistribution model that enables any device to distribute load over the contact areas of the human body (NPUAP & EPUAP, 2009). This is also the case when additional padding is used to protect an area, as it is likely increasing focal pressure.</p> <p>Positioning patients onto medical devices such as tubes or drains can increase localized pressure resulting in tissue damage (NPUAP & EPUAP, 2009). In some cases, use of local pressure devices may be of benefit (i.e. the use of doughnut type devices around the ear when side lying). It is essential to include education and training to caregivers and clients when using these techniques to minimize improper use and risk of ischemia.</p>	<p>NEW</p>

<p>Recommendation 3.7b</p> <p>Complete bed rest is not recommended for the prevention and healing of pressure ulcers. Determine the rationale for bed rest and focus on getting the client up into an appropriate wheelchair for part of the day, as appropriate.</p> <p style="text-align: right;">Level III Evidence</p>	<p>NEW</p>
<p>Discussion of Evidence</p> <p>There is no evidence that bed rest is effective in preventing or managing pressure ulcers, yet both physical and physiological complications are well documented (Allen et al, 1999; Norton et al., 2007). Recumbent positioning has been associated with a decrease in serum liver proteins such as albumin, pre-albumin and transferrin (Doweiko & Nomplessia, 1991; Lacy, 1991). Furthermore, Brown et al. (2004), in a study of hospitalized older patients found that lower mobility scores were also associated with adverse outcomes such as decreased independence in activities of daily living, increase institutional care after discharge and death. Their study also found that patients' with decreased mobility is often recorded as involuntary bed rest orders, and in almost 60 per cent of the cases, there was no documented additional medical indication for the use of bed rest (Brown et al., 2004).</p> <p>When considering prevention and management of pressure ulcers, evaluate all surfaces upon which the client sits or lays, the transfers to and from these surfaces, and the repositioning techniques and equipment used on these surfaces in terms of pressure, friction and shear. Consult an occupational or physical therapist familiar with seating, mobility, transfers and support surfaces.</p> <p>An appropriate wheelchair is one that has been prescribed by an occupational or physical therapist and recently reviewed by the therapist. The wheelchair fits the client's stature (height and weight), is in good working order, has a pressure management cushion that is positioned correctly and is not worn. See Recommendation 3.3 and Appendix M for further information.</p>	<p>NEW</p>
<p>Recommendation 3.8</p> <p>Protect skin from excessive moisture and incontinence to maintain skin integrity:</p> <ul style="list-style-type: none"> • Monitor fluid intake to ensure adequate hydration; • Use a pH balanced, non-sensitizing skin cleanser with warm water for cleansing; • Minimizing force and friction during care (e.g. use a soft wipe or spray cleanser); • Maintain skin hydration by applying moisturizing agents that are non-sensitizing, pH balanced, fragrance free and/or alcohol free; • Use topical protective barriers to protect skin from moisture. Avoid ingredients and excess application of products that may compromise the absorptive capacity of the incontinent brief; • Use protective barriers (e.g. liquid barrier films, transparent films, hydrocolloids) or protective padding to reduce friction injuries; • If skin irritation persists due to moisture, consult with advanced practice nurses and/or with the appropriate interdisciplinary team for evaluation and topical treatment; and/or • Establish a bowel and bladder program. <p style="text-align: right;">Level III Evidence</p>	

<p><i>This recommendation is an amalgamation of recommendations 3.9 and 3.10 of the 2005 guideline. The following information is an addition to the discussion of evidence found on pg.33 (3.9) and pg. 34 (3.10) of the 2005 guideline.</i></p> <p>The use of skin emollients to hydrate dry skin, and the use of barrier products on skin already compromised due to excessive moisture and/or incontinence is suggested to reduce risks for pressure damage (NPUAP & EPUAP, 2009). The choice of products for standardized performance indicators such as breathability, air permeability and other factors can guide continence management. The American-based National Association for Continence (www.nafc.org) is currently developing standards for continence products.</p> <div style="border: 1px solid black; padding: 5px; margin-top: 10px;">  <p>Consider the impact of incontinence products on pressure, friction and shear and use the minimum number of layers/amounts.</p> </div>	+
<p>Additional Literature Supports Bots & Apotheker (2004). Jolley et al. (2004). Reddy et al. (2006).</p>	
<p>Recommendation 3.9</p> <p>A nutrition and hydration assessment with appropriate interventions should be implemented on entry to any health-care setting and when the client’s condition changes. If nutritional deficit and/or dehydration is suspected:</p> <ul style="list-style-type: none"> • Consult with a registered dietitian; • Investigate factors that compromise an apparently well nourished individual’s dietary intake (especially protein or calories) and/or fluid intake and offer the individual support with eating/drinking; • Plan and implement a nutritional support and/or supplementation program for nutritionally compromised/ dehydrated individuals; and • If dietary/fluid intake remains inadequate, consider alternative nutritional interventions. <p style="text-align: right;">Type III Evidence</p>	
<p><i>The following information replaces the discussion of evidence found on pgs. 35-36 of the 2005 guideline.</i></p> <p>Discussion of Evidence</p> <p>Nutritional assessment on admission to a health care facility or agency and with each change in patient’s condition is critical to the prevention of pressure ulcers. Key components of a nutrition assessment that must be considered for pressure ulcer prevention and/or management are as follows:</p> <ol style="list-style-type: none"> a) Adequacy of intake of nutrition and hydration from all sources (e.g. calories, protein, micronutrients [e.g. vitamins/minerals], fluid); b) Precautions and contraindications to nutrient and fluid supplementation; c) Routes and extent of nutrition/hydration loss (e.g. gastrointestinal tract, urinary tract, wound exudate, fistulae, diaphoresis, negative pressure therapy); d) Weight status – significant unintentional weight loss, weight stability, overweight/obesity and the importance of frequent weight monitoring. (For patients who are obese, Donner et al. (2009) suggested that weight loss efforts may need to be modified or postponed temporarily to provide sufficient nutrients for prevention and/or healing of pressure ulcers); e) Nutrition/hydration-related blood work; 	NEW

- f) Ability to self-feed/need for assistance with eating and drinking; and
- g) Other barriers to optimal food/fluid intake (e.g. impaired dentition, dysphagia, impaired cognition/communication, advanced age, psychosocial factors, inadequate screening/assessment and monitoring).

It has been well documented that significant weight loss (greater than or equal to 5 per cent change in 30 days or greater than or equal to 10 per cent change in 180 days), low BMI (less than 22 kg/m²), dehydration, reduced appetite, protein-energy malnutrition and impaired ability to eat independently are associated with increased incidence of pressure ulcers and delayed wound healing (Dorner et al., 2009; Fraser, 2007; Fraser, 2009; Harris & Fraser, 2004; Stechmiller, 2010). Therefore, nutritional interventions directed at preventing and correcting such issues are critical for pressure ulcer prevention.

A meta-analysis conducted by Stratton et al., (2005) showed that provision of an oral nutrition supplement (ONS) (250 – 500 kcal per serving) given over two to 26 weeks was related to a significantly lower incidence of pressure ulcer development in at-risk populations (i.e. elderly, post-surgical, long-term care) compared with standard care. This systematic review also showed that the risk of developing pressure ulcers could be reduced by 25 per cent with oral and/or enteral (tube feeding) nutrition support. Although oral nutrition is the preferred route for nutrition and should be supported whenever possible, enteral and parenteral (delivered outside the alimentary tract) nutrition are necessary when oral nutrition is inadequate or not possible based on the patient's condition and goals (NPUAP & EPUAP, 2009).

Literature suggests that patients with nutritional risk and pressure ulcer risk factors be offered:

- A minimum of 30-35 kcal /kg body weight/ day with 1.25-1.5 g/kg/day protein (Dorner et. al., 2009; NPUAP & EPUAP, 2009);
- A minimum of 1 ml of fluid/ kcal/ day (NPUAP & EPUAP, 2009); for patients with dehydration, diarrhea, vomiting, elevated temperature, profuse sweating or heavily draining wound(s), provide additional fluid (Dorner et al., 2009); and
- A well balanced diet that includes appropriate sources of vitamins and minerals. If dietary intake is poor or deficiencies are suspected, offer vitamin/mineral supplements (Dorner et. al., 2009).

It should be noted that implementation of greater amounts of calories, protein and fluid, and initiation of vitamins and minerals must be based on clinical assessment and judgment by a registered dietitian based on a comprehensive nutrition assessment that considers concurrent disease processes and the inherent precautions and contraindications to supplementation.

An essential component of a comprehensive assessment is a patient's nutrition/hydration-related blood work that may identify underlying barriers to skin integrity and healing. Although a patient's pressure ulcer risk and "heal-ability", from the nutrition perspective, is not based on his or her blood work alone, blood work screening is an essential step to assist with the identification of resolvable barriers to healing. Appendix N outlines some of the nutrition/hydration-related blood work important to pressure ulcer prevention.

<p>Whether or not blood work is readily available, it is essential that the patient be assessed for the following clinical signs and symptoms of dehydration (Fraser, 2009, p.19):</p> <ul style="list-style-type: none"> • Decreased urine output; • Dark, concentrated and/or strong-smelling urine; • Frequent urinary tract infection; • Dry lips/mouth and thick, stringy saliva; • Constipation; • Dizziness when sitting up or standing; • Confusion or change in mental status; • Weight loss of 1.5 kg (3.5lb) in less than seven days; • Fever; • Decreased skin elasticity, such as on the arm that, when gently pinched, does not spring back into place but remains “pinched up” when released; and • Sunken eyeballs. 	
<p>Additional Literature Supports Langkamp-Henken et al. (2005). NPUAP & EPUAP (2009). Schols et al. (2004). Theaker (2005). WOCN (2010).</p>	
<p>Recommendation 3.10</p> <p>Institute a rehabilitation/restorative/activity program with the interprofessional team to maximize client’s functional status that is consistent with the overall goals of care. Consult with an occupational therapist or physical therapist as appropriate.</p> <p style="text-align: right;">Type IV Evidence</p>	
<p><i>The following is an addition to the discussion of evidence found on pg. 36 of the original guideline.</i></p> <p>Physical therapists and occupational therapists have unique training and skills to minimize patient risk for pressure ulcers such as specialization in biomechanics, exercise program development, equipment prescription and positioning. Rehabilitation to maximize range of motion, strength and mobility reduces patient risk for tissue damage. In addition, stretching and positioning devices can decrease muscle spasms to reduce friction and shear.</p> <p>Institution of a rehabilitation program across all spectrums of care will increase a client’s functional mobility, ensure safe and proper use of equipment, and allow for ongoing education to clients and caregivers to achieve their goals of care.</p>	

Discharge/ Transfer of Care Arrangements

Recommendation 4.1

Provide the following information for clients moving between care settings:

- Risk factors identified;
- Details of pressure points and skin condition prior to discharge;
- **Current plan to minimize pressure, friction and shear:**
 - Type of bed/mattress
 - Type of seating
 - **Current transfer techniques used by the client (bed-chair-commode);**
- **History of ulcers, previous treatments, products used and products not effective:**
 - Stage/Category, site and size of existing ulcers
 - Type of dressing currently used and frequency of dressing change
 - **Allergies and adverse reactions to wound care products**
 - Summary of relevant laboratory results
 - **Client and family response/ adherence to prevention and treatment plan**
 - **Requirement for pain management;**
- **Details of ulcers that are closed;** and
- **Need for on-going interprofessional support.**



Level IV Evidence

Recommendation 4.1 on page 37 of the 2005 guideline was deleted and incorporated into Recommendation 6.1 of this revision supplement. Accordingly, Recommendation 4.2 of the 2005 guideline has been converted to Recommendation 4.1.

Discussion of Evidence

Ensuring a smooth transfer of clients between care settings and care units requires an interdisciplinary team approach (McInnes, 2008). Clients at risk of developing pressure ulcers require clear consistent communication of their needs in order to ensure that equipment and funding is in place prior to the transfer of care to another practice setting. This ensures that provision of consistent care is maintained. Communication prior to transfer may include client and family conferences, the writing of equipment prescription letters and/or funding requests.

When transferring clients between care settings identified risk factors need to be shared with the interdisciplinary team, including the current status of the skin, any pressure points and any alterations to the skin integrity. Communicate established client care plans that support the minimization of pressure, friction and shear. For clients at risk of developing pressure ulcers, the type of bed/mattress, type of seating support/device and current transfer techniques used by the client (i.e. their bed-to-chair-to-commode) are required (Feutchtinger et al., 2006; Frankel et al., 2007). Rockwood et al. (2005) identified that new pressure ulcers are more likely to develop and existing ones are more likely to deteriorate when residents from long-term care are transferred to acute care. They also stated that prevention strategies are required for long-term care residents on admission to hospital and should be targeted to high risk patients such as those admitted with hip fractures and pneumonia.

For clients with a history of previous ulcers, communicate previous treatments, offloading strategies, wound care products used that were effective and those that were not effective; any adverse effects to wound care products need to be recorded and reported in the clients' care plan (Chaves et al., 2006).

Categorize/Grade any existing pressure ulcers and include the type of dressing used and frequency of dressing changes. Communicate the goal of the wound care plan,



including if the wound is closing or if the wound is palliative, maintenance status, pain assessment and management strategies. Having the client and family perspective on the prevention care plans supports open communication to discuss any further and ongoing care plan changes that may be required. Pressure ulcer prevention requires an interprofessional team support; consider interprofessional referrals to enhance patient outcomes (Feuchtinger et al., 2006).	
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Education Recommendations

<p>Recommendation 5.1a</p> <p>Educational programs for the prevention of pressure ulcers should be structured, organized and comprehensive, and should be updated on a regular basis to incorporate new evidence and technologies.</p> <p style="text-align: right;">Level III Evidence</p>	
<p>Recommendation 5.1b</p> <p>Programs should be directed at all levels of health care providers including clients, family or caregivers.</p> <p style="text-align: right;">Level III Evidence</p>	
<p><i>Recommendation 5.1 from the original guideline is divided into 5.1a and 5.1b for clarity.</i></p>	
<p>Additional Literature Supports</p> <p>Association for the Advancement of Wound Care (2009).</p> <p>Bergquist-Beringer et al. (2009).</p> <p>NPUAP & EPUAP (2009).</p> <p>Tweed & Tweed (2008).</p>	
<p>Recommendation 5.2</p> <p>An educational program for prevention of pressure ulcers should incorporate the principles of adult learning and the level of information provided, and the mode of delivery must be flexible to accommodate the needs of the adult learner. Program evaluation is a critical component of the program planning process. Information on the following areas should be include:</p> <ul style="list-style-type: none"> • The etiology and risk factors predisposing to pressure ulcer development. • Use of risk assessment tools, such as the Braden Scale for Predicting Pressure Sore Risk. Categories of the risk assessment should also be utilized to identify specific risks to ensure effective care planning, Appendix C. • Skin assessment. • Categorization/Grading of pressure ulcers. • Selection and/or use of pressure management devices. • Development and implementation of an individualized skin care program. • Demonstration of positioning/transferring techniques to decrease risk of tissue breakdown. • Instruction on accurate documentation of pertinent data. • Roles and responsibilities of team members in relation to pressure ulcer risk assessment and prevention. • Client/family education and/or client/ family involvement in the plan of care. • Ongoing evaluation of the education and program goals. • Evaluation results are to be integrated into the program on a continuous basis (i.e. yearly). <p style="text-align: right;">Level IIb Evidence</p>	

<p><i>The discussion of evidence for this recommendation found on pg. 39 of the 2005 guideline has been revised to reflect additional literature supports. The following content has been added:</i></p> <p>The principles of adult education indicate that a variety of methods are needed to adequately disseminate information to the bedside and thus impact care. This concept is supported by studies addressing various methods to change practice related to pressure ulcer prevention.</p> <p>Recent literature provides support for web-based training program as an effective mode of delivering information. In a study conducted by Magnan and Maklebust (2008), they found web-based training modules to be both effective and efficient in strengthening nurses' capabilities in pressure-ulcer risk assessment and in preparing nurses in making reliable assessments of pressure-ulcer risk when patients are at extreme risk. Similarly, Bergquist-Beringer et al. (2009) found the National Databases of Nursing Quality Indicators (NDHQI) Pressure Ulcer Training Program (www.nursingquality.org/NDNQIPressureUlcerTraining/Default.aspx) to be an effective educational method for training healthcare professionals in pressure ulcer identification and staging. Another study related to technology assisted pressure ulcer training also yielded positive results (Maklebust & Magnan, 2009).</p> <p>Elliott et al. (2008) used quasi experimental methods with a quality improvement project in which surveys of patients' skin were conducted during 22 audits of critically ill patients in an Australian ICU over 26 months. Education of the nursing staff was done using one on one clinical instruction, monthly newsletters, positive feedback and reinstruction. The authors' noted that the prevalence of pressure ulcers decreased from 50% to 8.3% and concluded that the use of quality improvement approaches to practice improvement resulted in a significant change in culture.</p> <p>To date, the components of the curriculum identified above continue to provide the essential information required for an effective pressure ulcer prevention programs. However, in keeping with guidelines published by the NPUAP & EPUAP (2009) and the Association for the Advancement of Wound Care (2009), the term "support surfaces" is changed to "pressure management devices". Emphasis on the use and maintenance of pressure management devices has also been found to be critical to include in educational programs related to pressure ulcer prevention (Association for the Advancement of Wound Care, 2009; NPUAP & EPUAP, 2009; Wedge & Gosnet, 2005).</p>	+
<p>Additional Literature Supports</p> <p>Gunningberg (2004b).</p> <p>Howe, L. (2008).</p> <p>Tetterton et al. (2004).</p>	

Organization and Policy Recommendations

<p>Recommendation 6.1</p> <p>Organizations require a policy to provide and request advance notice when transferring or admitting clients at risk of pressure ulcers between practice settings when special equipment (e.g. surfaces) is needed.</p> <p style="text-align: right;">Level IV Evidence</p>	
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<p><i>The following information is an addition to the discussion of evidence found on pg. 41 of the 2005 guideline under the heading “Organizational Commitment”.</i></p> <p>In order to prevent the development of pressure ulcers, transferring a client between and within care settings may require a site visit, a client/family conference, and advance notice to access funding for resources to ensure pressure management equipment is in place at the time of transfer to prevent the development of pressure ulcers.</p>	+
<p>Recommendation 6.2</p> <p>Guidelines are more likely to be effective if they take into account local circumstances and are disseminated by ongoing educational and training programs.</p> <p style="text-align: right;">Level III Evidence</p>	✓
<p><i>The following information is an addition to the discussion of evidence found on pg. 41 of the 2005 guideline under the heading “Implementation Strategies”.</i></p> <p>Baldelli & Paciella (2008) utilized a quality management approach that explored the use of a bundled concept (Table 1) for pressure ulcer prevention, a concept from the Institute for Health Care Improvement. In this study, interventions were geared toward the development of a pressure ulcer prevention program with the theme “Check, Rock and Roll around the Clock”, combined with education and audits. Overall, they found the program to be effective, with reduction of pressure ulcer prevalence and incidence rates to below national levels over the one-year period of the study.</p> <p>Table 1 - Bundle of Measures (Baldelli & Paciella, 2008, p. 138)</p> <div style="border: 1px solid black; padding: 10px; margin: 10px 0;"> <ul style="list-style-type: none"> • Risk assessment using a recognized tool • Skin assessment on admission and eight-hourly • Head of bed to be raised by <30 degrees • Management of incontinence • Turning and positioning at specified frequencies • Heel elevation • Nutritional assessment • Pressure relief surface </div>	+
<p>Recommendation 6.3</p> <p>Best practice guidelines can be successfully implemented only when there are adequate planning, resources, organizational and administrative supports, as well as appropriate facilitation. Organizations are recommended to develop a plan for implementation that includes:</p> <ul style="list-style-type: none"> • An assessment of organizational readiness and barriers to implementation; • Involvement of all members (whether in a direct or indirect supportive function) who will contribute to the implementation process; • Dedication of a qualified individual to provide the support needed for the education and implementation process; • Ongoing opportunities for discussion and education to reinforce the importance of best practices; • Opportunities for reflection on personal and organizational experience in implementing guidelines. 	✓

<p>In this regard, a panel of nurses, researchers and administrators developed the RNAO <i>Toolkit: Implementation of Clinical Practice Guideline</i> (2002) based on available evidence, theoretical perspectives and consensus. The Toolkit is recommended for guiding the implementation of the RNAO guideline <i>Risk Assessment and Prevention of Pressure Ulcers</i> (2005).</p> <p style="text-align: right;">Level IIb Evidence</p>	
<p><i>The following information is an addition to the discussion of evidence found on pg. 41 of the 2005 guideline under the heading "Implementation Strategies"</i></p> <p>Clarke et al. (2005) looked at strategies for implementing pressure ulcer clinical practice guidelines across the continuum of care. They compared prevalence and incidence before and after implementation. In addition, they also looked at barriers or facilitators for implementation. Overall, the study found barriers to implementation to be: a) under resourced in computer infrastructure; b) increased demand of nurses' time to learn new technology and computer skills; and c) lack of administrative supports. On the other hand, factors supporting implementations were: a) leadership support; b) risk assessment tools, plans of care and wound care grids; and c) increased communication between the interprofessional team. Indeed, all these supportive factors had been found to increase the likelihood of staff identification of issues related to pressure management, increased use of available resources, and improved consistency of care. In addition, Berlowitz et al. (2003) also found that employees of nursing homes with a greater degree of quality improvement implementation are more likely to report adoption of pressure ulcer clinical guidelines and are more satisfied with their job. Quality improvement implementation is most likely to be successful in nursing homes with an underlying culture that promotes innovation. However, while such implementation may result in staff who are more satisfied with their jobs and who believe that they are providing better care, the association with improved care is uncertain.</p>	+
<p>Additional Literature Supports Davies, Edwards, Ploeg & Virani (2008). Ploeg, Davies, Edwards, Gifford & Elliott-Miller (2007).</p>	
<p>Recommendation 6.4</p> <p>Organizations need to ensure that financial and human resources are available to clients and staff. These resources include, but are not limited to, appropriate moisturizers, skin barriers, access to equipment (therapeutic surfaces), relevant consultants and interprofessional wound care team (e.g. OT; PT; enterostomal therapist; wound, ostomy and continence nurses; dietitian; physicians; nurse practitioners; chiropodist; wound specialists, etc.) as well as time and support for front line nursing staff.</p> <p style="text-align: right;">Level IIa Evidence</p>	
<p><i>The following information is an addition to the discussion of evidence found on pg. 41 of the 2005 guideline under the heading "Implementation Strategies"</i></p> <p>Milne et al. (2009) did a failure mode and effect analysis study to improve the care processes that prevent pressure ulcers. They formed wound care teams, provided education, improved documentation, implemented new policies and procedures. Medical records were also reviewed to determine infrastructure process flaws. For 12 months post implementation, this study found pressure ulcer prevalence rates were reduced to a mean rate of 4.2 per cent, from a rate of 41 per cent prior to implementation. Furthermore, an increase in collaboration among disciplines regarding prevention was also evident post implementation.</p>	+

<p>Adequate access to equipment (pressure management surfaces) is also an important strategy for prevention of pressure ulcers within health care facilities. A study by the Toronto Health Economics and Technology Assessment Collaborative (THETA) (2008) found that implementation of alternative foam mattresses (with or without turning/ repositioning protocols) reduced lifetime risk of pressure ulcer by 11 to 15 per cent, and the lifetime risk of chronic pressure ulcer by 8 to 11 per cent. However, gains in health per individual were small – two to eight days of quality-adjusted survival gained. Furthermore, the study also provided information on staff time to care for residents identified at risk for pressure ulcer development. In particular, it had been identified that “a registered nurse (RN) staff time increased by an additional 20 minutes (from 0.27 hours to 0.58 hours) per resident per day for residents at high risk for the development of pressure ulcers in long-term care homes” (THETA, 2008, p. 60). The “proportion of residents in the homes that are at high risk for developing pressure ulcers is 62 per cent, and currently none of these residents receives 0.58 hours of RN time per day” (THETA, 2008, p. 60). Ultimately, this finding enforces the importance for organizations to invest in adequate nursing staff for delivery of quality care leading to prevention of pressure ulcers.</p> <p>A study by Pham et al. (in press) provided economic evidence of the cost effectiveness of pressure-redistribution foam mattresses on emergency department stretchers and beds for early prevention of pressure ulcers in elderly persons admitted to hospital emergency departments. In particular, they found that early prevention is likely to improve health for elderly patients with 0.0015 quality adjusted life-days gained, and mean hospital costs savings of \$32 per patient. Overall, the study demonstrated that if decision-makers are willing to invest \$50,000 per quality-adjusted life year gained, early prevention is cost effective even for short emergency department stays of one hour with low hospital acquired pressure ulcer risk (one per cent prevalence), and high unit price of pressure-redistribution mattresses (\$3,775).</p>	
<p>Recommendation 6.5</p> <p>Interventions and outcomes should be monitored and documented using prevalence and incidence studies, surveys and focused audits.</p> <p style="text-align: right;">Level III Evidence</p>	
<p>Recommendation 6.6</p> <p>Create and support the development of skin and wound care champions to assist with local implementation of pressure ulcer prevention programs specific to the client population.</p> <p style="text-align: right;">Level III Evidence</p>	<p>NEW</p>
<p>Recommendation 6.7</p> <p>Embed annual prevalence of pressure ulcer studies into assessment of risk/quality and professional practice.</p> <p style="text-align: right;">Level III Evidence</p>	<p>NEW</p>
<p><i>The following information is an addition to the discussion of evidence found on pg.41 of the 2005 guideline under the heading “Quality Indicator Monitoring”.</i></p> <p>Use of validated pressure ulcer surveillance tools is deemed effective for monitoring organizational prevalence and nosocomial pressure ulcer rates and trends. Surveillance programs can also help to identify blind spots in practice and equipment availability. Some databases may already be collecting some of this data in facilities or hospitals.</p>	

A study conducted by Harrison et al. (2008) between 2001 and 2007 revealed a decrease of pressure ulcer prevalence from 18 to 14 percent with the implementation of a pressure ulcer monitoring system across a number of health care settings in eastern Ontario. The authors, after 15 years of experience, recommended the following approaches in pressure ulcer monitoring:

1. Create and enable champions to monitor and develop unit-based solutions in response to findings;
2. Embed monitoring in the quality and professional practice infrastructure of the organization;
3. Use existing structures and processes such as unit councils or quality committees – quality processes and practice panels are ideal venues to situate pressure ulcer monitoring at both organizational and unit levels; and
4. Create a data collection process that is as clinically sensible and feasible as possible.

The presence or absence of a pressure ulcer is often seen as an indicator of quality of care. Accreditation Canada (2011) established a new Required Organizational Practice (ROP), an essential practice that an organization must have in place to enhance patient safety and minimize risk, related to pressure ulcer prevention in the long term care sector. As part of the ROP, long term care organizations are required to “assess each client’s risk for developing a pressure ulcer and implement interventions to prevent pressure ulcer development” (Accreditation Canada, 2011, p. 49). Specific “Test for Compliance” (outlined below) have been established to assess organizations’ compliance to pressure ulcer prevention. These may serve as criteria by which other organizations can guide their practice in relation to preventing pressure ulcer development. For more information regarding Accreditation Canada’s ROP, please visit

www.accreditation.ca/uploadedFiles/ROP%20Handbook%20EN.pdf

Tests for Compliance (Accreditation Canada, 2011, p. 49)

- The organization conducts an initial pressure ulcer risk assessment at admission, using a standardized risk assessment tool.
- The organization reassesses each client for risk of developing pressure ulcers at regular intervals.
- The organization implements documented protocols and procedures to prevent the development of pressure ulcers, which include interventions to prevent skin breakdown, reduce pressure, reposition, manage moisture, maximize nutrition, and enhance mobility and activity.
- The organization educates staff on the risk factors and strategies for the prevention of pressure ulcers.
- The organization monitors its success in preventing the development of pressure ulcers and makes improvements to its prevention strategies and processes.

Recommendation 6.8

Prevalence studies funded by the setting should be conducted annually for quality monitoring, client safety and program improvement. Funding should be provided to involve point of care staff in data collection and analysis. All participants of this process need to participate in a rigorous standardized education program prior to conducting the study.

NEW

Level III Evidence

Discussion of Evidence

Lahmann et al. (2010) looked at the impact of prevention structures and processes on pressure ulcer prevalence in long-term care homes and acute care hospitals. They found that repeated participation of health care professionals in pressure ulcer surveys resulted in lower pressure ulcer prevalence rates and increased use of all guidelines and risk assessment.

It is critical for participants to engage in educational programs prior to carrying out pressure ulcer prevalence studies (Harrison et al, 2008; Milne, 2009). Gallagher et al. (2008) conducted a prevalence study in Ireland using a team of physicians and registered nurses. All team members completed training one week prior to the prevalence study and again the morning of the study. They concluded that an investment in training is an important part of the process of conducting a prevalence study and also is necessary for implementation of pressure ulcer guidelines.

Equally important to consider is the methodology employed for conducting prevalence studies. Gunningberg and Ehrenberg (2004) conducted a study comparing determination of pressure ulcers based on chart review versus patient exam. They found the overall prevalence of pressure ulcers obtained by audit of patient records was 14.3 per cent compared to 33.3 per cent when the patients' skin was examined. They concluded patient records did not present valid and reliable data about pressure ulcers and were under predicting prevalence rates. More attention must be focused on the quality of charting data to make proper use of electronic patient records in the future. Similarly, Whittingdon & Briones (2004) concluded that the frequently used method of chart reviews for incidence data is less accurate than clinical examination. They identified the need for sequential national studies using rigorous, common methodology.



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Appendix B: Skin Assessment

The word “*comprehensive*” is added in the first paragraph to emphasize that skin inspection should be based on a comprehensive head-to-toe assessment.

The following bullet point is added to the list of typical vulnerable areas to assess.

- Parts of the body in contact with devices, such as taping, restraint, tubes, etc.

Appendix C:

Additional tools for assessment of pressure ulcer risks are added.

Tools	Site
Modified Braden Q Scale (for Pediatrics)	http://nursing.advanceweb.com/SharedResources/Downloads/2007/090107/NW/nng090107_p55table1.pdf
Norton Pressure Sore Risk Assessment Scale Scoring System	www.rd411.com/wrc/pdf/w0513_norton_pressure_sore_risk_assessment_scale_scoring_system.pdf
SCALE for End of Life	http://woundpedia.com/pdf/SCALEAbstractPanelMembersStatements.pdf
Spinal Cord Injury Pressure Ulcer Scale (SCIPUS)	www.scireproject.com/outcome-measures/spinal-cord-injury-pressure-ulcer-scale-scipus-measure
Waterlow Pressure Ulcer Risk Assessment Chart	www.judy-waterlow.co.uk/

Appendix E: International NPUAP-EPUAP Pressure Ulcer Classification System

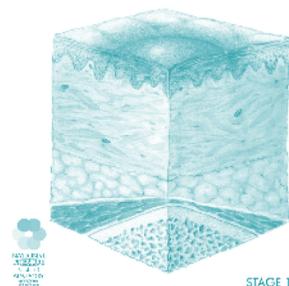
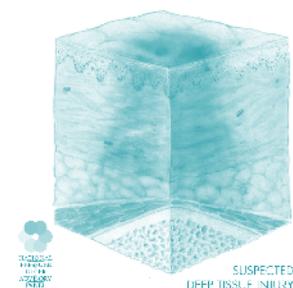
Appendix E: Staging of Pressure Ulcers on page 64 of the 2005 guideline is replaced by the following information. Note the change in the title of the appendix. Used with permission of the National Pressure Ulcer Advisory Panel & July 5, 2011.

Suspected Deep Tissue Injury: 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.

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

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



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

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

Category/Stage III: Full thickness tissue loss. Subcutaneous fat may be visible, but bone, tendon or muscles are not exposed. Slough may be present but does not obscure the depth of tissue loss. May include undermining and tunneling.

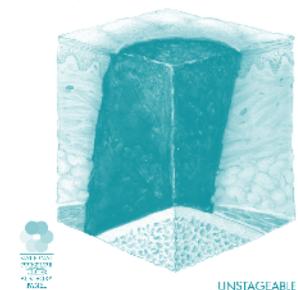
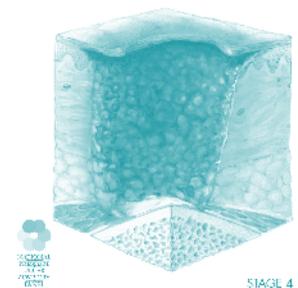
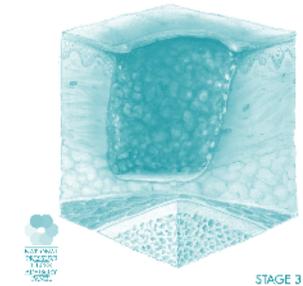
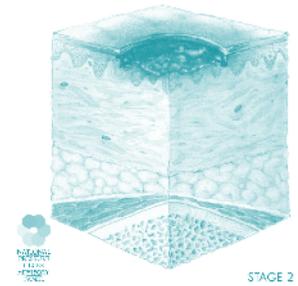
The depth of a Category/Stage III pressure ulcer varies by anatomical location. The bridge of the nose, ear, occiput and malleolus do not have subcutaneous tissue and Category/Stage III ulcers can be shallow. In contrast, areas of significant adiposity can develop extremely deep Category/Stage III pressure ulcers. Bone/tendon is not visible or directly palpable.

Category/Stage IV: Full thickness skin loss with exposed bone, tendon or muscle. Slough or eschar may be present on some parts of the wound bed. Often includes 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.



Appendix F: Force Management

Appendix F - Pressure Reduction and Pressure Relief on pg. 65 of the 2005 guideline is replaced by the following information. Note the change in the title of the appendix.

Decreasing peak points of pressure over the skin has been associated with a decreased risk of pressure ulcer development (Brienza et al., 2001). For this reason, it is important to consider the pressure between the client’s skin and the surface upon which they are sitting or lying. Many devices are available to help manage pressure. Pressure is not the only force that contributes to pressure ulcer development; friction and shear also play a factor. To manage these forces caregivers require a solid understanding of these forces.

Pressure is defined as “the force per unit area exerted perpendicular to the plane of interest” (NPUAP, 2007, p. 127). To experience pressure, try this activity:

“Place your right hand palm down on a table. Take the index finger of the left hand and press it into the back of your positioned hand. This is pressure. Now, flatten your left hand and press it on top of the dorsum (back) of the right hand that is still palm down on the table. You can tolerate more pressure because it is distributed over a greater surface area.” (Norton et al., 2011).

Many devices designed to manage pressure work on this principle of increasing the surface area, to decrease focal areas of pressure.

Shear is defined as “the force per unit area exerted parallel to the plane of interest” (NPUAP, 2007, p. 127). To experience shear, try this activity:

“Reach under your buttocks while you are sitting, and find your ischial tuberosities (backside bones). Rock your upper body forward and backward. Can you feel the movement of the ischial tuberosities? The force between the ischial tuberosity (bone) and the skin is called shear” (Norton et al., 2011).

Friction is defined as “the resistance to motion in a parallel direction relative to the common boundary of two surfaces” (NPUAP, 2007, p. 124). To experience friction try this activity:

“Reposition your right hand, palm down on a table. Slide this hand toward you. The force between your hand and the table is friction” (Norton et al., 2011).

Friction and shear are often confused as these forces often occur together. It is friction that holds the skin against the surface, allowing the client’s bony structures to slide against the inside of her or his skin. It is especially important to identify shear forces as they double the impact of pressure (Ohura et al., 2008). One sign that shearing forces are occurring is asymmetrical undermining of the wound (Ohura et al., 2008).

Many devices designed to manage friction and shear do this through the cover – decreasing friction against the skin, or designing the cover with two layers that slide against each other, rather than having the skin slide across the top cover.

Clients who are at risk for developing pressure ulcers, or who have developed a pressure ulcer should be referred to an occupational or physical therapist skilled in seating and mobility assessments to address the forces of pressure, friction and shear.

General Considerations:

- Assess all surfaces upon which the client sits or lies in terms of pressure, friction and shear.
- Assess all transfer and repositioning activities in terms of pressure, friction and shear.
- Ensure that the client is comfortable on all surfaces
- Ensure the equipment is in good working order and is not worn out.
- Ensure the surfaces are positioned and used correctly.
- Check that the surface is not bottomed out:
 - Foam – should rebound to its original shape when the client’s weight is removed. If it does not rebound, it is considered bottomed out.
 - Air – slide your hand, palm down, between the client and the air surface at the lowest bony prominence. The client should be floating in the surface. If there is less than a half an inch of air between the client’s lowest bony prominence and the bottom of the surface, the surface has bottomed out.

See Appendix L for more information about selecting therapeutic support surfaces.

See Appendix M for more information about seating.

Appendix G: Education Resource

Note change to the acronym CAET- Canadian Association **for** Enterostomal Therapy under the heading *Wound Care Association*.

Organizational Enablers are added under the heading *Other Resources* on page 69 of the 2005 guideline. These enablers are: a) a patient education brochure; b) a therapeutic surface algorithm; c) a pressure ulcer prevention poster; d) a pressure ulcer staging poster; and e) a turning clock. All of these resources can be access at www.rnao.org/Page.aspx?PageID=924&ContentID=816 under the *Related Items* section.

Appendix J: Individual Braden Subscale Intervention Checklist

Magnan, M & Maklebust, J. Braden Scale Risk Assessments and Pressure Ulcer Prevention Planning: What's the Connection? Journal of Wound, Ostomy and Continence Nursing, Volume 36, Issue 6, page 622-634.

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From the list provided, make a check mark next to the prevention intervention that you think should be implemented for this patient based on YOUR assessment.

Check if should be implemented

- | | |
|---|-------|
| 1. Implement a whole body repositioning schedule in the room or chart. | _____ |
| 2. Use a 30 degree lateral side-lying angle to avoid positioning onto sacral and trochanteric bony prominences. | _____ |
| 3. Use pillow or foam positioning wedges to maintain in desired position. | _____ |
| 4. Use a pressure reducing support surface while in bed. | _____ |
| 5. Float/suspend heels off bed. | _____ |
| 6. Use a pressure reducing chair cushion while sitting. | _____ |
| 7. Pad between bony prominences (e.g. knees and ankles). | _____ |
| 8. Consult a dietitian for nutritional concerns. | _____ |
| 9. Protect skin from moisture. | _____ |
| 10. Protect skin from friction and shear. | _____ |

Appendix K: InterRAI Pressure Ulcer Risk Scale

For more information about this tool, please refer to: www.biomedcentral.com/content/pdf/1471-2318-10-67.pdf

Source: Poss, J., Murphy, K., Woodbury, M, Orsted, H., Stevenson, K., Williams, G. et al. (2010). Development of interRAI Pressure Ulcer Risk Scale (PURS) for use in long-term care and home care setting. *BioMed Central Geriatrics*, 10, 67

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InteRai PURS Assessment	Score
<input type="checkbox"/> Bed mobility: Ability to move from to and from lying position, turn and position body in bed	0 - <input type="checkbox"/> Self performance 1 - <input type="checkbox"/> Support required
<input type="checkbox"/> Walk in room: How resident walks between locations in own room	0 - <input type="checkbox"/> Self performance 1 - <input type="checkbox"/> Support required
<input type="checkbox"/> Bowel Continence: Control of bowel movement, with appliance, or bowel program	0 - <input type="checkbox"/> Yes 1 - <input type="checkbox"/> No
<input type="checkbox"/> Weight Change : weight loss - 5% or more in last 30 days or 10% or more in last 180 days	0 - <input type="checkbox"/> No 1 - <input type="checkbox"/> Yes
<input type="checkbox"/> Hx of resolved pressure ulcers: Resident has a PU that was resolved in last 90 days	0 - <input type="checkbox"/> No 2 - <input type="checkbox"/> Yes
<input type="checkbox"/> Pain Symptoms: Frequency that resident complains or shows evidence of pain	0 - <input type="checkbox"/> No pain 1 - <input type="checkbox"/> Pain daily
<input type="checkbox"/> Shortness of Breath	0 - <input type="checkbox"/> No 1 - <input type="checkbox"/> Yes
Add numbers to obtain Total Score	(higher score = ↑ risk for developing a pressure ulcer)

Appendix L: Support Surface Selection Tool

Adapted from: Norton, L., Coumts, P., Sibbald, R. G. (2011). Beds: Practical Pressure Management for Surfaces/Mattresses. *Advances in Skin & Wound Care*, 24(7), 324-332.

With an evidence-based practice background (scientific evidence, expert knowledge and patient preference), clinicians still require a user-friendly guide to translate this information into practice to potentially improve patient care outcomes. The Support Surface Selection Tool was first developed in 2008 to respond to this need. This tool stratified the types of support surfaces (active support surfaces and reactive support surfaces) based on the risk of the client developing pressure ulcers or the number of ulcers the client has and their mobility status. Feedback from clinicians indicated that while the tool was helpful, further assistance was required to select the additional features. As a result, two decision trees were created to help with the selection of specific features of active and reactive support surfaces.

As illustrated in Figure 1, a validated risk assessment tool should be utilized to determine the type of support surface required for an individual client (i.e. the columns across the top of the chart in Figure 1). If the client currently has pressure ulcers, choose the description in the first row which best fits the client's clinical status. Note that the heels are excluded from this clinical description as heels are best managed independently from the bed surface (RNAO, 2007; NPUAP & EPUAP, 2009).

Next determine the client's usual degree of mobility in bed by selecting the appropriate row listed down the side of the chart. Where the column of "risk" intersects with the row of "mobility", a specific type of support surface is recommended; either a reactive support surface or an active support surface. If a reactive support surface is recommended, go to the reactive support surface decision tree (Figure 2). If an active support surface is recommended, go to the active support surface decision tree (Figure 3). Follow the decision tree to identify other specific features that may benefit the specific client. Recognize that this algorithm is not designed to replace clinical judgment, but is designed to assist the clinician to choose features for their client based on a comprehensive assessment of each individual client. Specific examples of support surfaces can be added in to the last box of the decision tree based on the surfaces available in your setting.

Figure 1

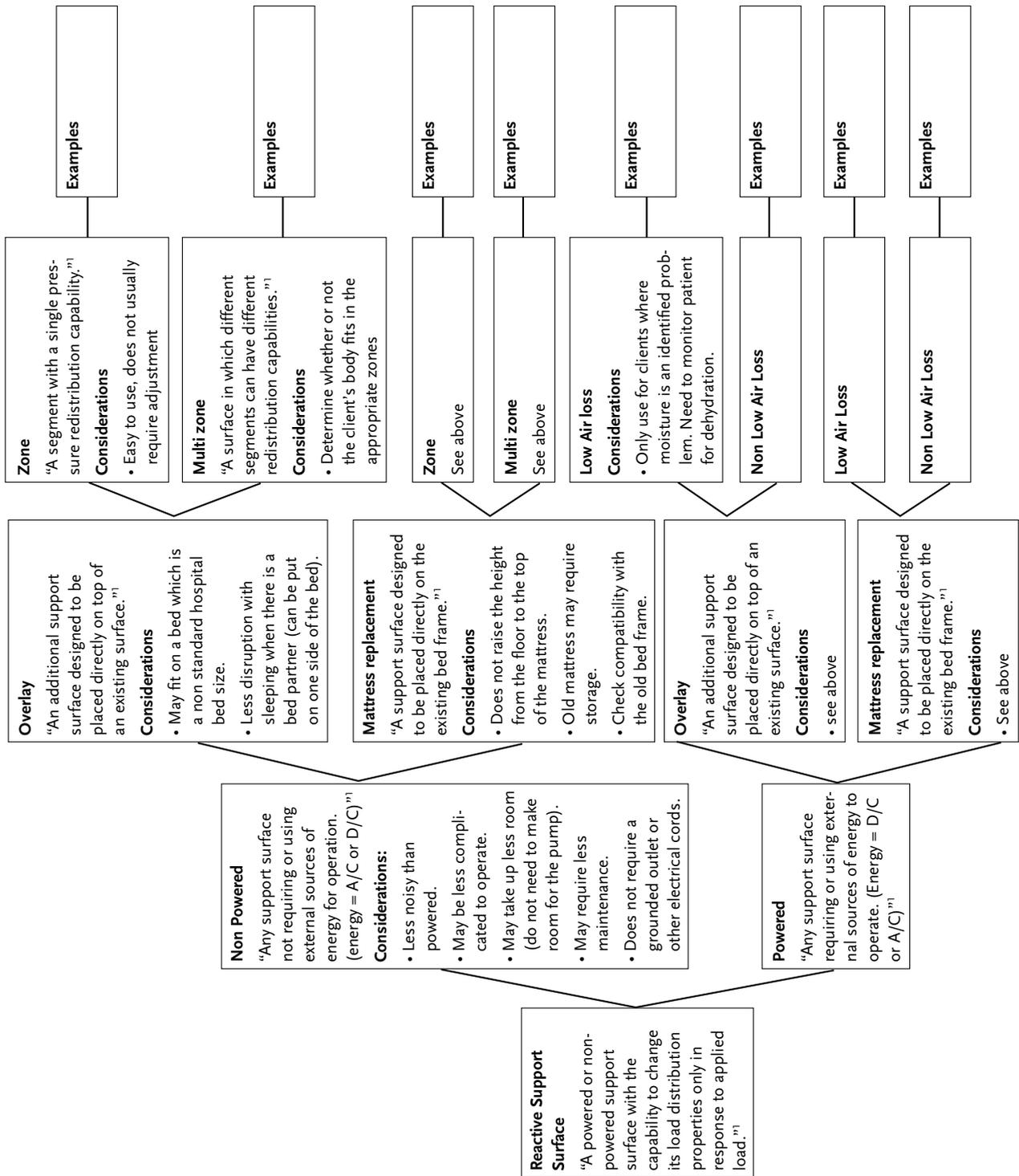
© Norton, Coumts, Sibbald		Validated Risk Assessment Score or Pressure Ulcer Description			
		At risk Or Redness present which fades quickly when pressure removed	Moderate risk Or Pressure ulcer (excluding the heels) where the client can be positioned off the ulcer	High Risk Or Pressure ulcer (excluding the heels) and redness over another area	Very High Risk Or Multiple pressure ulcers (excluding the heels) or the client can not be positioned off of an ulcerated area
Ability to change position in bed (i.e. bed mobility)	Total assist to change position in bed	Reactive Support Surface (non powered) (e.g. air/gel/foam overlay)	Reactive Support Surface (e.g. air/gel/foam overlay)	Active Support Surface Multi-Zoned Surface (e.g. alternating pressure mattress, rotational surface) or a powered reactive support surface (e.g. low air loss)	Active Support Surface Multi-Zoned Surface (e.g. alternating pressure mattress, rotational surface)
	Moderate assistance with bed mobility required.	Reactive Support Surface (non powered e.g. air/gel/foam overlay or high density foam mattress)	Reactive Support Surface (e.g. foam overlay with air section insert in the area of the wound)	Reactive Support Surface (non powered e.g. foam overlay with air section insert in the area of the wound)	Active Support Surface Multi-Zoned Surface (e.g. alternating pressure mattress, rotational surface)
	Client independent with or without a device with bed positioning (light assist may be required)	Reactive Support Surface (eg High density foam mattress)	Reactive Support Surface (e.g. foam overlay with air section insert)	Reactive Support Surface (non powered) (e.g. air/gel/foam overlay)	Active Support Surface (if the controls can be placed within the client's reach)

Users guide:

1. With a validated risk assessment tool, determine the patient level of risk OR grade the patients with ulcers based on the clinical descriptors
2. Assess the level of mobility in bed and follow the column and row intersection to determine the appropriate reactive or active support system
3. For more information on reactive surfaces see figure 2 and for more information on active surfaces see figure 3

Figure 2 Reactive Support Surface

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¹National Pressure Ulcer Advisory Panel, Support Surface Standards Initiative: Terms and Definitions version 01/29/2007 http://www.npuap.org/NPUAP_S3I_TD.pdf. Accessed 03/21/ 2007.

Notes for both Active and Reactive Surfaces:

- Support surfaces do not substitute for turning schedules.
- Check weight limits of the surfaces prior to use.
- Follow the manufacturer's directions regarding cleaning and infection control.
- Manage heels independently from the surface (i.e. suspend the heels above the surface or use heel booties).

Summary

The selection of a therapeutic support surface is an integral part of the pressure prevention and management plan of clients, but does not replace good client care. Turning and repositioning are still required despite having a therapeutic support surface. Support surfaces can help to reduce the forces of pressure, friction and shear against the client. With the multitude of surfaces available, all with different costs, it is important to choose the support surface with the features which best match the client's individual needs, that does not restrict their mobility and is easy for caregivers to use. The support surface selection tool presented in here facilitates the linkage of client and clinician needs with specific therapeutic support surface features.

Appendix M: Seating Assessment

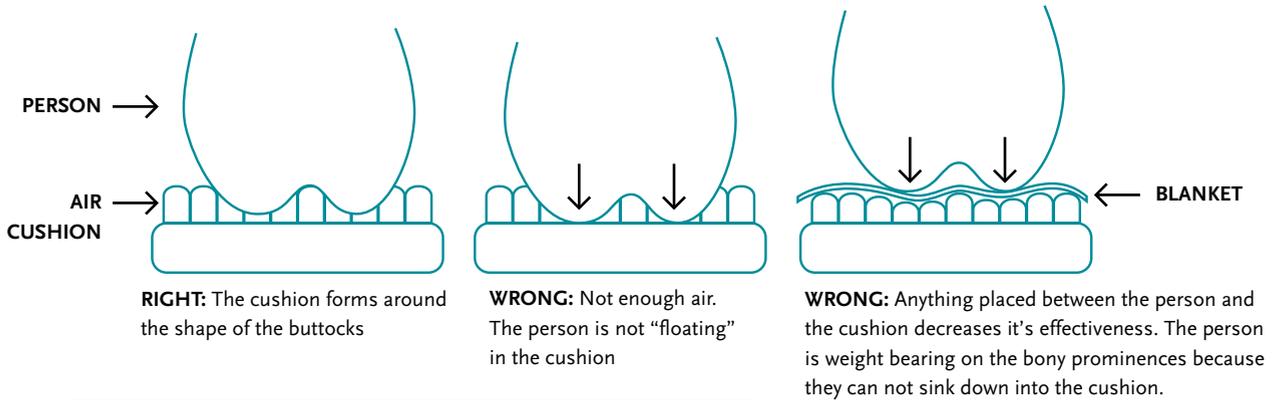
A seating and mobility assessment requires a specialized expertise. As a result, all clients at risk of developing pressure ulcers, or who have pressure ulcers and sit in a wheelchair or other chairs should be referred to an occupational or physical therapist with an expertise in seating and mobility. These individuals are often familiar with various funding sources both governmental and non-governmental which may be able to assist the client with the purchase of any needed equipment. A seating assessment should occur every two to three years, whenever the client has status changes, or where there is a risk of pressure ulcer development.

There are other activities that members of the health-care team can do to maximize the reduction in pressure, friction and shear when sitting. These include:

- **If the client uses a wheelchair, ensure that the wheelchair and seat cushion have been prescribed for that client and it is the latest prescription.** Clients may have been given a wheelchair that was prescribed for another relative, or purchased without a therapist's involvement. In these situations, the fit of the chair may not be ideal. In other cases, the client may have a newer piece of equipment that they are not using. Encouraging the use of the most recently prescribed equipment may help to minimize friction and shearing forces.
- **Check that there are no foreign objects in the wheelchair.**
- **Encourage clients to engage in weight shifting behavior.** Depending on the abilities of the client this may include shifting from side to side, leaning forward or using the tilt feature on their chair.
- **Assist clients to reposition themselves in the wheelchair at least every 2 hours.**
- **Always use a specialty wheelchair cushion, which has been prescribed by an occupational or physical therapist. Ensure this cushion is correctly placed in the wheelchair.** Many cushions have contours on the top of the cushion. The contour in the middle on one side of the cushion is called a pommel. The pommel should be positioned on the top at the front of the wheelchair, as it is designed to help align the legs. Provide education for the client and/or family on cushion use.
- **Check to ensure that the wheelchair is properly maintained and is not worn or bottoming out.** As foam cushions near the end of their life span, they may not return to their original shape when the client's weight is removed; alternatively they may collapse under the client and not distribute the pressure under the client. Some gel cushions may leak. Bottoming out or leaking are indicators that the client requires a new pressure management cushion. Air cushions should be checked to ensure they are properly inflated weekly. The only way to check the inflation of an air cushion is to put your hand between the client and cushion when the client is sitting normally on the chair (Note: wear gloves during this procedure. A low friction sleeve or sheet over the glove will make this process easier). There should be approximately one inch of air between the client's lowest bony prominence, and the bottom of the cushion (see diagram below).

Inflation of Air Cushions

Concept: The person should be “floating” in the cushion not sitting “on top of” the cushion.



OTHER TIPS:

- The best way to check the inflation is to put your hand between the person’s bony prominence (ischial tuberosity) and the cushion and “feel” how much air is in the cushion.
- When the person gets out of the cushion it may look as though there is not enough air
- Remember to check the cushion regularly to ensure that it has the correct amount of air

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Appendix N: Nutrition/Hydration-related Blood Work

Albumin and Prealbumin	Albumin and prealbumin are hepatic proteins that are often cited in the literature as markers of protein and nutrition status. There is much discussion among clinicians and authors, with many disputing the value of albumin and prealbumin as nutritional markers, especially in critical care and acute care settings. Low values reflect severity of illness and/or injury regardless of protein status and are “red flags” for the potential of a patient to develop malnutrition or to become more malnourished (Barnes et al., 2007; Fuhrman, Charney & Mueller, 2004).
Anemia	If a patient presents with anemia it is imperative that the type of anemia be identified. Both iron deficiency anemia and anemia of chronic disease (ACD) result in a decreased hemoglobin level, which is a barrier to healing. A chronic non-healing pressure ulcer itself is an inflammatory process that may lead to ACD (Holcomb, 2001; Keast & Fraser, 2004).
Glycemic Control	The physical signs and symptoms of diabetes do not always accompany hyperglycemia that is identified by blood tests (Fraser, 2007). It is recommended that both fasting blood glucose and Hemoglobin A1C be screened in all individuals with pressure ulcers, as an individual may present with normal fasting levels but have impaired glucose tolerance. Screening an individual who has no known history of diabetes mellitus may uncover previously unidentified hyperglycemia that is negatively impacting his or her wound management. Preventing and treating ulcers are more effective when screening and management measures are implemented to address underlying factors such as hyperglycemia that impede successful outcomes. Hemoglobin A1C levels greater than 7.0 per cent (0.070) are associated with significantly increased risk for both microvascular and macrovascular complications (Canadian Diabetes Association Expert Committee, 2003). Individuals with diabetes exhibit significantly impaired wound healing and increased complication rates (Arnold & Barbul, 2006; Collins, 2003; Lioupis, 2005). Controlling serum glucose levels to promote wound healing and prevention cannot be overemphasized (Marston, 2006).

Hypothyroidism	Hypothyroidism is a metabolic disorder that exerts biochemical and histological effects on tissue integrity and regeneration that can adversely affect wound prevention and healing (Ekmekzoglou & Zografos, 2006). Hypothyroidism and diabetes mellitus can coexist in clinical settings. The influence of these conditions individually and concurrently warrants the screening for, and immediate management of these conditions for optimal wound healing (Ekmekzoglou & Zografos, 2006).
Dehydration	Dehydration is a risk factor for skin breakdown and wound healing. The blood urea nitrogen (BUN):creatinine ratio may be used as an indicator of a patient's hydration status, though may not be accurate in patients with renal failure. An elevated BUN level with a normal or low creatinine level may indicate under-hydration. A BUN:creatinine ratio greater than 20:1 is a red flag for dehydration which must be investigated and addressed. In addition, BUN and creatinine are indicators of renal function. A clinician must be aware of a patient's renal status prior to the recommendation of enhanced protein, fluid, vitamins and minerals as there are precautions and contraindications to supplementation in a case of renal insufficiency as well as in other co-morbidities.



