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Revised March 2005

Nursing Best Practice Guideline

Shaping the future of Nursing

Risk Assessment & Prevention of Pressure Ulcers

RNAO
Registered Nurses' Association of Ontario
L'Association des infirmières et infirmiers autorisés de l'Ontario
NURSING BEST PRACTICE GUIDELINES PROGRAM

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NURSING BEST PRACTICE GUIDELINES PROGRAM

Greetings from Doris Grinspun
Executive Director
Registered Nurses' Association of Ontario

It is with great excitement that the Registered Nurses' Association of Ontario disseminates this **revised** nursing best practice guideline to you. Evidence-based practice supports the excellence in service that nurses are committed to deliver in our day-to-day practice. The RNAO is committed to ensuring that the evidence supporting guideline recommendations is the best available, and this guideline has been recently reviewed and revised to reflect the current state of knowledge.

We offer our endless thanks to the many institutions and individuals that are making RNAO's vision for Nursing Best Practice Guidelines (NBPG) a reality. The Government of Ontario recognized RNAO's ability to lead this program and is providing multi-year funding. Tazim Virani – NBPG program director – with her fearless determination and skills, is moving the program forward faster and stronger than ever imagined. The nursing community, with its commitment and passion for excellence in nursing care, is providing the knowledge and countless hours essential to the creation, evaluation and revision of each guideline. Employers have responded enthusiastically by getting involved in nominating best practice champions, implementing and evaluating the NBPG and working towards an evidence-based practice culture.

Now comes the true test in this phenomenal journey: will nurses utilize the guidelines in their day-to-day practice?

Successful uptake of these NBPG requires a concerted effort of four groups: nurses themselves, other healthcare colleagues, nurse educators in academic and practice settings, and employers. After lodging these guidelines into their minds and hearts, knowledgeable and skillful nurses and nursing students need healthy and supportive work environments to help bring these guidelines to life.

We ask that you share this NBPG, and others, with members of the interdisciplinary team. There is much to learn from one another. Together, we can ensure that Ontarians receive the best possible care every time they come in contact with us. Let's make them the real winners of this important effort!

RNAO will continue to work hard at developing, evaluating and ensuring current evidence for all future guidelines. We wish you the best for a successful implementation!

Doris Grinspun, RN, MSN, PhD(cand), OOnt

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Risk Assessment & Prevention of Pressure Ulcers

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VHA Home Healthcare

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Risk Assessment & Prevention of Pressure Ulcers

Disclaimer

These best practice guidelines are related only to nursing practice and not intended to take into account fiscal efficiencies. These guidelines are not binding for nurses and their use should be flexible to accommodate client/family wishes and local circumstances. They neither constitute a liability nor discharge from liability. While every effort has been made to ensure the accuracy of the contents at the time of publication, neither the authors nor RNAO give any guarantee as to the accuracy of the information contained in them nor accept any liability, with respect to loss, damage, injury or expense arising from any such errors or omission in the contents of this work. Any reference throughout the document to specific pharmaceutical products as examples does not imply endorsement of any of these products.

How to Use this Document

This nursing best practice guideline is a comprehensive document providing resources necessary for the support of evidence-based nursing practice. The 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. Guidelines should not be applied in a "cookbook" fashion but used 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.

Nurses, other healthcare professionals and administrators who are leading and facilitating practice changes will find this document valuable for the development of policies, procedures, protocols, educational programs, assessments and documentation tools. It is recommended that the nursing best practice guidelines be used as a resource tool. Nurses providing direct client care will benefit from reviewing the recommendations, the evidence in support of the recommendations and the process that was used to develop the guidelines. However, it is highly recommended that practice settings/environments adapt these guidelines in formats that would be user-friendly for daily use. This guideline has some suggested formats for such local adaptation and tailoring.

Organizations wishing to use the guideline may decide to do so in a number of ways:

- Assess current nursing and healthcare practices using the recommendations in the guideline.
- Identify recommendations that will address identified needs or gaps in services.
- Systematically develop a plan to implement the recommendations using associated tools and resources.

RNAO is interested in hearing how you have implemented this guideline. Please contact us to share your story. Implementation resources will be made available through the RNAO website at www.rnao.org/bestpractices to assist individuals and organizations to implement best practice guidelines.

Table of Contents

Summary of Recommendations

	RECOMMENDATION	*LEVEL OF EVIDENCE
Practice Recommendations		
Assessment	1.1 A 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.	IV
	1.2 The client's risk for pressure ulcer development is determined by the combination of clinical judgment and the use of a reliable risk assessment tool. The use of a tool that has been tested for validity and reliability, such as the *Braden Scale for Predicting Pressure Sore Risk*, is recommended. Interventions should be based on identified intrinsic and extrinsic risk factors and those identified by a risk assessment tool, such as Braden's categories of sensory perception, mobility, activity, moisture, nutrition, friction and shear. Risk assessment tools are useful as an aid to structure assessment.	IV
	1.3 Clients who are restricted to bed and/or chair, or those experiencing surgical intervention, should be assessed for pressure, friction and shear in all positions and during lifting, turning and repositioning.	IV
	1.4a All pressure ulcers are identified and staged using the National Pressure Ulcer Advisory Panel (NPUAP) criteria.	IV
	1.4b If pressure ulcers are identified, utilization of the RNAO best practice guideline *Assessment and Management of Stage I to IV Pressure Ulcers* is recommended.	IV
	1.5 All data should be documented at the time of assessment and reassessment.	IV
Planning	2.1 An individualized plan of care is based on assessment data, identified risk factors and the client's goals. The plan is developed in collaboration with the client, significant others and health care professionals.	IV
	2.2 The nurse uses clinical judgment to interpret risk in the context of the entire client profile, including the client's goals.	IV
Interventions	3.1 For clients with an identified risk for pressure ulcer development, minimize pressure through the immediate use of a positioning schedule.	IV
	3.2 Use proper positioning, transferring, and turning techniques. Consult Occupational Therapy/Physiotherapy (OT/PT) regarding transfer and positioning techniques and devices to reduce friction and shear and to optimize client independence.	IV
	3.3a Consider the impact of pain. Pain may decrease mobility and activity. Pain control measures may include effective medication, therapeutic positioning, support surfaces, and other non-pharmacological interventions. Monitor level of pain on an on-going basis, using a valid pain assessment tool.	IV
	3.3b Consider the client's risk for skin breakdown related to the loss of protective sensation or the ability to perceive pain and to respond in an effective manner (e.g., impact of analgesics, sedatives, neuropathy, etc.).	IV
	3.3c Consider the impact of pain on local tissue perfusion.	IV

*See page 14 for an Interpretation of Evidence.

RECOMMENDATION	LEVEL OF EVIDENCE
3.4 Avoid massage over bony prominences.	IIb
3.5 Clients at risk of developing a pressure ulcer should not remain on a standard mattress. A replacement mattress with low interface pressure, such as high-density foam, should be used.	Ia
3.6 For high risk clients experiencing surgical intervention, the use of pressure-relieving surfaces intraoperatively should be considered.	Ia
3.7 For individuals restricted to bed: ■ Utilize an interdisciplinary approach to plan care. ■ Use devices to enable independent positioning, lifting and transfers (e.g., trapeze, transfer board, bed rails). ■ Reposition at least every 2 hours or sooner if at high risk. ■ Use pillows or foam wedges to avoid contact between bony prominences. ■ Use devices to totally relieve pressure on the heels and bony prominences of the feet. ■ A 30° turn to either side is recommended to avoid positioning directly on the trochanter. ■ Reduce shearing forces by maintaining the head of the bed at the lowest elevation consistent with medical conditions and restrictions. A 30° elevation or lower is recommended. ■ Use lifting devices to avoid dragging clients during transfer and position changes. ■ Do not use donut type devices or products that localize pressure to other areas.	IV
3.8 For individuals restricted to chair: ■ Utilize an interdisciplinary approach to plan care. ■ Have the client shift weight every 15 minutes, if able. ■ Reposition at least every hour if unable to shift weight. ■ Use pressure-reducing devices for seating surfaces. ■ Do not use donut type devices or products that localize pressure to other areas. ■ Consider postural alignment, distribution of weight, balance, stability, support of feet and pressure reduction when positioning individuals in chairs or wheelchairs. ■ Refer to Occupational Therapy/Physiotherapy (OT/PT) for seating assessment and adaptations for special needs.	IV
3.9 Protect and promote skin integrity: ■ Ensure hydration through adequate fluid intake. ■ Individualize the bathing schedule. ■ Avoid hot water and use a pH balanced, non-sensitizing skin cleanser. ■ Minimize force and friction on the skin during cleansing. ■ Maintain skin hydration by applying non-sensitizing, pH balanced, lubricating moisturizers and creams with minimal alcohol content. ■ Use protective barriers (e.g., liquid barrier films, transparent films, hydrocolloids) or protective padding to reduce friction injuries.	IV

	RECOMMENDATION	LEVEL OF EVIDENCE
	3.10 Protect skin from excessive moisture and incontinence: ■ Assess and manage excessive moisture related to body fluids (e.g., urine, feces, perspiration, wound exudate, saliva, etc.). ■ Gently cleanse skin at time of soiling. Avoid friction during care with the use of a spray perineal cleanser or soft wipe. ■ Minimize skin exposure to excess moisture. When moisture cannot be controlled, use absorbent pads, dressings or briefs that wick moisture away from the skin. Replace pads and linens when damp. ■ Use topical agents that provide protective barriers to moisture. ■ If unresolved skin irritation exists in a moist area, consult with the physician for evaluation and topical treatment. ■ Establish a bowel and bladder program.	IV
	3.11 A nutritional assessment with appropriate interventions should be implemented on entry to any new health care environment and when the client's condition changes. If a nutritional deficit is suspected: ■ Consult with a registered dietitian. – Level IV ■ Investigate factors that compromise an apparently well nourished individual's dietary intake (especially protein or calories) and offer him or her support with eating. – Level IV ■ Plan and implement a nutritional support and/or supplementation program for nutritionally compromised individuals. – Level IV ■ If dietary intake remains inadequate, consider alternative nutritional interventions. – Level IV ■ Nutritional supplementation for critically ill older clients should be considered. – Level Ib	
	3.12 Institute a rehabilitation program, if consistent with the overall goals of care and the potential exists for improving the individual's mobility and activity status. Consult the care team regarding a rehabilitation program.	IV
Discharge/Transfer of Care Arrangements	4.1 Advance notice should be given when transferring a client between settings (e.g., hospital to home/long-term care facility/hospice/residential care) if pressure reducing/relieving equipment is required to be in place at time of transfer (e.g., pressure relieving mattresses, seating, special transfer equipment). Transfer to another setting may require a site visit, client/family conference, and/or assessment for funding of resources to prevent the development of pressure ulcers.	IV
	4.2 Clients moving between care settings should have the following information provided: ■ Risk factors identified; ■ Details of pressure points and skin condition prior to discharge; ■ Type of bed/mattress the client requires; ■ Type of seating the client requires; ■ Details of healed ulcers; ■ Stage, site and size of existing ulcers; ■ History of ulcers, previous treatments and products used; ■ Type of dressing currently used and frequency of change; ■ Adverse reactions to wound care products; ■ Summary of relevant laboratory results; and ■ Need for on-going nutritional support.	IV

RECOMMENDATION		LEVEL OF EVIDENCE
Education Recommendations		
	5.1 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. Programs should be directed at all levels of health care providers including clients, family or caregivers.	III
	5.2 The educational program for prevention of pressure ulcers should be based on the principles of adult learning, the level of information provided and the mode of delivery. Programs must be evaluated for their effectiveness in preventing pressure ulcers through such mechanisms as quality assurance standards and audits. Information on the following areas should be included: ■ 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 and ensure effective care planning. ■ Skin assessment. ■ Staging of pressure ulcers. ■ Selection and/or use of support surfaces. ■ 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.	III
Organization & Policy Recommendations		
	6.1 Organizations need a policy with respect to providing and requesting advance notice when transferring or admitting clients between practice settings when special needs (e.g., surfaces) are required.	IV
	6.2 Guidelines are more likely to be effective if they take into account local circumstances and are disseminated by ongoing educational and training programs.	IV

	RECOMMENDATION	LEVEL OF EVIDENCE
	6.3 Nursing best practice guidelines can be successfully implemented only when there is adequate planning, resources, organizational and administrative support, as well as appropriate facilitation. Organizations may wish to develop a plan for implementation that includes: ■ An assessment of organizational readiness and barriers to education. ■ 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. In this regard, RNAO (through a panel of nurses, researchers and administrators) has developed the *Toolkit: Implementation of Clinical Practice Guidelines* based on available evidence, theoretical perspectives and consensus. The *Toolkit* is recommended for guiding the implementation of the RNAO guideline *Risk Assessment and Prevention of Pressure Ulcers*.	IV
	6.4 Organizations need to ensure that resources are available to clients and staff. These resources include, but are not limited to, appropriate moisturizers, skin barriers, access to equipment (therapeutic surfaces) and relevant consultants (OT, PT, ET, wound specialists, etc.).	IV
	6.5 Interventions and outcomes should be monitored and documented using prevalence and incidence studies, surveys and focused audits.	IV

Interpretation of Evidence

Levels of Evidence

Ia	Evidence obtained from meta-analysis or systematic review of randomized controlled trials.
Ib	Evidence obtained from at least one randomized controlled trial.
IIa	Evidence obtained from at least one well-designed controlled study without randomization.
IIb	Evidence obtained from at least one other type of well-designed quasi-experimental study without randomization.
III	Evidence obtained from well-designed non-experimental descriptive studies, such as comparative studies, correlation studies and case studies.
IV	Evidence obtained from expert committee reports or opinions and/or clinical experiences of respected authorities.

Responsibility for Development

The Registered Nurses' Association of Ontario (RNAO), with funding from the Government of Ontario, has embarked on a multi-year program of nursing best practice guideline development, pilot implementation, evaluation and dissemination. One of the areas of focus is on risk assessment and prevention of pressure ulcers. This guideline was originally developed, and subsequently revised, by a panel of nurses and researchers convened by the RNAO and conducting its work independent of any bias or influence from the Government of Ontario.

Purpose & Scope

Best practice guidelines are systematically developed statements to assist practitioners' and clients' decisions about appropriate health care (Field & Lohr, 1990). This best practice guideline assists nurses who work in diverse practice settings to identify adults who are at risk of pressure ulcers. This guideline further provides direction to nurses in defining early interventions for pressure ulcer prevention, and to manage Stage I pressure ulcers.

This guideline focuses its recommendations on: Practice Recommendations including assessment, planning, intervention and discharge/transfer of care; Educational Recommendations for supporting the skills required for nurses working with adults at risk for pressure ulcers; and Organization & Policy Recommendations addressing the importance of a supportive practice environment as an enabling factor for providing high quality nursing care, which includes ongoing evaluation of guideline implementation.

The RNAO panels strongly acknowledge that successful pressure ulcer prevention requires an interdisciplinary team effort. The purpose of this guideline is to assist nurses with the provision of evidence-based quality care to those adults at risk for developing pressure ulcers. Nurses, working in partnership with the interdisciplinary health care team and individuals at risk for pressure ulcers, have an important role in risk assessment and prevention. The panel recognizes however that prevention and management of pressure ulcers are intertwined in practice, and therefore recommends the use of the RNAO nursing best practice guideline *Assessment and Management of Stage I to IV Pressure Ulcers* (2002b) in conjunction with this guideline.

The guideline contains recommendations for Registered Nurses (RNs) and Registered Practical Nurses (RPNs) on best nursing practices in the area of pressure ulcer risk identification and prevention. It is acknowledged that the individual competencies of nurses vary between nurses and across categories of nursing professionals (RPNs and RNs) and are based on knowledge, skills, attitudes, critical analysis and decision making which are enhanced over time by experience and education. It is expected that individual nurses will perform only those aspects of risk assessment and prevention interventions for which they have appropriate education and experience.

It is expected that nurses, both RPNs and RNs, will seek appropriate consultation in instances where the client's care needs surpass the professional's ability to act independently. Effective health care depends on a coordinated interdisciplinary approach with ongoing communication between health care professionals and clients, ever mindful of the personal preferences and unique needs of each individual client.

Original Development Process – 2000

In January 2000, a panel of clinicians, educators and researchers with expertise in the practice and research of pressure ulcer prevention from institutional, community and academic settings was convened under the auspices of the RNAO. The panel identified a set of five existing guidelines for the prevention of pressure ulcers. The five guidelines were then evaluated using the *Appraisal Instrument for Canadian Clinical Practice Guidelines* which is an adapted tool from Cluzeau, Littlejohns, Grimshaw, Feder & Moran (1997). The panel subsequently selected the following two guidelines to adapt and modify:

Agency for Health Care Policy and Research (1992). Pressure ulcers in adults: Prediction and prevention. Clinical practice guideline. [Online]. Available: www.ncbi.nlm.nih.gov.

Clinical Resource Efficiency and Support Team (1998). Guidelines for the prevention and management of pressure sores. [Online]. Available: www.n-i.nhs.uk/crest.

An additional review of systematic review articles and pertinent literature was conducted to update the existing guidelines. The scope of this guideline and the focus on risk assessment and prevention of pressure ulcers in adults was established. Through a process of discussion and consensus, recommendations for nursing care were developed. The final draft was submitted to a set of external stakeholders for review and feedback. The completed nursing best practice guideline was further refined after a pilot implementation phase in selected practice settings in Ontario (see Acknowledgement for a listing of stakeholders and implementation sites). Pilot implementation practice settings were identified through a "request for proposal" process conducted by the RNAO. The pilot implementation comprised of an eight month systematic implementation and evaluation of the best practice guideline.

Revision Process – 2005

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

Guideline development staff have reviewed abstracts published in key databases on the topic of pressure ulcer prevention, focusing on systematic reviews, RCTs and recently published clinical practice guidelines on a quarterly basis since the nursing best practice guideline *Risk Assessment and Prevention of Pressure Ulcers* was originally published. The purpose of this review was to identify evidence that would impact on the recommendations, either further supporting the published recommendations, or indicating that a recommendation was no longer appropriate. In the latter case, an "action alert" would be issued, or a full review would be conducted prior to the three-year schedule. No evidence of this nature was identified during the ongoing monitoring phase, and this guideline moved into the revision phase as originally scheduled.

In September of 2004, a panel of nurses with expertise in pressure ulcer prevention from a range of practice settings (including institutional, community and academic sectors) was convened by the RNAO. This group was invited to participate as a review panel to revise the *Risk Assessment and Prevention of Pressure Ulcers* guideline that was originally published in January 2002. This panel was comprised of members of the original development panel, as well as other recommended specialists, including representation from the pilot implementation site.

The panel members were given the mandate to review the guideline, focusing on the currency of the recommendations and evidence, keeping to the original scope of the document. This work was conducted as follows:

Planning:

- Clinical questions were identified to structure the literature search.
- Search terms were generated with input from the panel team leader for each recommendation in the guideline.
- Literature search was conducted by a health sciences librarian.

Quality Appraisal:

- Search results were reviewed by a Research Assistant assigned to the panel. This review included assessing for inclusion/exclusion related to the clinical questions. See *Appendix A* for a detailed description of the search strategy.
- Studies/guidelines that met the inclusion/exclusion criteria were retrieved. Quality appraisal and data extraction was conducted by the Research Assistant. These results were summarized and circulated to the panel.
- Recently published clinical practice guidelines on pressure ulcer prevention were critically appraised by the revision panel with the AGREE Instrument (AGREE Collaboration, 2001).

Panel Review:

- Panel members reviewed the data extraction tables, systematic reviews, and where appropriate, original studies and clinical guidelines.
- Recommendations for additional search strategies were identified, as required.
- Through a process of consensus, recommendations for revision to the guideline were identified.
- The revised guideline was reviewed with the AGREE Instrument (2001) prior to publication.

Definition of Terms

Clinical Practice Guidelines or Best Practice Guidelines are systematically developed statements (based on best available evidence) to assist practitioner and patient decisions about appropriate health care for specific clinical (practice) circumstances (Field & Lohr, 1990).

Consensus is a process for making policy decisions, not a scientific method for creating new knowledge. At its best, consensus development merely makes the best use of available information, be that scientific data or the collective wisdom of the participants (Black et al., 1999).

Education Recommendations are statements of educational requirements and educational approaches/strategies for the introduction, implementation and sustainability of the best practice guideline.

Family is whomever the person defines as being family. Family members can include: parents, children, siblings, neighbours, and significant people in the community.

Interdisciplinary is a process where health care professionals representing expertise from various health care disciplines participate in the support of clients and their families in health care delivery.

Meta-analysis is the use of statistical methods to summarize the results of independent studies, therefore providing more precise estimates of the effects of health care than those derived from the individual studies included in a review (Alderson, Green & Higgins, 2004).

Organization & Policy Recommendations are statements of conditions required for a practice setting that enables the successful implementation of the best practice guideline. The conditions for success are largely the responsibility of the organization, although they may have implications for policy at a broader government or societal level.

Practice Recommendations are statements of best practice directed at the practice of health care professionals that are ideally evidence-based.

Pressure (Interface Pressure) is the force per unit area that acts perpendicularly between the body and the support surface. It is affected by the stiffness and thickness of the support surface, the composition of the body tissue, and the geometry of the body being supported (AHCPR, 1994).

Pressure Redistribution:

Pressure Reducing Surfaces are surfaces that lower the interface pressure as compared to a standard hospital mattress or chair surface, but do not consistently reduce pressure to less than capillary closing pressure (Wound, Ostomy and Continence Nurses Society, 1987).

Pressure Relieving Surfaces are surfaces that consistently lower interface pressure below capillary closing pressure (WOCN, 1987). Capillary closing pressure is the amount of pressure required to close capillaries, impairing blood flow to tissue and resulting in tissue anoxia and eventual cell death. It is often measured to be between 28-32 mmHg in healthy individuals. The amount of pressure required decreases to 12 or lower in compromised individuals.

Pressure Ulcers are any lesions caused by unrelieved pressure that results in damage to underlying tissue. Pressure ulcers usually occur over a bony prominence and are staged to classify the degree of tissue damage observed.

Randomized Controlled Trials are clinical trials that involve at least one test treatment and one control treatment, concurrent enrollment and follow-up of the test- and control-treated groups, and in which the treatments to be administered are selected by a random process.

Stakeholder is an individual, group, or organization with a vested interest in the decisions and actions of organizations who may attempt to influence decisions and actions (Baker et al., 1999). Stakeholders include all individuals or groups who will be directly or indirectly affected by the change or solution to the problem.

Standard Mattresses are ones that do not provide reduced interface pressure, therefore they are not considered preventative of tissue breakdown. Fleck (2001) describes the properties of mattress replacements in lieu of standard mattresses.

Systematic Review is an application of a rigorous scientific approach to the preparation of a review article (National Health and Medical Research Centre, 1998). Systematic reviews establish where the effects of health care are consistent and research results can be applied across populations, settings, and differences in treatment (e.g., dose); and where effects may vary significantly. The use of explicit, systematic methods in reviews limits bias (systematic errors) and reduces chance effects, thus providing more reliable results upon which to draw conclusions and make decisions (Alderson, Green & Higgins, 2004).

Background Context

Pressure ulcers, also known as pressure sores, bedsores and decubitus ulcers, are areas of localized damage to the skin and underlying tissue. This damage is generally a result of external forces – pressure, shear and/or friction. Pressure ulcer development occurs in institutional and community settings, and is most often seen in elderly, debilitated and immobile (e.g., orthopaedic) clients, those with severe acute illness (e.g., those in intensive care units) and in individuals with neurological deficits (e.g., spinal cord injuries) (NHS Centre for Reviews and Dissemination, 1995).

The high prevalence of pressure ulcers is a significant health care concern. A recent study reported by Woodbury & Houghton (2004) reviewed data that surveyed over 14,000 patients from 45 health care institutions across Canada, and estimated the prevalence of pressure ulcers as follows:

Acute Care Hospitals:	25.1%
Non-Acute Facilities (Long-term care, Nursing Homes, etc)	29.9%
Mixed Health Care Facilities (acute and non-acute)	22.1%
Community Care	15.1%

Overall, the estimate of the prevalence of pressure ulcers in all health care institutions across Canada was 26.2%. This data suggests that pressure ulcers are a significant concern in all health care settings in Canada (Woodbury & Houghton, 2004).

Estimates have indicated that up to 10% of those admitted to hospital develop a pressure ulcer, the elderly being at the highest risk with approximately 70% of all pressure ulcers occurring in elders (Lyder, 2002). In those individuals who develop pressure ulcers, approximately 60% occur in the acute care setting – usually within the first two weeks of hospitalization (Langemo et al., 1989). With the increased acuity of those admitted to hospital, it is estimated that 15% of elderly patients will develop pressure ulcers within the first week of hospitalization (Lyder, 2002). In the long term care setting, pressure ulcers are most likely to develop within the first four weeks of admission (Bergstrom & Braden, 1992). Malnutrition is a significant problem for the elderly, and is a risk factor for the development of pressure ulcers. Rates of malnutrition in the institutionalized elderly are estimated to affect 23-85% of the population, while the rate for those being admitted to hospital is estimated to range from 20-50%. Pressure ulcer risk increases by 74% with the combination of immobility, stress to the immune system and loss of lean body mass (muscle) (Harris & Fraser, 2004).

Mortality is associated with pressure ulcers – several studies have reported mortality rates as high as 60% for elders with a pressure ulcer within one year of discharge from hospital. The pressure ulcer is not generally the cause of death, but rather it develops after a decline in the health status of the older person (Lyder, 2002).

The burden of pressure ulcers and their treatment impacts on quality of life for the client and family, but also creates significant financial strain for those living with a pressure ulcer, their families, and the health care system. Costs associated with the treatment of pressure ulcers in the United States have been conservatively estimated to be $500 to $50,000 (US) per ulcer, with more severe wounds being significantly more expensive to manage than less severe ulcers (Pompeo, 2001). AHCPR (1992) estimated that the total national cost (United States) for pressure ulcer treatment was at that time $1.3 billion dollars (U.S.) annually and rising. Although there is no comparable Canadian data related to national costs, the Canadian Association of Wound Care (2004) reported on a study conducted in the late 1990s that estimated the cost of treating an individual with a pressure ulcer within a long term care facility to be an average of $24,050 for three months of treatment. Similarly, a recent case study (Allen & Houghton, 2004) estimated the total cost for 12 weeks of treatment in the community, including electrical stimulation, to be $27,632. These costs, however, do not address the burden of pain and suffering and the impact on the individual's quality of life.

Early intervention is essential for those at risk of developing pressure ulcers. The principle components of early intervention are (National Pressure Ulcer Advisory Panel, 1992):

- Identification of at-risk individuals who need preventive interventions and of the specific factors that place them at risk;
- Protection and promotion of skin integrity;
- Protection against the forces of pressure, friction and shear; and
- Reduction of the incidence of pressure ulcers through educational programs for health professionals and clients.

Practice Recommendations

Assessment

Recommendation 1.1

A 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. *Level of Evidence – IV*

Discussion of Evidence:

As pressure ulcers usually develop over bony prominences, it is recommended that these areas be the focus for assessment (AHCPR, 1992; Consortium for Spinal Cord Medicine, 2000; Royal College of Nursing, 2000; Weir, 2001). Skin inspection should be based on a head-to-toe assessment of those areas known to be vulnerable for each patient. These areas typically include the temporal region and occiput of the skull, ears, scapulae, spinous processes, shoulders, elbows, sacrum, coccyx, ischial tuberosities, trochanters, knees, malleoli, metatarsal areas, heels, and the toes. In addition, areas of the body covered by anti-embolic stockings or restrictive clothing, areas where pressure, friction and shear are exerted during activities of daily living, and parts of the body in contact with equipment are also considered vulnerable. Additional areas should be inspected as determined by the individual's condition (National Institute for Clinical Excellence, 2001; Weir, 2001). Refer to *Appendix B* for additional details regarding skin inspection and assessment.

The Royal College of Nursing (2000) and the National Institute for Clinical Excellence (2001) describe a thorough skin assessment for sites of non-blanchable erythema. This assessment should involve a comprehensive visual and tactile inspection. The first indication of a developing ulcer is usually a change in the colour, texture and sensation of the skin surface, however, it is recognized that it may not be possible to observe redness/erythema associated with tissue damage in people with darkly pigmented skin (Consortium for Spinal Cord Medicine, 2000; RCN, 2000). The following signs may indicate incipient pressure ulcer development in individuals with darkly pigmented skin: persistent erythema; non-blanching hyperemia; blisters and discolouration (purplish/bluish localized areas); localized heat, which if tissue becomes damaged is replaced by coolness; localized edema and localized induration.

Those individuals who are able to participate in the inspection of their own skin should be encouraged to do so, following appropriate education. Wheelchair users should be instructed to use a mirror to visualize areas that they cannot see easily, or alternatively, to get assistance from others (NICE, 2001).

Recommendation 1.2

The client's risk for pressure ulcer development is determined by the combination of clinical judgment and the use of a reliable risk assessment tool. The use of a tool that has been tested for validity and reliability, such as the *Braden Scale for Predicting Pressure Sore Risk*, is recommended. Interventions should be based on identified intrinsic and extrinsic risk factors and those identified by a risk assessment tool, such as Braden's categories of sensory perception, mobility, activity, moisture, nutrition, friction and shear. Risk assessment tools are useful as an aid to structure assessment.
Level of Evidence – IV

Risk Assessment Tools

In order to determine the client's level of risk, the AHCPR guideline (1992) recommends the use of a standard risk assessment tool. The *Braden Scale* and the *Norton Scale* have been tested sufficiently for reliability and validity to be useful adjuncts to nursing assessments and care planning. The Braden Scale has good sensitivity (83-100%) and specificity (64-77%), while the Norton Scale has a sensitivity of 73-92% and specificity of 61-94%. Positive predictive values are documented as: Braden – approximately 40%; Norton – approximately 20% (Lyder, 2002). Refer to *Appendix C* for a sample of the *Braden Scale for Predicting Pressure Sore Risk*.

Frequency of Risk Assessment

Although the optimum frequency of risk assessment has not been substantiated in the literature, there are clinical standards that are widely accepted and reported. It has been noted that the majority of pressure ulcers develop within the first two weeks after admission to a facility (Maklebust & Sieggreen, 1996). One prospective study of new admissions to a nursing home over three months showed that of those who developed pressure ulcers, 80% did so within the first two weeks and 96% did so within three weeks (Bergstrom & Braden, 1992). These results support the need to identify those clients "at risk" for developing pressure ulcers early in their care, preferably on admission. The literature also supports reassessments for "at risk" individuals ranging from daily to weekly, however, many sources agree that whenever a client's condition changes, reassessments should be conducted (Consortium for Spinal Cord Medicine, 2000; Ferguson, Cook, Rimmasch, Bender & Voss, 2000; Maklebust & Sieggreen, 1996; NICE, 2001; RCN, 2000).

The Consortium for Spinal Cord Medicine (2000) supports the view that regular assessment should be incorporated into the overall assessment of all individuals with spinal cord injuries. Documentation may vary from every shift, to daily or weekly, to variable intervals in the community, depending on client need and clinical presentation. The trigger for reassessment should be based on deterioration or improvement in the individual's health status.

Braden (2001) suggests that the frequency of risk assessments should be based on the findings of the initial admission assessment and the rapidity of the client's change in health status. Ideally, the client should be assessed for risk on admission, again in 48 hours and as often as the level of morbidity indicates. In addition, Braden (2001) makes recommendations for assessment of specific populations according to the following schedules:

SITE OF CARE RISK ASSESSMENT SCHEDULE

Long-term care facilities – At admission, then every week for four weeks and quarterly thereafter
Intensive Care Units – Daily
General medical/surgical units – Every other day
Community – Every home visit

Intrinsic/Extrinsic Risk Factors

The determination of risk for pressure ulcer development is established by the combination of the use of a reliable risk assessment tool and clinical judgment (refer to Recommendation 2.2). There is discussion in the literature regarding the need to look beyond assessment tools in considering risk, as the development of pressure ulcers may be influenced by factors not addressed within these tools. The potential to develop pressure ulcers may be influenced by **intrinsic risk factors** that relate to aspects of the client's physical, psychosocial or medical condition. These factors should be considered when performing a risk assessment, and include nutritional status (malnutrition and dehydration), reduced mobility or immobility, repetitive stress syndrome (involuntary movements), posture/contractures, neurological/sensory impairment, incontinence (urinary and fecal), extremes of age, level of consciousness, acute illness, history of previous pressure damage, vascular disease, and severe chronic or terminal illness (CREST, 1998; Gould et al., 2000; Lyder, 2002; NICE, 2001; RCN, 2000). In addition, it is the consensus of the review panel that pain as a risk factor should also be assessed. Refer to Recommendation 3.3.

Extrinsic factors derived from the environment can also influence the development of pressure ulcers. These include factors such as hygiene, living conditions, medication, pressure, shearing, friction, garments, transfer slings, restraint use and the support systems used to relieve pressure (CREST, 1998; Gould et al., 2000; Lyder, 2001; NICE, 2001; RCN, 2000). Clinical assessment of all factors that increase the client's risk for skin breakdown must be considered to facilitate early identification of those at risk.

An additional category of risk factors discussed in the literature is specific to **surgical interventions**. Recommendation 1.3 reviews surgical risk factors.

Recommendation 1.3

Clients who are restricted to bed and/or chair, or those experiencing surgical intervention, should be assessed for pressure, friction and shear in all positions and during lifting, turning and repositioning.
Level of Evidence – IV

Discussion of Evidence

An understanding of mechanical loads (pressure, friction and shear) and the risk of pressure ulcer development is essential in the assessment of clients, particularly those restricted to bed and/or chair (Cuddigan & Frantz, 1998). Fleck (2001) identifies extrinsic mechanical forces and factors that contribute to pressure ulcers. They are pressure, shear, friction and moisture. All contribute to soft tissue damage impacting on blood flow, tissue necrosis and pressure ulcer development, especially in the immobile patient. Physical movements associated with improper turning and transfer techniques and prolonged, unrelieved pressure can result in the development of pressure ulcers (Consortium for Spinal Cord Medicine, 2000).

External **pressure** over the tissue causes compression and distortion of underlying structures – if the pressure is higher than the capillary closing pressure, occlusion of the blood vessels, decreased tissue perfusion and tissue death may result (CREST, 1998). Deep tissue damage and necrosis can occur when the **shearing** between two layers of tissue leads to stretching, kinking and tearing of vessels at the subcutaneous level. The resulting disruption of the local blood supply produces ischemia. Prolonged ischemia is the precursor to endothelial damage and cell death (Consortium for Spinal Cord Medicine, 2000; CREST,

1998). Shearing forces should not be considered separately from pressure as they are an integral component of the effect of pressure on the client (RCN, 2000). The majority of shear injuries can be eliminated with proper positioning (AHCPR, 1992), as most shearing occurs when individuals slide down, or are dragged up in bed or chair (RCN, 2000).

Friction (a third mechanical force) occurs when two surfaces move across each other, and often results in the removal of superficial layers of skin. Friction damage often occurs as a result of poor lifting techniques (RCN, 2000). In addition, voluntary and involuntary movements by the client can lead to friction injuries, particularly on elbows and heels. Any agent that eliminates this contact or decreases the friction that occurs between the skin and the bed surface (including linens) will reduce the potential for injury (AHCPR, 1992).

Risk factors associated with the surgical experience include (Armstrong & Bortz, 2001): length of surgery (time); position during surgery; use of a standard foam mattress; positioning devices; warming devices; anesthetic agents; sedation; vasoactive medications; hemodynamics; retractors; operating room personnel; and the nature of the surgery. More specifically, intraoperative risks can be summarized as pooled moisture from prep solutions, skin shearing and friction during positioning, patient's position and use of postioning devices, negativity (layering of materials between the patient and the pressure-reducing surface), intraoperative hypotension, alteration in hemodynamic and circulatory status related to position and blood loss (Armstrong & Bortz, 2001).

Recommendation 1.4a

All pressure ulcers are identified and staged using the National Pressure Ulcer Advisory Panel (NPUAP) criteria.

Level of Evidence – IV

Recommendation 1.4b

If pressure ulcers are identified, utilization of the RNAO best practice guideline *Assessment and Management of Stage I to IV Pressure Ulcers* is recommended.

Level of Evidence – IV

Discussion of Evidence:

Several classification systems exist to describe pressure ulcers in terms of observed tissue damage. The use of a classification tool allows for universal assessment and consistent communication of the severity of tissue damage among health care professionals (Armstrong & Bortz, 2001). The four-stage National Pressure Ulcer Advisory Panel system is the framework most widely accepted (Consortium for Spinal Cord Medicine, 2000; CREST, 1998; Ferguson et al., 2000; Ferrell, Josepheson, Norvid & Alcorn, 2000). It was accepted by the AHCPR panel in 1994 and has since become a clinical standard (Weir, 2001). Indeed, the development panel, through a consensus building process, recognized the universality of the defining criteria, as they are understood and utilized by clinicians in a wide range of practice settings.

The National Pressure Ulcer Advisory Panel (1989) definitions include:

STAGE	DEFINITION
Stage I	Pressure ulcer is an observable pressure-related alteration of intact skin whose indicators as compared to an adjacent or opposite area on the body may include changes in one or more of the following: skin temperature (warmth or coolness), tissue consistency (firm or boggy feel), and/or sensation (pain, itching). The ulcer appears as a defined area of persistent redness in lightly pigmented skin, whereas in darker skin tones, the ulcer may appear with persistent red, blue, or purple hues (1998).
Stage II	Partial thickness skin loss involving epidermis, dermis, or both. The ulcer is usually superficial and presents clinically as an abrasion, blister, or shallow crater.
Stage III	Full thickness skin loss involving damage to, or necrosis of, subcutaneous tissue that may extend down to, but not through, underlying fascia. The ulcer presents clinically as a deep crater with or without undermining of adjacent tissue.
Stage IV	Full thickness skin loss with extensive destruction, tissue necrosis, or damage to muscle, bone, or supporting structures (e.g., tendon, joint, capsule). Undermining and sinus tracts also may be associated with Stage IV pressure ulcers.

Refer to *Appendix E* for additional details regarding the NPUAP pressure ulcer classification system. For additional information regarding the assessment and management of pressure ulcers, refer to the RNAO best practice guideline *Assessment and Management of Stage I to IV Pressure Ulcers (2002b)*.

Recommendation 1.5

All data should be documented at the time of assessment and reassessment.

Level of Evidence – IV

Discussion of Evidence:

Documentation is essentially communication that reflects the client's perspective on his/her health, the care provided, the effect of the care and the continuity of care. This record allows nurses and other members of the health care team to assist clients in making future care decisions (College of Nurses of Ontario, 2004; RCN, 2000). Proper documentation provides an accurate record of a client's progress and risk status. Any skin changes should be documented immediately, including a detailed description of what was observed and what actions were taken (RCN, 2000) and should be made accessible to all members of the health care team (NICE, 2001).

Planning

Recommendation 2.1

An individualized plan of care is based on assessment data, identified risk factors and the client's goals. The plan is developed in collaboration with the client, significant others and health care professionals.
Level of Evidence – IV

Discussion of Evidence:

The risk factors identified in the assessment phase provide the framework for the development of the plan of care. Including the client and family in the development of the plan of care is essential for the establishment of mutual goals and adherence to the plan.

Gage (1994) reports on the development of a client-driven interdisciplinary care plan that provides a shared vision for the client, health care professionals and family members involved in the individual's care. The client's concerns become outcomes that can be evaluated, to ensure that the plan of care is meaningful to the individual. Client and family involvement and partnership in care are central to client-centred care delivery. Individuals at risk for pressure ulcers should be involved in all aspects of pressure ulcer risk assessment and prevention, from involvement in assessment to shared decision-making about planning care (Consortium for Spinal Cord Medicine, 2000; RCN, 2000).

Braden (2001) describes a care planning protocol by level of risk, based on the results of the *Braden Scale for Predicting Pressure Sore Risk*:

- For individuals **at risk** (15-18), the plan of care should include a turning schedule, maximum remobilization, heel protection, the management of moisture, nutrition, friction and shear as well as the use of pressure-reduction support surfaces if bed or chair-bound. Braden suggests that if other major risk factors are present, care should advance to the next level.
- At **moderate risk** (13-14), the interventions for mild risk are to continue, with the addition of a turning schedule with the 30° rule.
- For individuals at **high risk** (10-12), the frequency of turning and the use of foam wedges to facilitate 30° lateral turns should be supplemented with small shifts in weight. All the interventions for moderate risk are to continue.
- For **very high risk** individuals (≤ 9), the plan needs to continue with the previous risk interventions, plus the possibility of static air overlay if adequate monitoring is possible. Consider the use of a low-air-loss bed if the individual at very high risk has additional risk factors ameliorated by a low air-loss bed, or uncontrolled pain, or severe pain exacerbated by turning. Braden (2001) cautions that the use of low air-loss beds does not substitute for an appropriate turning schedule, and that positioning should be a component of the plan of care.

Refer to *Appendix D* for a summary of level of risk and prevention interventions.

Recommendation 2.2

The nurse uses clinical judgment to interpret risk in the context of the entire client profile, including the client's goals.

Level of Evidence – IV

Discussion of Evidence

The literature addresses the need for the use of clinical judgment, in conjunction with a recognized risk assessment tool, in the identification of risk (Consortium for Spinal Cord Medicine, 2000; CREST, 1998; RCN, 2000). Research evidence indicates that there is insufficient evidence to recommend a particular risk assessment scale that is appropriate in all settings, and that clinical judgment continues to play a critical role in the care of clients at risk for pressure ulcers.

Both the development and revision panel strongly support the need for clinical nursing judgment in conjunction with the overall client profile as a basis for determining risk and planning of appropriate care. This recommendation is based on current practice, clinical experience and opinion. The Royal College of Nursing (2000) supports this approach, stating that "risk assessment scales should only be used as an aide memoire and should not replace clinical judgment" (pg. 12).

Interventions

Recommendation 3.1

For clients with an identified risk for pressure ulcer development, minimize pressure through the immediate use of a positioning schedule.

Level of Evidence – IV

Discussion of Evidence

Interventions related to the prevention of pressure ulcers should be based on clinical assessment and an established plan of care. When developing the care plan, the need for pressure reducing/relieving equipment should be determined by the overall assessment of the client, and not based on risk assessment scores alone (RCN, 2000). A review of several guidelines on pressure ulcer prevention establishes consensus on the need for the immediate use of preventative intervention in the form of pressure reducing/relieving equipment and/or repositioning schedules for those identified at risk (AHCPR, 1992; Consortium for Spinal Cord Medicine, 2000; CREST, 1998; NICE, 2001; RCN, 2000; WOCN, 2003).

Little research exists to provide nurses with guidelines on optimum turning schedules (Cullum, Deeks, Fletcher, Sheldon & Song, 1995). However, current clinical practice recommendations support the use of repositioning schedules for clients identified at risk for pressure ulcer development (AHCPR, 1992; NHS Centre for Reviews & Dissemination, 1995; Consortium for Spinal Cord Medicine, 2000; CREST, 1998; RCN, 2000; WOCN, 2003). Researchers have recommended every two hours for turns, however, alternatives have not been evaluated (Cullum et al., 1995; NHS Centre for Reviews & Dissemination, 1995). A systematic review reported by Cullum et al. (1995) found that only one small randomized controlled trial (RCT) evaluated routine manual repositioning compared with the standard routine, however only ten clients received the intervention, and the repositioning schedule

was found difficult to implement. This same review identified two randomized controlled trials that evaluated unscheduled turning, but in both cases the sample sizes were small and the results were not statistically significant.

In the absence of strong evidence, the Royal College of Nursing (2000) supports a written repositioning schedule that is determined by the results of a skin inspection and individual needs and not by a predetermined schedule.

Recommendation 3.2

Use proper positioning, transferring, and turning techniques. Consult Occupational Therapy/ Physiotherapy (OT/PT) regarding transfer and positioning techniques and devices to reduce friction and shear and to optimize client independence.

Level of Evidence – IV

Discussion of Evidence

The techniques involved in positioning, turning or transferring are an important component in the implementation of care. Individuals should never be dragged across surfaces as this increases the risk of friction and shear damage. Most friction injuries can be avoided with appropriate techniques.

Voluntary and involuntary movements by individuals themselves can lead to friction injuries, especially on elbows and heels. The use of products to minimize contact with surfaces (including bed linens) can reduce the potential for injury (AHCPR, 1992; Consortium for Spinal Cord Medicine, 2000; WOCN, 2003). Use turning devices such as sheets, trapezes, or manual or electric lifts that will decrease the risk of skin damage (AHCPR, 1992; Consortium for Spinal Cord Medicine, 2000). After using turning equipment, slings, sleeves or other components of the device should not be left underneath the individual after repositioning (NICE, 2001).

Turning and repositioning devices should be used appropriately in order to minimize shear and friction damage (NICE, 2001). All staff should be trained in the correct moving and handling of clients (CREST, 1998).

Recommendation 3.3a

Consider the impact of pain. Pain may decrease mobility and activity. Pain control measures may include effective medication, therapeutic positioning, support surfaces, and other non-pharmacological interventions. Monitor level of pain on an on-going basis, using a valid pain assessment tool.

Level of Evidence – IV

Recommendation 3.3b

Consider the client's risk for skin breakdown related to the loss of protective sensation or the ability to perceive pain and to respond in an effective manner (e.g., impact of analgesics, sedatives, neuropathy, etc.).

Level of Evidence – IV

Recommendation 3.3c

Consider the impact of pain on local tissue perfusion.

Level of Evidence – IV

Discussion of Evidence

Pain is a factor that may result in decreased mobility in clients who are dealing with chronic conditions such as arthritis, multiple sclerosis, cancer, and musculoskeletal injuries. Any decrease in mobility as a result of such pain may increase the risk for the development of pressure ulcers. At the same time, however, analgesia and sedatives may depress the central nervous system. This may result in reduced mental alertness, activity and mobility, thereby altering the individual's ability to respond effectively to ischemic pain (Lindquist et al., 2003).

In general, clinical guidelines on prevention of pressure ulcers do not address the assessment of pain, however the revision panel reached consensus on the importance of addressing pain issues within the context of pressure ulcer prevention. A recent study comparing pain assessment tools for use in the leg ulcer population (Nemeth et al., 2003) found that of the five tools that met the inclusion criteria (pain ruler, numerical rating, visual analogue, verbal descriptor, short-form *McGill Pain Questionnaire*), none had been studied for validity or reliability in this population. It was concluded that the current evidence was insufficient to recommend any one pain assessment tool for individuals with leg ulcers, however they did suggest that a two-step pain assessment process might be useful in practice. Initially, the assessment should include a self-report related to the presence and level of pain, and in situations where pain is present, a more comprehensive assessment of the quality of the pain should be conducted. More research is needed in the area of pain and its impact as a risk factor for pressure ulcer development. For details regarding comprehensive pain assessment and management, refer to the RNAO nursing best practice guideline *Assessment and Management of Pain* (2002a).

Recommendation 3.4

Avoid massage over bony prominences.

Level of Evidence – IIb

Discussion of Evidence

The AHCPR (1992) reports on studies by Ek, Gustavsson & Lewis (1985) and Dyson (1978) which provide evidence to suggest that massage over bony prominences may be harmful. Lower blood flow to the skin after massage, significant decreases in skin temperature, and tissue degeneration were noted in those studied. Several clinical practice guidelines support this recommendation (AHCPR, 1992; Consortium for Spinal Cord Medicine, 2000; CREST, 1998; WOCN, 2003).

Recommendation 3.5

Clients at risk of developing a pressure ulcer should not remain on a standard mattress. A replacement mattress with low interface pressure, such as high-density foam, should be used.

Level of Evidence – Ia

Discussion of Evidence

A systematic review conducted by Cullum et al. (2004) examined to what extent pressure-relieving surfaces reduced the incidence of pressure ulcers compared with standard support surfaces, and reviewed how effective different pressure-relieving surfaces were in preventing pressure ulcers, compared to one another. It was concluded, from the 41 randomized controlled trials included in the review, that in 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. Standard hospital mattresses have been consistently outperformed by a range of foam-based, low pressure mattresses and overlays, and also by "higher-tech" pressure-relieving beds and mattresses in the prevention of pressure ulcers.

Clients at very high risk of developing pressure ulcers may benefit from an alternating pressure mattress or other high-tech pressure redistributing systems (Consortium for Spinal Cord Medicine, 2000; RCN, 2000). Alternating pressure devices generate alternating high and low interface pressures between the body and support surface (bed), usually by alternate inflation and deflation of air-filled cells. These devices are available as mattress overlays, and single or multi-layer mattress replacements. The systematic review conducted by Cullum et al. (2004) indicates that the relative merits of higher-tech constant low pressure and alternating pressure for prevention are unclear.

Fleck (2001) outlines criteria and selection modalities for the use of support surfaces in the prevention of pressure ulcers. 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).

Refer to *Appendix F* for a further discussion of pressure reducing and pressure relieving surfaces.

Recommendation 3.6

For high risk clients experiencing surgical intervention, the use of pressure-relieving surfaces intraoperatively should be considered.

Level of Evidence – Ia

Discussion of Evidence

Clients experiencing surgery are at risk for development of pressure ulcers because of factors that cannot be controlled – length of procedure (Schoonhoven et al., 2002), hemodynamic state and the use of vasoactive medications during surgery. There are, however, many risk factors that can be controlled to reduce the incidence of pressure ulcer development, including pooled prep solutions, negativity, shearing, friction and the use of warming blankets beneath the client. Another factor that can be controlled in order to decrease pressure ulcers is the surface on which the person is placed during the surgical procedure (Armstrong & Bortz, 2001; WOCN, 2003).

Cullum et al. (2004) included four RCTs in a systematic review that evaluated different methods of pressure relief on the operating table. The results of three of the four trials suggest that pressure-relieving overlays are beneficial in reducing subsequent pressure ulcer incidence in high risk surgical patients. Nixon McElvenny, Mason, Brown & Bond (1998), one of the trials included in this review, found that the use of a dry visco-elastic polymer pad during the intra-operative period reduced the probability of pressure sore development by half. Cullum et al. (2004) concluded that "organizations might consider the use of pressure relief for high risk patients in the operating theatre, as this is associated with a reduction in post-operative incidence of pressure ulcers". Currently, the most effective means of pressure relief on the operating table is unclear, and further research is this area is recommended.

Recommendation 3.7

For individuals restricted to bed:

- **Utilize an interdisciplinary approach to plan care.**
- **Use devices to enable independent positioning, lifting and transfers (e.g., trapeze, transfer board, bed rails).**
- **Reposition at least every 2 hours or sooner if at high risk.**
- **Use pillows or foam wedges to avoid contact between bony prominences.**
- **Use devices to totally relieve pressure on the heels and bony prominences of the feet.**
- **A 30º turn to either side is recommended to avoid positioning directly on the trochanter.**
- **Reduce shearing forces by maintaining the head of the bed at the lowest elevation consistent with medical conditions and restrictions. A 30º elevation or lower is recommended.**
- **Use lifting devices to avoid dragging clients during transfer and position changes.**
- **Do not use donut type devices or products that localize pressure to other areas.**

Level of Evidence – IV

Recommendation 3.8

For individuals restricted to chair:

- **Use an interdisciplinary approach to plan care.**
- **Have the client shift weight every 15 minutes, if able.**
- **Reposition at least every hour if unable to shift weight.**
- **Use pressure-reducing devices for seating surfaces.**
- **Do not use donut type devices or products that localize pressure to other areas.**
- **Consider postural alignment, distribution of weight, balance, stability, support of feet and pressure reduction when positioning individuals in chairs or wheelchairs.**
- **Refer to Occupational Therapy/Physiotherapy (OT/PT) for seating assessment and adaptations for special needs.**

Level of Evidence – IV

Discussion of Evidence

Appropriate positioning of individuals restricted to bed and/or chair is aimed at reducing pressure and allowing for adequate tissue perfusion. Current clinical practice guidelines and other literature reviewed all support the need to position clients confined to bed/chair in such a way as to provide optimum pressure reduction (AHCPR, 1992; Braden, 2001; Consortium for Spinal Cord Medicine, 2000; CREST 1998; Folkedahl, Frantz & Goode, 2002; NICE, 2001; RCN, 2000; WOCN, 2003). In addition, it has been noted that equipment used for the provision of care and transfer of clients (slings, sleeves, or other equipment accessories) should not be left under individuals as these objects act as a source of pressure (NICE, 2001; RCN, 2000).

Careful attention must be paid to effective chair positioning, as very high interface pressure and shearing forces can develop with poor posture or inappropriate seating surfaces (Braden, 2001; Consortium for Spinal Cord Medicine, 2000). For clients at high risk, avoid prolonged sitting – less than two hours (NICE, 2001) – and provide them with pressure reduction/relief chair and bed surfaces (NICE, 2001; WOCN, 2003). In addition, if able, chair-bound individuals should use a mirror to inspect areas that they cannot see, or get others to inspect for them (Consortium for Spinal Cord Medicine, 2000; NICE, 2001; RCN, 2000). The recommended seating position includes a chair that is slightly tilted back with foot support (feet should never be left dangling), and arm rests (Braden, 2001).

It is important to consult with the interdisciplinary team, particularly the occupational therapist or physiotherapist, for seating assessments and necessary adaptations (AHCPR, 1992; CREST, 1998; RCN, 2000). Seating assessments for aids and equipment should be carried out by trained assessors who have acquired specific knowledge and expertise, such as Physiotherapists and Occupational Therapists (NICE, 2001; WOCN, 2003).

Recommendation 3.9

Protect and promote skin integrity:

- **Ensure hydration through adequate fluid intake.**
- **Individualize the bathing schedule.**
- **Avoid hot water and use a pH balanced, non-sensitizing skin cleanser.**
- **Minimize force and friction on the skin during cleansing.**
- **Maintain skin hydration by applying non-sensitizing, pH balanced, lubricating moisturizers and creams with minimal alcohol content.**
- **Use protective barriers (e.g., liquid barrier films, transparent films, hydrocolloids) or protective padding to reduce friction injuries.**

Level of Evidence – IV

Discussion of Evidence

Adequate hydration of the stratum corneum protects against mechanical injury of the skin. Decreased hydration of the skin results in reduced pliability and severely dried skin is at risk for the development of fissures and cracks. Moisturizers should be applied to areas of dry skin, while care is taken not to rub or massage over areas of bony prominence. Maintenance of environmental conditions such as relative humidity and temperature minimize the incidence of dry skin (AHCPR, 1992; Consortium for Spinal Cord Medicine, 2000).

Hygienic practices to remove foreign material has been studied in relation to cleansing pressure ulcers, but not as a preventative measure (Consortium for Spinal Cord Medicine, 2000). However, it is noted in practice that frequent removal of metabolic wastes such as urine and feces is necessary to prevent chemical irritation of the skin (AHCPR, 1992). Skin may be exposed to a variety of moist substances such as urine, feces, perspiration, wound drainage and saliva all increasing susceptibility to injury (Braden, 2001; NICE, 2001; RCN, 2000). During routine cleansing of the skin, and at times of soiling, use of mild cleansing agents (pH balanced, non-sensitizing) and warm (rather than hot) water is recommended to minimize drying and irritation (AHCPR, 1992; Consortium for Spinal Cord Medicine, 2000; RCN, 2000; WOCN, 2003).

Recommendation 3.10

Protect skin from excessive moisture and incontinence:

- **Assess and manage excessive moisture related to body fluids (e.g., urine, feces, perspiration, wound exudate, saliva, etc.).**
- **Gently cleanse skin at time of soiling. Avoid friction during care with the use of a spray perineal cleanser or soft wipe.**
- **Minimize skin exposure to excess moisture. When moisture cannot be controlled, use absorbent pads, dressings or briefs that wick moisture away from the skin. Replace pads and linens when damp.**
- **Use topical agents that provide protective barriers to moisture.**
- **If unresolved skin irritation exists in a moist area, consult with the physician for evaluation and topical treatment.**
- **Establish a bowel and bladder program.** *Level of Evidence – IV*

Discussion of Evidence

Wet skin is fragile and more susceptible to friction and tearing injuries, especially during cleansing. Moist skin also has a tendency to adhere to bed linens, potentially leading to damage when linen is removed. In addition, it is more susceptible to irritation, rashes and infections, such as candida. When the source of moisture cannot be controlled, use of protective barriers and moisture absorbing products are recommended. Absorbent pads, dressings or briefs should be changed as they become saturated, rather than delaying until they reach their absorptive capacity. These products should not interfere with any pressure-redistributing surface an individual may be placed on (AHCPR, 1992; Consortium for Spinal Cord Medicine, 2000; RCN, 2000). When skin is moist from perspiration, cotton linens are recommended to promote evaporation, skin aeration and faster drying. Frequent changing of moist linens is recommended to maintain dry intact skin.

Effective continence management is an essential component of skin care. An RCT examining skin health outcomes of an exercise and incontinence intervention found that intervention subjects were significantly better in urinary and fecal incontinence, physical activity and skin wetness outcome measures than the control group, but despite these improvements, skin health improvements were limited to specific areas of the body (back, distal perineal area) and there was no difference between groups in the incidence rates of pressure ulcers (Bates-Jensen, Alessi, Al Samarrai & Schnelle, 2003). To manage incontinence, consider use of a collection device (i.e., condoms) or a pouching system to contain urine or stool and to protect the skin. When urinary incontinence has contributed or may contribute to a pressure ulcer, a urinary catheter may

be necessary for a short period of time (WOCN, 2003). A referral to a continence advisor or enterostomal therapist should be considered on an individual basis. Refer to the RNAO nursing best practice guideline *Promoting Continence Using Prompted Voiding* (2005) for further information regarding continence management.

Recommendation 3.11

A nutritional assessment with appropriate interventions should be implemented on entry to any new health care environment and when the client's condition changes. If a nutritional deficit is suspected:

- **Consult with a registered dietitian.** – *Level IV*
- **Investigate factors that compromise an apparently well nourished individual's dietary intake (especially protein or calories) and offer him or her support with eating.** – *Level IV*
- **Plan and implement a nutritional support and/or supplementation program for nutritionally compromised individuals.** – *Level IV*
- **If dietary intake remains inadequate, consider alternative nutritional interventions.** – *Level IV*
- **Nutritional supplementation for critically ill older clients should be considered.** – *Level Ib*

Discussion of Evidence

There is a strong relationship between nutritional status (including hydration) and pressure ulcer development. Nutrition plays an important role in pressure ulcer prevention and healing, and is critical in maintaining tissue integrity (Consortium for Spinal Cord Medicine, 2000; Ferguson et al., 2000; RCN, 2000). Specific factors that are significantly associated with the development and prolonged healing of pressure ulcers are impaired nutrition and reduced nutritional intake. Nutritional status influences the integrity of the skin and support structures (WOCN, 2003). Lack of vitamins and trace elements may predispose the patient to an increased risk of pressure damage (RCN, 2000).

Ferguson et al. (2000) indicate that nutritional intervention begins with nutrition screening and assessment; the goal is to ensure that dietary intake contains adequate nutrients to maintain or improve nutritional status. Nutritional assessment should be performed on entry to a new health care setting and whenever there is a change in an individual's condition that may increase the risk of malnutrition. Detailed screening and assessment may be beneficial, and referral to a registered dietitian is encouraged (Ferguson et al., 2000; RCN, 2000). This assessment should include (WOCN, 2003): current and usual weight; history of involuntary weight gain/loss; nutritional intake versus needs (including protein, calorie and fluid needs); appetite; dental health; chewing/swallowing difficulties; person's ability to feed him/herself; medical/surgical history that may impact on nutrient absorption; drug/nutrient interaction; psychosocial factors (finances, food preferences, availability of food preparation facilities) and cultural/lifestyle influences. It is essential to ensure that the individual can tolerate and/or manage the recommended diet. A referral to a speech-language pathologist should be made for a swallowing assessment in situations where the nutritional screen indicates chewing or swallowing difficulties.

Laboratory parameters should be monitored to identify nutritional status and impact of interventions. No single measurement or combination of measurements has been shown to accurately predict the risk of pressure ulcer development, however standard measurements of protein status – albumin, transferrin and pre-albumin – should be considered. Low serum albumin may be indicative of a chronic disease state

rather than represent overall nutritional status and, due to its 20 day half-life, is not a sensitive measure of the effects of intervention. Pre-albumin, on the other hand, with a half-life of 2-3 days is more reflective of the individual's current protein stores. Protein-calorie malnutrition may also be noted in those with a decreased total lymphocyte count (WOCN, 2003).

Two cohort prospective studies document the role that deficiencies of calories, protein and iron play in the development of pressure ulcers (AHCPR, 1992). The National Pressure Ulcer Advisory Panel recommends that patients with pressure ulcers who are underweight or losing weight receive enhanced caloric and protein supplementation. Recommendations for calorie and protein requirements in those with pressure ulcers are 35-40 kcal/kg of body weight/day for total calories, and 1.0-1.5 g protein/kg of body weight/day for total protein (WOCN, 2003). There is no evidence to support the practice of vitamin C and zinc supplementation for pressure ulcer prevention (WOCN, 2003). Langer et al (2004) concluded in a systematic review that it was not possible to reach a conclusion on the effect of enteral and parenteral nutrition on the prevention and treatment of pressure ulcers.

Bourdel-Marchasson et al. (2000) conducted a multi-centre RCT of 622 patients to assess the effect of nutritional supplementation on dietary intake and on pressure ulcer development in critically ill older patients. A nutritional intervention group received two oral supplements per day in addition to the normal diet. It was found that nutritional supplement intervention was associated with a decreased risk of pressure ulcer incidence.

Recommendation 3.12

Institute a rehabilitation program, if consistent with the overall goals of care and the potential exists for improving the individual's mobility and activity status. Consult the care team regarding a rehabilitation program.

Level of Evidence – IV

Discussion of Evidence

Immobility and inactivity has been associated with larger ulcers, and bed and chair-bound persons are at higher risk for pressure ulcer development. Researchers have reported that the use of active and passive range of motion exercises promotes activity and reduces the effects of pressure on tissue. Exercise, ambulation, proper positioning, strengthening and increased range of motion all assist in the prevention process (AHCPR, 1992; Consortium for Spinal Cord Medicine, 2000).

Discharge/Transfer of Care Arrangements

Recommendation 4.1

Advance notice should be given when transferring a client between settings (e.g., hospital to home/long-term care facility/hospice/residential care) if pressure reducing/relieving equipment is required to be in place at time of transfer (e.g., pressure relieving mattresses, seating, special transfer equipment). Transfer to another setting may require a site visit, client/family conference, and/or assessment for funding of resources to prevent the development of pressure ulcers.

Level of Evidence – IV

Recommendation 4.2

Clients moving between care settings should have the following information provided:

- **Risk factors identified;**
- **Details of pressure points and skin condition prior to discharge;**
- **Type of bed/mattress the client requires;**
- **Type of seating the client requires;**
- **Details of healed ulcers;**
- **Stage, site and size of existing ulcers;**
- **History of ulcers, previous treatments and products used;**
- **Type of dressing currently used and frequency of change;**
- **Adverse reactions to wound care products;**
- **Summary of relevant laboratory results; and**
- **Need for on-going nutritional support.**

Level of Evidence – IV

Discussion of Evidence

In order to ensure a smooth transfer of clients who have been identified at risk for developing pressure ulcers between practice settings, and to provide consistency of care, it is essential to ensure that funding and equipment is in place to prevent an interruption in the plan of care. The Royal College of Nursing (2000) recommends that there should be policies and procedures for the transfer of individuals between care settings in order to enhance continuity of care. This information should be provided in writing as well as verbally in order to enhance communication (Consortium for Spinal Cord Medicine, 2000; CREST, 1998). Similar approaches to care in various settings will provide continuity and consistency for the client and their caregivers. The use of clinical practice guideline recommendations across the continuum of care can facilitate decision making by practitioners and clients regarding appropriate health care for specific clinical circumstances (Field & Lohr, 1990).

Education Recommendations

Recommendation 5.1

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. Programs should be directed at all levels of health care providers including clients, family or caregivers.

Level of Evidence – III

Discussion of Evidence

All health care providers should receive relevant education in pressure ulcer risk assessment and prevention (NICE, 2001). The Royal College of Nursing (2000) identified several studies (Bergstrom Braden, Boynton & Bruch, 1995; Moody et al, 1988) reported in a systematic review by McGough (as cited in RCN, 2000) that support the concept that education programs may reduce the incidence and prevalence of pressure ulcer development. They state that "a continuous quality assurance approach would advocate that increasing people's awareness about pressure ulcer risk assessment and prevention via a coordinated and structured educational program, is more likely to result in benefits for patients than providing no program" (pg. 34). In addition, several clinical practice guidelines support educational intervention for improvement of pressure ulcer prevention (AHCPR, 1992; Consortium for Spinal Cord Medicine, 2000; NICE, 2001; RCN, 2000; WOCN, 2003).

In our current health care environment, individuals experience significantly shorter hospital stays. Frequently, the focus of care is on maximizing functional gains in activities of daily living and mobility, and education is informal or minimal. It is essential, however, that individuals be provided with the basic knowledge necessary to return them to home and their communities (Consortium for Spinal Cord Medicine, 2000), and have this knowledge provided in a way that is meaningful and useful to the client and caregiver. Boyd (1987) in a systematic review indicates that the majority of people in the United States have a reading comprehension level at or below the eighth grade. This has implications for the development of patient education programs and patient teaching materials. There is extensive discussion in the literature that supports the need to ensure education programs are directed at all levels of clinicians, patients and other caregivers (AHCPR, 1992; Consortium for Spinal Cord Medicine, 2000; RCN, 2000; Wiechula, 1997).

Individuals at risk for pressure ulcers should be informed and educated about risk assessment and prevention strategies, and this education should include family and other caregivers, where appropriate. NICE (2001) indicate that patient/caregiver education should provide information regarding personal risk factors for pressure ulcer development, sites that are of the greatest personal risk for ulcer development, how to inspect for skin damage and recognize changes in the skin, how to care for the skin (including methods for pressure relief/reduction), and where the individual or family can get assistance and advice when required, with an emphasis on the need for immediate assessment by a health care professional should signs of deterioration be noted.

Recommendation 5.2

The educational program for prevention of pressure ulcers should be based on the principles of adult learning, the level of information provided and the mode of delivery. Programs must be evaluated for their effectiveness in preventing pressure ulcers through such mechanisms as quality assurance standards and audits. Information on the following areas should be included:

- **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 and ensure effective care planning.**
- **Skin assessment.**
- **Staging of pressure ulcers.**
- **Selection and/or use of support surfaces.**
- **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.**

Level of Evidence – III

Discussion of Evidence

Principles of adult learning should guide the development of educational programs, and a variety of educational methods, including lectures (didactic presentations), demonstrations, and written guides with illustrations are recommended (AHCPR, 1992). In order to ensure that education programs are effective, they need to be monitored for outcomes, for example the reduction of prevalence and incidence of ulcers (AHCPR, 1992; RCN, 2000).

The AHCPR (1992) reviewed many educational programs in various clinical settings – spinal cord injury, rehabilitation centres, long-term care and hospitals – in order to identify the essential information for effective pressure ulcer prevention programs. NICE (2001) suggest that education programs should include a focus on the limitations and potential applications of risk assessment tools. The Royal College of Nursing (2000) confirms and further defines the content areas to be included. Specifically, they expand the focus on selection, use and maintenance of pressure redistributing equipment, and the roles and responsibilities of the interdisciplinary team members in pressure ulcer prevention and management as well as the inclusion of patient education.

Effective intervention strategies require the communication of the roles and responsibilities of the interdisciplinary team members (CREST, 1998). Enhanced continuity of care occurs when a team approach is used and each team member's roles and responsibilities are identified (AHCPR, 1992; Consortium for Spinal Cord Medicine, 2000; RCN, 2000). In addition, adopting a team approach requires each team member to take responsibility for facilitating and improving communication, sharing care and responsibility for care. This approach requires that health professionals and clients understand and respect each others roles in the delivery of care (RCN, 2000). The articulation of these roles can be addressed in educational programming aimed at various audiences.

Refer to *Appendix G* for selected educational resources.

Organization & Policy Recommendations

Recommendation 6.1

Organizations need a policy with respect to providing and requesting advance notice when transferring or admitting clients between practice settings when special needs (e.g., surfaces) are required.
Level of Evidence – IV

Recommendation 6.2

Guidelines are more likely to be effective if they take into account local circumstances and are disseminated by ongoing educational and training programs.
Level of Evidence – IV

Recommendation 6.3

Nursing best practice guidelines can be successfully implemented only when there is adequate planning, resources, organizational and administrative support, as well as appropriate facilitation. Organizations may wish to develop a plan for implementation that includes:

- **An assessment of organizational readiness and barriers to education.**
- **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.**

In this regard, RNAO (through a panel of nurses, researchers and administrators) has developed the *Toolkit: Implementation of Clinical Practice Guidelines* based on available evidence, theoretical perspectives and consensus. The *Toolkit* is recommended for guiding the implementation of the RNAO guideline *Risk Assessment and Prevention of Pressure Ulcers.* *Level of Evidence – IV*

Recommendation 6.4

Organizations need to ensure that resources are available to clients and staff. These resources include, but are not limited to, appropriate moisturizers, skin barriers, access to equipment (therapeutic surfaces) and relevant consultants (OT, PT, ET, wound specialists, etc.).
Level of Evidence – IV

Recommendation 6.5

Interventions and outcomes should be monitored and documented using prevalence and incidence studies, surveys and focused audits. *Level of Evidence – IV*

Discussion of Evidence

Organizational Commitment

A critical initial step in the implementation of guidelines must be the formal adoption of the guidelines. For example, the organization may consider formally incorporating the recommendations to be adopted into their policy and procedure structure (Graham, Harrison, Brouwers, Davies, & Dunn, 2002). This initial step paves the way for general acceptance and integration of the guideline into such systems as the quality management process.

New initiatives such as the implementation of a best practice guideline require strong leadership from nurses who are able to transform the evidence-based recommendations into useful tools that will assist in directing practice. The role of the project leader (facilitator) is to enable the implementation of the recommendations by assessing, interpreting and acting on the organizational context (RCN, 2003). It is suggested that the RNAO *Toolkit* (2002c) and opportunities for leadership development in facilitating change be considered to assist organizations to develop the leadership required for successful implementation. Appendix H provides a description of the *Toolkit*.

Implementation Strategies

Organizations must consider ensuring the acquisition of the resources needed not only to implement, but also to sustain practice that is based on the guideline recommendations. Partridge and Hill (2000) suggest the following key findings from systematic reviews that address guideline implementation in clinical areas other than pressure ulcer prevention:

- Application of the guideline to the characteristics of the local community and setting;
- An initial, specific educationally based strategy to implement the guideline;
- Consideration to amending commonly utilized education and documentation tools to include cues that assist in implementation of the recommendations;
- Outreach by an expert or implementation leader directly to practicing clinicians to impact the success of implementation and maintenance;
- Multiple strategies for implementation are more likely to produce the desired change in clinical practice, including continuing education, ongoing feedback about benchmarks achieved and/or quality indicators monitored; and
- Target barriers to adapting the guideline, including work load and administrative support for change.

Quality Indicator Monitoring

The presence or absence of pressure ulcers is often seen as an indicator of the quality of care and these numbers are often used to make policy and funding decisions (RCN, 2000). Prevalence and incidence measures are defined as follows:

Prevalence of pressure ulcers – 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. Prevalence is calculated by determining the number of individuals with pressure ulcers divided by the total population at a fixed period of time. This rate provides a snapshot of the distribution of pressure ulcers, however, the rate is effected by factors such as admission of new patients, healing rates, effectiveness of treatment, discharge practices, etc. (CREST, 1998; RCN, 2000).

Incidence of pressure ulcers – the new 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 month and showed documentation of 10 ulcers would have an incidence rate of 10%. The rate is generally calculated by case with a new occurrence (10) over all the cases (100) present during a specified time period (1 month). A definition for quality improvement purposes may take into account all new occurrences, even if it is a multiple occurrence during the timeframe for an individual. For example, if five of the ten cases on the surgical unit had two ulcers during the one month period, the incidence rate would be 15%. It is important to make the formula you are using explicit. Incidence measures how many clients develop pressure ulcers during their hospital admission/community care (CREST, 1998; RCN, 2000).

Prevalence rates are difficult to compare between and within care settings and are challenging to interpret because they are affected by incidence, healing rates, admission and discharge practices and policies (RCN, 2000). Incidence rates give an increasingly accurate picture of the effectiveness of risk assessment and preventative interventions as it identifies those who have developed ulcers over time in a specific place of care. However, the measures of incidence need to be considered in conjunction with the type and number of at risk patients admitted into the care setting (RCN, 2000). Evaluation and audits should form an integral component of the quality assurance activities of practice settings (CREST, 1998; RCN, 2000). CREST (1998) suggests that the audit of prevention of pressure ulcers could be divided into two components:

a) **Client Audit** (CREST, 1998)

- Has a risk assessment been carried out with the client?
- Is this client identified as being at risk for pressure ulcer development?
- If this client is at risk for developing pressure ulcers, has a plan of care been instigated which highlights the following:
  - Strategies to reduce identified risks (type of bed surface, frequency of position changes)?
  - Involvement of other disciplines?

b) **Facility Audit** (CREST, 1998)

- Is there a policy for prevention of pressure ulcers?
- Is there a mattress replacement policy for the unit?
- Is there guidance provided on allocation of pressure relieving equipment?
- Does the facility advocate the use of a single risk assessment tool?
- Is there guidance provided on the use of staging criteria?
- Do staff know about the existing policies?

The development panel, through a consensus building approach, identified the need to include an evaluation of care being provided in the community by professionals, family and other care providers.

c) **Community Audit**

- Is there a provision to educate clients, family and health care professionals?
- Are adequate resources in place to assist care providers?

Documentation of ongoing monitoring of outcome indicators is essential in order to monitor the success of guideline implementation. Tools that facilitate the monitoring of client outcomes and the quality of care need to be integrated into the organization's quality management process. Sample tools developed for this purpose can be found in *Appendix I.*

Research Gaps & Future Implications

The revision panel, in reviewing the evidence for the updating of this guideline, has identified several gaps in the research literature related to pressure ulcer prevention. In considering these gaps, they have identified the following priority research areas:

- The optimum frequency and effectiveness of positioning schedules.
- The effectiveness of positioning schedules for those individuals receiving care on pressure relieving surfaces.
- The effectiveness of pressure relieving interventions for pressure-related ulcers to the heels.
- The most effective surface for prevention of pressure ulcers during the intra-operative period.
- The impact of pain on pressure ulcer development and healing.

The above list, although in no way exhaustive, is an attempt to identify and prioritize the research gaps in this area. Some of the recommendations in this guideline are based on evidence gained from qualitative or quantitative research, while others are based on consensus or expert opinion. Further substantive research is required in some areas to validate the expert opinion and impact knowledge that will lead to improved practice and outcomes for those at risk of developing pressure ulcers.

Evaluation/Monitoring of Guideline

Organizations implementing the recommendations in this nursing best practice guideline are recommended to consider how the implementation and its impact will be monitored and evaluated. The following table, based on a framework outlined in the RNAO *Toolkit: Implementation of Clinical Practice Guidelines* (2002c), illustrates some indicators for monitoring and evaluation:

	Structure	Process	Outcome
	To evaluate the supports available in the organization that allow nurses to assess risk of and prevent pressure ulcers.	To evaluate changes in practice that lead towards improved risk assessment and prevention of pressure ulcers.	To evaluate the impact of implementing the recommendations.
Organization	Review of best practice guideline recommendations by organizational committee(s) responsible for policies/procedures. Availability of products for prevention, including pressure reducing/relieving support surfaces for use by clients identified at risk for pressure ulcer development. Availability of, and access to, health care professionals with expertise in pressure ulcer prevention.	A risk assessment tool, such as the Braden Scale, is used to assess pressure ulcer risk.	Presence of a process to monitor incidence/prevalence of pressure ulcers within the practice setting. Decrease in incidence/prevalence of pressure ulcers within the practice setting. Policies and procedures related to assessing pressure ulcer risk are consistent with the guidelines.
Nurse	Availability of educational opportunities re: pressure ulcer risk assessment and prevention within the organization. Number of nurses attending educational sessions re: pressure ulcer risk assessment and prevention. Availability of ongoing support for clinical application of educational content related to pressure ulcer prevention.	Pressure ulcer risk assessment is conducted, including: ■ Skin inspection; and ■ Risk assessment score. Pressure ulcer prevention strategies are implemented, including: ■ Skin care; ■ Turning schedules; ■ Pressure reducing/relieving surfaces; ■ Nutritional interventions. Nurses' self-assessed knowledge of: ■ The etiology and risk factors for pressure ulcer development; ■ Use of risk assessment tools, such as the Braden Scale – assessment and analysis of result;	Evidence of documentation in client's record consistent with guideline recommendations regarding: ■ Assessment of risk; ■ Skin inspection; ■ Plan of care re: prevention including collaborative/interdisciplinary care; ■ Implementation of interventions; ■ Evaluation of interventions; and ■ Provision of client/family education.

	Structure	Process	Outcome
		■ Skin assessment including pressure ulcer staging (NPUAP); ■ Support surfaces; and ■ Positioning techniques. Nurses' self-reported awareness of communication needs when transferring a client within and between care settings.	
Client		Percentage of clients reporting an assessment of their pressure ulcer risk. Percentage of clients reporting a review of their prevention plan with the nurse. Percentage of clients reporting discharge teaching appropriate to his/her care needs and setting of care. Percentage of clients assessed to need nutritional interventions, a turning schedule and pressure reduction/relief, etc. who actually receive it.	Absence of Stage I pressure ulcers or breakdown caused by friction and shear (prevention). Appropriate use of pressure reducing/relieving surfaces. Appropriate pain relief allowing acceptable positioning schedule. Appropriate guideline interventions are provided.
Financial Costs	Provision of adequate financial resources for the level of staffing necessary to implement the guideline recommendations.	Cost related to implementing guideline: ■ Staff education; ■ Documentation systems; ■ Pressure relieving/reducing equipment.	Overall resource utilization.

Implementation Strategies

The Registered Nurses' Association of Ontario and the guideline revision panel have compiled a list of implementation strategies to assist health care organizations or health care disciplines who are interested in implementing this guideline. A summary of these strategies follows:

- Have at least one dedicated person such as an advanced practice nurse or a clinical resource nurse who will provide support, clinical expertise and leadership. The individual should also have good interpersonal, facilitation and project management skills.
- Conduct an organizational needs assessment related to prevention of pressure ulcers to identify current knowledge base and further educational requirements.
- Initial needs assessment may include an analysis approach, survey and questionnaire, group format approaches (e.g., focus groups), and critical incidents.
- Establish a steering committee comprised of key stakeholders and interdisciplinary members committed to lead the change initiative. Identify short term and long term goals. Keep a work plan to track activities, responsibilities and timelines.
- Create a vision to help direct the change effort and develop strategies for achieving and sustaining the vision.
- Program design should include:
  - Target population;
  - Goals and objectives;
  - Outcome measures;
  - Required resources (human resources, facilities, equipment); and
  - Evaluation activities.
- Design educational sessions and ongoing support for implementation. The education sessions may consist of presentations, facilitator's guide, handouts, and case studies. Binders, posters and pocket cards may be used as ongoing reminders of the training. Plan education sessions that are interactive, include problem solving, address issues of immediate concern and offer opportunities to practice new skills (Davies & Edwards, 2004).
- Provide organizational support such as having the structures in place to facilitate the implementation. For example, hiring replacement staff so participants will not be distracted by concerns about work and having an organizational philosophy that reflects the value of best practices through policies and procedures. Develop new assessment and documentation tools (Davies & Edwards, 2004).
- Identify and support designated best practice champions on each unit to promote and support implementation. Celebrate milestones and achievements, acknowledging work well done (Davies & Edwards, 2004).
- Organizations implementing this guideline should adopt a range of self-learning, group learning, mentorship and reinforcement strategies that will over time, build the knowledge and confidence of nurses in implementing this guideline.
- Beyond skilled nurses, the infrastructure required to implement this guideline includes access to specialized equipment and treatment materials. Orientation of the staff to the use of specific products and technologies must be provided and regular refresher training planned.
- Teamwork, collaborative assessment and treatment planning with the client and family and interdisciplinary team are beneficial in implementing guidelines successfully. Referral should be made as necessary to services or resources in the community or within the organization.

In addition to the strategies mentioned above, the RNAO has developed resources that are available on the website. A *Toolkit* for implementing guidelines can be helpful if used appropriately. A brief description about this *Toolkit* can be found in *Appendix H*. A full version of the document in pdf format is also available at the RNAO website, www.rnao.org/bestpractices.

Process for Update/Review of Guideline

The Registered Nurses' Association of Ontario proposes to update this best practice guideline as follows:

1. Each nursing best practice guideline will be reviewed by a team of specialists (Review Team) in the topic area every three years following the last set of revisions.
2. During the three-year period between development and revision, RNAO Nursing Best Practice Guidelines program staff will regularly monitor relevant literature in the field.
3. Based on the results of the monitor, program staff may recommend an earlier revision period. Appropriate consultation with a team of members comprised of original panel members and other specialists in the field will help inform the decision to review and revise the guideline earlier than the three-year milestone.
4. Three months prior to the three-year review milestone, program staff will commence the planning of the review process by:
   a. Inviting specialists in the field to participate in the Review Team. The Review Team will be comprised of members from the original panel as well as other recommended specialists.
   b. Compiling feedback received, questions encountered during the dissemination phase as well as other comments and experiences of implementation sites.
   c. Compiling new clinical practice guidelines in the field, systematic reviews, meta-analysis papers, technical reviews, randomized controlled trial research, and other relevant literature.
   d. Developing detailed work plan with target dates and deliverables.

The revised guideline will undergo dissemination based on established structures and processes.

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Appendix A: Search Strategy for Existing Evidence

The search strategy utilized during the revision of this guideline focused on two key areas. One was the identification of new guidelines published on the topic of pressure ulcer risk assessment and prevention since the original guideline was published in 2002, and the second was to identify systematic reviews, and primary studies published in this area from 2001 to 2004.

STEP 1 – DATABASE Search

A database search for existing literature related to pressure ulcer prevention was conducted by a university health sciences library. An initial search of the Medline, Embase and CINAHL databases for guidelines and studies published from 2001 to 2004 was conducted in August 2004. This search was structured to answer the following questions:

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:
   - Assessment of risk factors;
   - Pressure relief; and
   - Pressure reduction?
5. What education do nurses need around strategies for the prevention of pressure ulcers?
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?

Detailed search strings developed to address these questions are available on the RNAO web site at www.rnao.org/bestpractices.

STEP 2 – Structured Web Site Search

One individual searched an established list of web sites for content related to the topic area in July 2004. This list of sites, reviewed and updated in May 2004, was compiled based on existing knowledge of evidence-based practice web sites, known guideline developers, and recommendations from the literature. Presence or absence of guidelines was noted for each site searched as well as date searched. The web sites at times did not house a guideline but directed to another web site or source for guideline retrieval. Guidelines were either downloaded if full versions were available or were ordered by phone/email.

- Agency for Healthcare Research and Quality: http://www.ahcpr.gov
- Alberta Heritage Foundation for Medical Research – Health Technology Assessment: http://www.ahfmr.ab.ca/hta
- Alberta Medical Association – Clinical Practice Guidelines: http://www.albertadoctors.org
- American College of Chest Physicians: http://www.chestnet.org/guidelines
- American Medical Association: http://www.ama-assn.org

- Bandolier Journal: http://www.jr2.ox.ac.uk/bandolier
- British Columbia Council on Clinical Practice Guidelines: http://www.hlth.gov.bc.ca/msp/protoguides/index.html
- British Medical Journal – Clinical Evidence: http://www.clinicalevidence.com/ceweb/conditions/index.jsp
- Canadian Centre for Health Evidence: http://www.cche.net/che/home.asp
- Canadian Cochrane Network and Centre: http://cochrane.mcmaster.ca
- Canadian Coordinating Office for Health Technology Assessment: http://www.ccohta.ca
- Canadian Institute of Health Information: http://www.cihi.ca
- Canadian Task Force on Preventive Health Care: http://www.ctfphc.org
- Centers for Disease Control and Prevention: http://www.cdc.gov
- Centre for Evidence-Based Mental Health: http://cebmh.com
- Centre for Evidence-Based Nursing: http://www.york.ac.uk/healthsciences/centres/evidence/cebn.htm
- Centre for Evidence-Based Pharmacotherapy: http://www.aston.ac.uk/lhs/teaching/pharmacy/cebp
- Centre for Health Evidence: http://www.cche.net/che/home.asp
- Centre for Health Services and Policy Research: http://www.chspr.ubc.ca
- Clinical Resource Efficiency Support Team (CREST): http://www.crestni.org.uk
- CMA Infobase: Clinical Practice Guidelines: http://mdm.ca/cpgsnew/cpgs/index.asp
- Cochrane Database of Systematic Reviews: http://www.update-software.com/cochrane
- Database of Abstracts of Reviews of Effectiveness (DARE): http://www.york.ac.uk/inst/crd/darehp.htm
- Evidence-based On-Call: http://www.eboncall.org
- Guidelines Advisory Committee: http://gacguidelines.ca
- Institute for Clinical Evaluative Sciences: http://www.ices.on.ca
- Institute for Clinical Systems Improvement: http://www.icsi.org/index.asp
- Institute of Child Health: http://www.ich.ucl.ac.uk/ich
- Joanna Briggs Institute: http://www.joannabriggs.edu.au
- Medic8.com: http://www.medic8.com/ClinicalGuidelines.htm
- Medscape Women's Health: http://www.medscape.com/womenshealthhome
- Monash University Centre for Clinical Effectiveness: http://www.med.monash.edu.au/healthservices/cce/evidence
- National Guideline Clearinghouse: http://www.guidelines.gov
- National Institute for Clinical Excellence (NICE): http://www.nice.org.uk
- National Library of Medicine Health Services/Technology Assessment Test (HSTAT): http://hstat.nlm.nih.gov/hq/Hquest/screen/HquestHome/s/64139
- Netting the Evidence: A ScHARR Introduction to Evidence-Based Practice on the Internet: http://www.shef.ac.uk/scharr/ir/netting
- New Zealand Guidelines Group: http://www.nzgg.org.nz
- NHS Centre for Reviews and Dissemination: http://www.york.ac.uk/inst/crd
- NHS Nursing & Midwifery Practice Development Unit: http://www.nmpdu.org
- NHS R & D Health Technology Assessment Programme: http://www.hta.nhsweb.nhs.uk/htapubs.htm
- NIH Consensus Development Program: http://consensus.nih.gov/about/about.htm
- PEDro: The Physiotherapy Evidence Database: http://www.pedro.fhs.usyd.edu.au/index.html
- Queen's University at Kingston: http://post.queensu.ca/~bhc/gim/cpgs.html
- Royal College of General Practitioners: http://www.rcgp.org.uk
- Royal College of Nursing: http://www.rcn.org.uk/index.php
- Royal College of Physicians: http://www.rcplondon.ac.uk
- Sarah Cole Hirsh Institute – Online Journal of Issues in Nursing: http://fpb.cwru.edu/HirshInstitute

- Scottish Intercollegiate Guidelines Network: http://www.sign.ac.uk
- Society of Obstetricians and Gynecologists of Canada Clinical Practice Guidelines: http://www.sogc.medical.org/sogcnet/index_e.shtml
- SUMSearch: http://sumsearch.uthscsa.edu
- The Qualitative Report: http://www.nova.edu/ssss/QR
- Trent Research Information Access Gateway: http://www.shef.ac.uk/scharr/triage/TRIAGEindex.htm
- TRIP Database: http://www.tripdatabase.com
- U.S. Preventive Service Task Force: http://www.ahrq.gov/clinic/uspstfix.htm
- University of California, San Francisco: http://medicine.ucsf.edu/resources/guidelines/index.html
- University of Laval – Directory of Clinical Information Websites: http://132.203.128.28/medecine

STEP 3 – Search Engine Web Search

A web site search for existing practice guidelines on pressure ulcer risk assessment and prevention was conducted via the search engine "Google", using key search terms. One individual conducted this search, noting the results of the search, the web sites reviewed, date and a summary of the results. The search results were further reviewed by a second individual who identified guidelines and literature not previously retrieved.

STEP 4 – Hand Search/Panel Contributions

Additionally, panel members were asked to review personal archives to identify guidelines not previously found through the above search strategy. Results of this strategy revealed no additional clinical practice guidelines.

SEARCH RESULTS:

The search strategy described above resulted in the retrieval of 1,818 abstracts on the topic of pressure ulcers. These abstracts were then screened by a Research Assistant in order to identify duplications and assess for inclusion/exclusion criteria. A total of 106 abstracts were identified for article retrieval and quality appraisal. The quality appraisal was conducted by a Masters prepared nurse with expertise in critical appraisal. The tool used to conduct this work was one developed by the Effective Public Health Practice Project (EPHPP) for appraising quantitative studies.

In addition, three recently published clinical practice guidelines were identified for review and critical appraisal by the panel, using the *Appraisal of Guidelines for Research and Evaluation* (AGREE Collaboration, 2001) instrument. These guidelines included:

Folkedahl, B.A., Frantz, R.A. & Goode, C. (2002). Prevention of pressure ulcers evidence-based protocol. In M.G. Titler (Series Ed.), *Series on Evidence-Based Practice for Older Adults*, Iowa City, IA: The University of Iowa College of Nursing Gerontological Nursing Interventions Research Center, Research Translation and Dissemination Core.

National Institute for Clinical Excellence (2001). Pressure ulcer risk assessment and prevention. [Online]. Available: www.nice.org.uk.

Wound Ostomy and Continence Nurses Society (2003). *Guideline for the prevention and management of pressure ulcers*. Glenview, IL: Wound, Ostomy, and Continence Nurses Society.

Appendix B: Skin Assessment

Skin inspection should be based on a head-to-toe assessment of those areas known to be vulnerable for each client (see illustrations for at risk areas). This assessment is best conducted when dressing or undressing in order to better visualize vulnerable areas. Any aids (braces, anti-embolic stockings, etc.) should be removed prior to this inspection.

Vulnerable areas typically include:

- temporal region and occiput of the skull;
- ears;
- scapulae;
- spinous processes;
- shoulders;
- elbows;
- sacrum;
- coccyx;
- ischial tuberosities;
- femoral trochanters;
- knees;
- malleoli;
- metatarsals;
- heels;
- toes;
- areas of the body covered by anti-embolic stockings or restrictive clothing;
- areas where pressure, friction and shear are exerted during activities of daily living; and
- parts of the body in contact with equipment.

Additional areas should be inspected as determined by the individual's condition (NICE, 2001; Weir, 2001).

A comprehensive skin assessment for sites of non-blanching erythema requires both visual and tactile inspection. Early indications of a developing ulcer include:

- Change in colour (redness/erythema), texture and sensation of the skin surface.
- In individuals with darkly pigmented skin, observe for persistent erythema, non-blanching hyperemia, blisters and discolouration (purple/blue localized areas), localized heat (replaced by coolness as tissue is damaged), localized edema and localized induration.

PRESSURE POINTS IN VARIOUS POSITIONS

Client Education – Enabler for Client or Family/Caregiver to Assess Skin for Changes

CHECKING SKIN FOR CHANGES

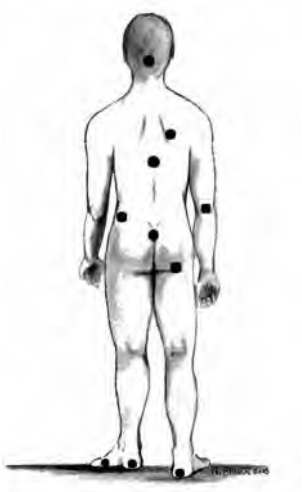
1. Check the whole body, make sure you pay special attention to bony areas.
   - By inspecting skin regularly, you can spot a problem at the very beginning. Checking the skin is the way to spot the warning signals of a problem.
   - Use prevention products on those areas that may be affected by pressure.

2. What should you look for?
   - Redness, blisters, opening in skin, rashes, etc. Feel for heat in red areas with the back of your fingers.

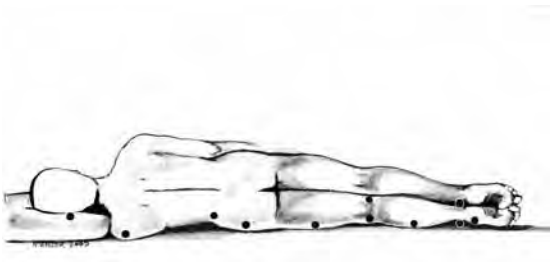
3. Check any areas that may have been previously broken and have since healed over – scar tissue breaks easily.

4. How often should a skin inspection occur?
   - At least twice daily: Morning and evening when dressing or undressing is recommended.
   - Check more frequently if there is an increase in sitting or lying times.
   - It is recommended that you check whenever changing positions.

5. Your caregiver can check your skin, or you can check your skin using a long-handled mirror.



If you have been lying on your back, observe these areas for changes.



If you have been resting on your side, observe these areas for changes.

6. Which parts to check?
   - Check the front, back, and sides of the body.
   - Also check the areas where there may have been pressure.

7. What to do if you notice a change:
   - Apply creams to areas of redness (your nurse will have shown you the barrier creams to use).
   - Show your nurse or doctor as soon as possible (especially if redness does not go away after the pressure has been removed for longer than 15 minutes).
   - Do not massage area.
   - Avoid lying or sitting on reddened area, if possible.

If you have been sitting, observe these areas for changes.

Adapted with permission of Linda Simmons, RN, BScN, Oshawa, Ontario

Illustrated by:
Nancy A. Bauer, BA, Bus Admin, RN, ET

Appendix C: Braden Scale for Predicting Pressure Sore Risk

Patient's Name _____ Evaluator's Name _____

SENSORY PERCEPTION ability to respond meaningfully to pressure-related discomfort	1. **Completely Limited** Unresponsive (does not moan, flinch or grasp) to painful stimuli, due to diminished level of consciousness or sedation, *OR* limited ability to feel pain over most of body.	2. **Very Limited** Responds only to painful stimuli. Cannot communicate discomfort except by moaning or restlessness, *OR* has a sensor impairment that limits the ability to feel pain or discomfort over 1/2 of body.
MOISTURE degree to which skin is exposed to moisture	1. **Constantly Moist** Skin is kept moist almost constantly by perspiration, urine, etc. Dampness is detected every time patient is moved or turned.	2. **Very Moist** Skin is often, but not always, moist. Linen must be changed at least once a shift.
ACTIVITY degree of physical activity	1. **Bedfast** Confined to bed.	2. **Chairfast** Ability to walk severely limited or non-existent. Cannot bear own weight and/or must be assisted into chair or wheelchair.
MOBILITY ability to change and control body position	1. **Completely Immobile** Does not make even slight changes in body or extremity position without assistance.	2. **Very Limited** Makes occasional slight changes in body or extremity position but unable to make frequent or significant changes independently.
NUTRITION usual food intake pattern	1. **Very Poor** Never eats a complete meal. Rarely eats more than 1/3 of any food offered. Eats 2 servings or less of protein (meat or dairy products) per day. Takes fluids poorly. Does not take a liquid dietary supplement *OR* is NPO and/or maintained on clear liquids or IVs for more than 5 days.	2. **Probably Inadequate** Rarely eats a complete meal and generally eats only about 1/2 of any food offered. Protein intake includes only 3 servings of meat or dairy products per day. Occasionally will take a dietary supplement *OR* receives less than optimum amount of liquid diet or tube feeding.
FRICTION AND SHEAR	1. **Problem** Requires moderate to maximum assistance in moving. Complete lifting without sliding against sheets is impossible. Frequently slides down in bed or chair, requiring frequent repositioning with maximum assistance. Spasticity, contractures or agitation lead to almost constant friction.	2. **Potential Problems** Moves feebly or requires minimum assistance. During a move skin probably slides to some extent against sheets, chair restraints, or other devices. Maintains relatively good position in chair or bed most of the time but occasionally slides down.

Note: Individuals with a score of 18 or less are considered to be at risk of developing pressure ulcers. At risk – 15 to 18; Moderate Risk – 13 to 14; High Risk – 10 to 12; Very High Risk – 9 or below.

Braden, 2001

			Date of Assessment			
	3. **Slightly Limited** Responds to verbal commands, but cannot always communicate discomfort or the need to be turned, *OR* has some sensory impairment which limits ability to feel pain or discomfort in 1 or 2 extremities.	4. **No Impairment** Responds to verbal commands. Has no sensory deficit which would limit ability to feel or voice pain or discomfort.				
	3. **Occasionally Moist** Skin is occasionally moist, requiring an extra linen change approximately once a day.	4. **Rarely Moist** Skin is usually dry, linen only requires changing at routine intervals.				
	3. **Walks Occasionally** Walks occasionally during day, but for very short distances with or without assistance. Spends majority of each shift in bed or chair.	4. **Walks Frequently** Walks outside the room at least twice a day and inside room at least every 2 hours during waking hours.				
	3. **Slightly Limited** Makes frequent though slight changes in body or extremity position independently.	4. **No Limitation** Makes major and frequent changes in position without assistance.				
	3. **Adequate** Eats over half of most meals. Eats a total of 4 servings of protein (meat or dairy products) each day. Occasionally will refuse a meal, but will usually take a supplement if offered *OR* is on a tube feeding or TPN regimen, which meets most of nutritional needs.	4. **Excellent** Eats most of every meal. Never refuses a meal. Usually eats a total of 4 or more servings of meat and dairy products. Occasionally eats between meals. Does not require supplementation.				
	3. **No Apparent Problem** Moves in bed and in chair independently and has sufficient muscle strength to lift up completely during move. Maintains good position in bed or chair.					
		TOTAL SCORE				

Appendix D: Risk and Related Interventions

Interventions by Level of Risk

AT RISK (15-18)*

- Turn, turn, turn
- Maximal remobilization
- Protect heels
- Manage moisture, nutrition, friction and shear
- Pressure reduction support surface if bed – or chair-bound

* If other major risk factors are present (advanced age, fever, poor dietary intake of protein, diastolic pressure below 60, hemodynamic instability) advance to next level of risk.

MODERATE RISK (13-14)*

- Turning schedule with 30° rule
- Pressure reduction support surface
- Maximal remobilization
- Protect heels
- Manage moisture, nutrition, friction and shear

* If other major risk factors present, advance to next level of risk.

HIGH RISK (10-12)

- Pressure reduction support surface
- Increase frequency of turning, 30° with foam wedges, supplement with small shifts
- Maximal remobilization
- Protect heels
- Manage moisture, nutrition, friction and shear

LOW AIR-LOSS BEDS AND PREVENTION

High risk

+

uncontrolled pain

or

severe pain exacerbated by turning

or

Braden scale score ≤9 (severe risk)

+

Additional risk factors

Please Note: low air loss beds do not substitute for turning schedules

MANAGE MOISTURE

- Use commercial moisture barrier
- Use absorbent pads or diapers that wick and hold moisture
- Address cause, if possible
- Offer bedpan/urinal and glass of water in conjunction with turning schedules

MANAGE NUTRITION

- Increase protein intake
- Increase calorie intake to spare proteins
- Supplement with multi-vitamin (should have Vitamin A, C & E)
- Act quickly to alleviate deficits
- Consult dietitian

MANAGE FRICTION AND SHEAR

- Elevate head of bed no more than 30º
- Use trapeze when indicated
- Use lift sheet to move patient
- Protect elbows and heels if being exposed to friction

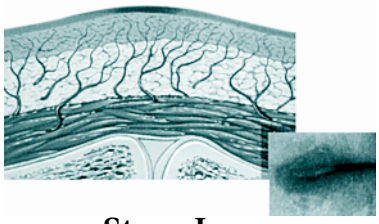
OTHER GENERAL CARE ISSUES

- No massage of reddened bony prominences
- No “donut” type devices
- Maintain good hydration
- Avoid drying the skin

Appendix E: Staging of Pressure Ulcers

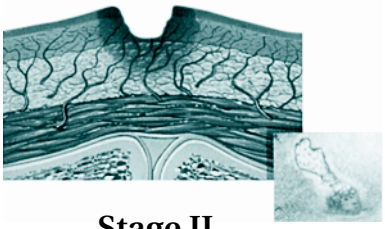
National Pressure Ulcer Advisory Panel (1989)

Stage I: A Stage I pressure ulcer is an observable pressure related alteration of intact skin whose indicators as compared to the adjacent or opposite area on the body may include changes in one or more of the following: skin temperature (warmth or coolness), tissue consistency (firm or boggy feel), and/or sensation (pain, itching). The ulcer appears as a defined area of persistent redness in lightly pigmented skin, whereas in darker skin tones, the ulcer may appear with persistent red, blue, or purple hues (NPUAP, 1998).



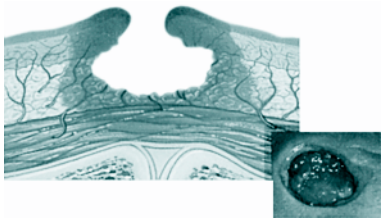
Stage I

Stage II: Partial thickness skin loss involving epidermis, dermis or both. The ulcer is usually superficial and presents clinically as an abrasion, blister or shallow crater.



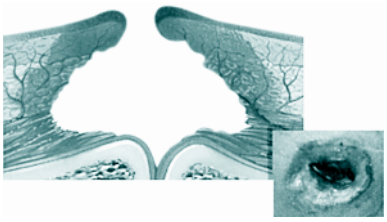
Stage II

Stage III: Full thickness skin loss involving damage to, or necrosis of, subcutaneous tissue that may extend down to, but not through, underlying fascia. The ulcer presents clinically as a deep crater with or without undermining of adjacent tissue.



Stage III

Stage IV: Full thickness skin loss with extensive destruction, tissue necrosis, or damage to muscle, bone or supporting structures (e.g., tendon, joint, capsule). Undermining and sinus tracts also may be associated with Stage IV pressure ulcers.



Stage IV

Pictures courtesy of KCI Medical Canada, Inc.

Appendix F: Pressure Reduction and Pressure Relief

Pressure (Interface): The force per unit area that acts perpendicularly between the body and the support surface. It is affected by the stiffness of the support surface, the composition of the body tissue, and the geometry of the body being supported (AHCPR, 1994).

Pressure Reducing Surface: A surface that reduces the interface pressure between the body surface and the resting surface, but does not consistently maintain pressure below capillary closing pressure (AHCPR, 1994; Mulder, Fairchild & Jeter, 1991; WOCN, 1987).

Pressure Relieving Surface: A surface that consistently reduces the interface pressure between the body surface and resting surface below capillary closing pressure (AHCPR, 1994; Mulder et al., 1991; WOCN, 1987).

Indications:

1. To prevent skin breakdown, or further skin breakdown.
2. To promote healing in the patient who already has skin breakdown involving multiple surfaces (Bryant, 1992).

There are seven basic requirements that a support surface must meet in order to prevent pressure and shear. The surface must:

1. Conform to bony prominences without resistance;
2. Not have significant memory;
3. Allow patient immersion;
4. Not "bottom out";
5. Relieve shear caused by patient movement;
6. Prevent skin maceration; and
7. Provide patient comfort (Jay, 1995).

To determine if a patient has bottomed out, the caregiver should place an outstretched hand (palm up) under the mattress overlay below the part of the body at risk for ulcer formation. If the caregiver can feel that the support material is less than an inch thick at this site, the patient has bottomed out. Bottoming out should be checked at various anatomical sites and while the patient assumes various body positions.

Overlay mattresses are devices that are applied over the surface of the hospital mattress. Most overlays provide pressure reduction. Overlays may be **static** (foam, gel, water, air filled) or **dynamic** (low air loss, alternating air).

Static Devices

These support surfaces remain motionless except in response to body movement and seek to redistribute the body weight by shifting the extra weight or load from areas with bony prominences to areas under low pressure (Holzapfel, 1993).

When selecting a static support surface made of foam, consider the following characteristics of foam: stiffness, density and thickness. Indentation load deflection (ILD) is a measure of stiffness. Typical values for foam mattress overlays would be a 25% ILD of 30 lbs., a density of 1.3 pounds per cubic foot, and thickness of 3 to 4 inches (Kemp & Krouskop, 1994).

Use a static support surface if a patient can assume a variety of positions without bearing weight on a pressure ulcer and without "bottoming out" (AHCPR, 1994).

Dynamic Devices

Use a dynamic support surface if the patient cannot assume a variety of positions without bearing weight on a pressure ulcer, if the patient fully compresses the static support surface, or if the pressure ulcer does not show evidence of healing (AHCPR, 1994).

Dynamic devices have moving parts and are attached to an electrical power source. These devices compensate for the motionless or compromised body movement by shifting the weight or load from areas with bony prominences to areas under lower pressure. If a patient has large Stage III or IV pressure ulcers on multiple turning surfaces, a low-air loss bed or an air-fluidized bed may be indicated (AHCPR, 1994).

When excess moisture on intact skin is a potential source of maceration and skin breakdown, a support surface that provides airflow can be important in drying the skin and preventing pressure ulcers (AHCPR, 1994). Moist skin is more likely to abrade and blister.

Summary of Pressure Redistributing Surfaces:

	Surface	Description	Advantage	Disadvantage	Indications
STATIC	Thick foam mattress	Overlay or mattress replacement	Inexpensive and portable	May be difficult to clean, may be single use	Patient is able to shift weight, no pressure ulcers
STATIC	Water mattress	Waterfilled mattress or overlay	Re-distribution of pressure secondary to emersion into water surface	Difficult to maintain, heavy, difficult to transport	Patient is able to shift weight, free of pressure ulcers
STATIC	Air floatation mattress	Inflatable plastic or nylon mattress overlay	Inexpensive, portable, easy to store, moderate emersion into surface	Air leaks, risk of bottoming out, require regular monitoring	Patient is able to shift weight, no pressure ulcers or low stage pressure ulcer
DYNAMIC	Low air loss mattress/ bed	Multiple inflated fabric pillows, may be attached to a bed frame	Lightweight, re-distribute peak pressures via emersion into air surface	Expensive, warm, risk of bottoming out	Functionally dependent patients with large, deep or multiple ulcers
DYNAMIC	Alternating air pressure mattress	Multiple air filled compartments, air pressure levels fluctuate within and between compartments	Light weight, re-distribute pressure via emersion into air compartments and by alternating pressure levels within and between compartments	Expensive, noisy, complex to setup, risk of bottoming out, warm	Functionally dependent patients with large, deep or multiple ulcers
DYNAMIC	Air fluidized mattress/ bed	Contains beads which are fluidized by a flow of warm pressurized air, covered in polyester	Feces and urine pass through the sheet into the beads. Frequent turning unnecessary	Very expensive and heavy, generate heat, causes insensible water loss, decreases patient mobility, noisy	Functionally dependent patients with large, deep or multiple ulcers
BARIATRIC	Bariatric bed	For clients over 250 lbs. May be static or dynamic	Designed to fit body shape and weight of bariatic population	Expense and availability	For patients over 250 lbs and up to 850 lbs

Reproduced with permission. Hutchinson, B., & Orsted. H. (2003). *Pressure management: Assessment, prevention, intervention & evaluation, Skills Lab #1*. Skin and Wound Assessment and Treatment, Calgary Health Region, Calgary, AB.

Appendix G: Educational Resources

The following resources for nurses are intended to assist in supporting pressure ulcer risk assessment and prevention education. These are examples of resources only, and are not intended to be a comprehensive listing.

Joanna Briggs Institute: www.joannabriggs.edu.au/about/home.php

The Joanna Briggs Institute was established to address the need for a collaborative approach to the evaluation of evidence derived from a diverse range of sources, including experience, expertise and all forms of rigorous research and the translation, transfer and utilization of the "best available" evidence into health care practice.

Registered Nurses' Association of Ontario: www.rnao.org

The Registered Nurses' Association of Ontario (RNAO) is the professional association representing registered nurses in Ontario. It is the strong, credible voice leading the nursing profession to influence and promote healthy public policy. The Nursing Best Practice Guidelines Program was launched in November 1999 with funding from the Government of Ontario. The purpose of this multi-year program is to support Ontario nurses by providing them with best practice guidelines for client care.

Royal College of Nursing: www.rcn.org.uk

The Royal College of Nursing (RCN) represents nurses and nursing, promotes excellence in practice and shapes health policies.

Wound Care Associations:

Canadian Association of Enterostomal Therapists (CAET): www.caet.ca

The Canadian Association for Enterostomal Therapy (C.A.E.T.) is a professional organization founded to represent Enterostomal Therapy nursing. The C.A.E.T. believes that all persons with the following conditions are entitled to the comprehensive services of an Enterostomal Therapy nurse: abdominal stomata (opening), fistulae, draining wounds, and selected disorders of the integumentary (skin), gastrointestinal, and genitourinary systems.

Canadian Association of Wound Care (CAWC): www.cawc.net

The CAWC is a non-profit organization of health care professionals, industry participants, patients and caregivers dedicated to the advancement of wound care in Canada.

Cochrane Wounds Group:

www.york.ac.uk/healthsciences/gsp/themes/woundcare/Wounds

The Cochrane Collaboration is an international not-for-profit organization. Its aim is to make up-to-date, accurate information about the effects of health care readily available world-wide.The Cochrane Wounds Group uses evidence from trials to conduct systematic reviews to establish the effectiveness of:

- interventions for the prevention and treatment of wounds
- interventions for the prevention and treatment of wound complications.

European Pressure Ulcer Advisory Panel (EPUAP): www.epuap.org

The European Pressure Ulcer Advisory Panel leads and supports all European countries in the efforts to prevent and treat pressure ulcers.

National Pressure Ulcer Advisory Panel: www.npuap.org

The National Pressure Ulcer Advisory Panel (NPUAP) provides multidisciplinary leadership for improved patient outcomes in pressure ulcer prevention and management through education, public policy and research.

Wound, Ostomy & Continence Nurses Society (WOCN): www.wocn.org

The WOCN Society is a professional nursing society which supports its members by promoting educational, clinical and research opportunities to advance the practice and guide the delivery of expert health care to individuals with wounds, ostomies and incontinence.

Wound Care Sites:

Ostomy/Wound Management: www.o-wm.com/owm

Ostomy/Wound Management is an online resource for clinical, practical, and professional information about skin, wound, ostomy and incontinence care. This peer reviewed journal is published eleven times per year.

Prevention Plus: www.bradenscale.com

The mission of Prevention Plus is to provide health care professionals with a simple way to obtain information related to the *Braden Scale for Predicting Pressure Sore Risk* and its appropriate use in a program of prevention of pressure ulcers. They provide accurate, evidence-based information and practical tools to the many health professionals who are striving to improve the quality of care in their facilities or agencies.

World Wide Wounds: www.worldwidewounds.com

The mission of World Wide Wounds is to be the premier online resource for peer-reviewed information on dressing materials providing practical guidance on all aspects of wound management to health professionals worldwide.

Other Resources:

Industry Resources

Companies manufacturing pressure ulcer products often have educational resource material specific to product use. Many also have educational programs about wound care in general, and risk assessment and prevention/treatment of pressure ulcers specifically. Consult your vendor company representative to determine educational resources that may be appropriate for your specific needs and clinical setting.

Appendix H: Description of the Toolkit

Best practice guidelines can only be successfully implemented if there are: adequate planning, resources, organizational and administrative support as well as appropriate facilitation. RNAO, through a panel of nurses, researchers and administrators has developed the *Toolkit: Implementation of Clinical Practice Guidelines* based on available evidence, theoretical perspectives and consensus. The *Toolkit* is recommended for guiding the implementation of any clinical practice guideline in a health care organization.

The *Toolkit* provides step-by-step directions to individuals and groups involved in planning, coordinating, and facilitating the guideline implementation. Specifically, the *Toolkit* addresses the following key steps in implementing a guideline:

1. Identifying a well-developed, evidence-based clinical practice guideline.
2. Identification, assessment and engagement of stakeholders.
3. Assessment of environmental readiness for guideline implementation.
4. Identifying and planning evidence-based implementation strategies.
5. Planning and implementing evaluation.
6. Identifying and securing required resources for implementation.

Implementing guidelines in practice that result in successful practice changes and positive clinical impact is a complex undertaking. The *Toolkit* is one key resource for managing this process.

The *Toolkit* is available through the Registered Nurses' Association of Ontario. The document is available in a bound format for a nominal fee, and is also available free of charge from the RNAO website. For more information, an order form or to download the *Toolkit*, please visit the RNAO website at www.rnao.org/bestpractices.

Appendix I: Monitoring Tools

Tools that facilitate the monitoring of client outcomes and the quality of care need to be integrated into quality management processes. The following samples of monitoring tools have not been extensively tested, however they are provided as examples for organizations to consider in their implementation process.

Sample 1: Pressure Ulcers Management Monitor

Folkedahl, B. A., Frantz, R. A. & Goode, C. (2002). Prevention of pressure ulcers evidence-based protocol. In M.G. Titler (Series Ed.), *Series on Evidence-Based Practice for Older Adults*, Iowa City, IA: The University of Iowa College of Nursing Gerontological Nursing Interventions Research Center, Research Translation and Dissemination Core.
www.nursing.uiowa.edu/centers/gnirc/disseminatecore.htm

For each patient receiving the prevention of pressure ulcer protocol, please complete the chart below. This chart should be completed at least weekly for each patient who is receiving the pressure ulcers management program. For each patient receiving the management intervention, please keep a record of the changes observed in his or her patient records.

Please make a copy of the chart on the next page and place it in the chart of each patient who is receiving the prevention of pressure ulcers protocol. The outcomes on this chart should be assessed and recorded for each patient on a weekly basis. Add any outcomes that are suited to individual patient needs.

To use the chart: Place the appropriate key criteria next to each separate outcome for each patient assessment.

The example below is for the first outcome (Patient Interview) and displays the various criteria keys:

EXAMPLE

Criteria Key

Y = **Yes/**met criteria
N = **No/**criteria not met
J = **Justified variation/**patient not included in the monitor (Note *why* patient is not included)

Please place the appropriate key next to the outcomes for each assessment period.

Outcome 1: Patient Interview/Observation	**Week 1**	**Week 2**	**Week 3**	**Week 4**	**Week 5**	**Week 6**	**Week 7**	**Week 8**
Patient observation reveals intact skin	N	N	N	Y	Y	Y	Y	Y

Criteria Key

Y = **Yes/**met criteria
N = **No/**criteria not met
J = **Justified variation/**patient not included in the monitor (Note *why* patient is not included)

Please place the appropriate key next to the outcomes for each assessment period.

Outcome 1: Patient Interview/Observation	**Week 1**	**Week 2**	**Week 3**	**Week 4**	**Week 5**	**Week 6**	**Week 7**	**Week 8**
Patient observation reveals intact skin								
Outcome 2: Patient Record								
Documentation reveals that skin integrity has been maintained								
Braden Score Documented								
Comments:								
Week 1								
Week 2								
Week 3								
Week 4								
Week 5								
Week 6								
Week 7								
Week 8								

Sample 2: Pressure Ulcer Risk Assessment and Prevention: Implementation Guide and Audit Protocol

The Royal College of Nursing (2003) has developed a series of audit forms to evaluate the implementation of guideline recommendations related to pressure ulcer prevention. These audits include a ward/nursing home/caseload audit, a patient audit, and knowledge test. A summary of the details of the patient audit tool follows, however the full protocol *Pressure Ulcer Risk Assessment and Prevention: Implementation Guide and Audit Protocol 2003* is available at www.rcn.org.uk.

Patient Audit Form:

- *Patient information* – gender, age, reason for admission, date of initial nursing assessment following admission.
- *Pressure ulcer risk* – date of initial assessment, assessment tool used, score. Evidence of other factors being taken into account in identifying risk should be included. Evidence of reassessments and their frequency should be included.
- *Skin inspection* – requires information from the client's chart and skin inspection by the reviewer. This requires identification of the pressure ulcer scoring tool used, the presence of any pressure ulcers and grading (documented and actual) based on skin inspection.
- *Equipment* – review of equipment provided, including whether it is in use, requested and not received, or not available.
- *Other aids* – pressure relieving/redistributing devices.
- *Repositioning/moving and handling* – planning, implementing and reviewing repositioning schedules and movement and handling procedures.
- *Seating* – seating assessment documentation, length of time recommended for patients to be seated, and information on implementation and review.

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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.

RNAO Registered Nurses' Association of Ontario
L'Association des infirmières et infirmiers autorisés de l'Ontario

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:

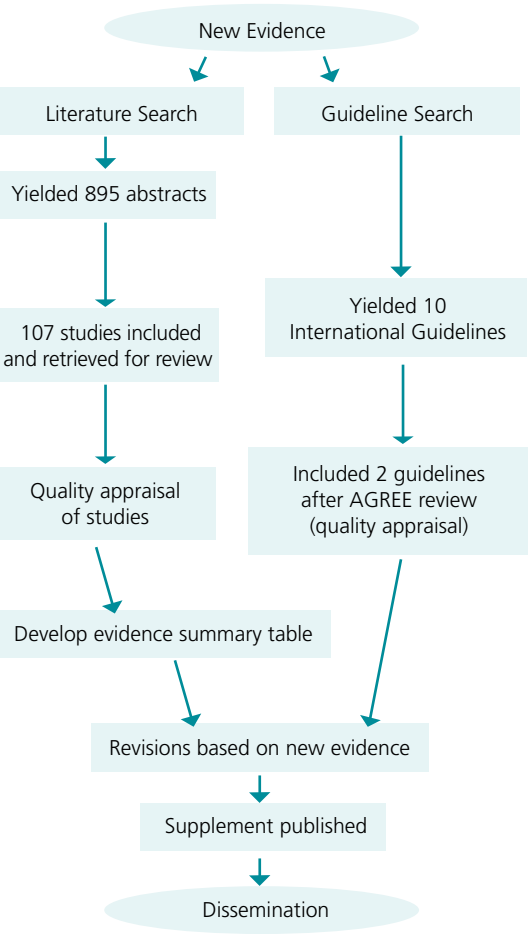
- National Pressure Ulcer Advisory Panel (NPUAP) and European Pressure Ulcer Advisory Panel (EPUAP) (2009). Prevention and Treatment of Pressure Ulcer: Clinical Practice Guideline. Washington, DC: National Pressure Ulcer Advisory Panel.
- Wound, Ostomy and Continence Nurses Society (2010). Guideline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

Review Process 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).

Suport 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 RNAO 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 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

Recommendation 1.1 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.** Level Ia Evidence	✎
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: Since the last revised edition of *Risk Assessment and Prevention of Pressure Ulcers* (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. A number of studies cited as secondary sources by the *Guideline for Prevention and Management of Pressure Ulcers* (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: **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	\+

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.

Additional Literature Support

Brink et al. (2006).

Recommendation 1.2 of the 2005 guideline (pg. 27) has been divided into two sub-recommendations for clarity.

Recommendation 1.2a

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.

Level III Evidence

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:

Discussion of Evidence

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).

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).

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	• organ failure, sepsis	Fogerty et al., 2008
	• interface pressure, skin moisture, smoking, body temperature	Suriadi et al., 2007
	• level of consciousness, activity, cooperation, bowel incontinence, length of stay, C-reactive protein level	Sayar et al., 2009
	• intermittent hemodialysis, mechanical ventilation, vasopressor therapy and pain	Nijs et al., 2009
	• 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	Black et al., 2011
Medical/Surgical	• having two co-morbidities, neuropsychiatric disorder, infection	Reddy et al., 2006; Terekeci et al., 2009
Medical Client	• length of time of hospitalization	Lindgren et al., 2004
Surgical Client	• weight, serum albumin	Lindgren et al., 2004
Acute Care (surgery, internal medicine, neurology, geriatric)	• age greater than 75 years, weight on admission, abnormal appearance of skin, planned surgery in coming week	Schoonhoven et al., 2007
	• presence of malignant tumor, arterial obstructive disease of abdominal and pelvic arteries	Nonnemacher et al., 2009
Orthopedic	• age greater than 71 years, pulmonary disease, diabetes	Lindholm, 2008
	• cerebral vascular accident	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

Recommendation 1.5 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. Level IV Evidence	NEW
Discussion of Evidence 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.	NEW
Recommendation 1.6a 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).** Level IV Evidence	
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: 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. 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.	+
Recommendation 1.6b If pressure ulcers are identified, utilization of the RNAO best practice guideline *Assessment and Management of Stage I to IV Pressure Ulcers* along with other related guidelines is recommended. Level IV Evidence	✓
Recommendation 1.7 All findings should be documented at the time of assessment and reassessment. Level IV Evidence	✓

Planning

Recommendation 2.1

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.**

Level IV Evidence

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.

Interventions

Recommendation 3.1a

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.**

Level Ia Evidence

Recommendation 3.5 of the 2005 guideline now becomes 3.1a.

Discussion of Evidence

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.

+

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).

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:

- **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"* (p. 5).
- **Active support surface:** *"A powered surface with the capability to change its load distribution properties, with or without applied load"* (p. 5).

The NPUAP has also created standard definitions for support surface features such as low air loss, alternating air, envelopment and immersion.

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).

Recommendation 3.1b

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.

Level Ia Evidence

NEW

Discussion of Evidence

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.

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.

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.

NEW

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.

Entrapment

Reproduced with permission: Norton L. (2010). Support Surface Selection Guide. Shoppers Home Health Care. Toronto. Revised June 2011.

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.

Seven Zones of Entrapment

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.

To minimize the risk of entrapment consider:

- 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.

Additional Literature Support

Kaitani et al. (2010).

Recommendation 3.2

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.

Level III Evidence

NEW

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.

NEW

Discussion of Evidence

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.

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).

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.

Additional Literature Support
Schoonhoven et al. (2006).

Recommendation 3.3

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.

Level Ib Evidence

Recommendation 3.3 is a combination of Recommendation 3.2 and 3.7 of the 2005 guideline.

Discussion of Evidence

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:

- **Pressure** as: *"the force per unit area exerted perpendicular to the plane of interest"* (p. 127).
- **Friction** as: *"the resistance to motion in a parallel direction relative to the common boundary of two surfaces"* (p.124).
- **Shear** as: *"the force per unit area exerted parallel to the plane of interest"* (p.127).

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).

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).

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

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.

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.

The guideline review panel strongly recommends the use of the RNAO *Assessment and Management of Pain* (2002; 2007S) best practice guideline for guidance related to pain assessment and interventions.

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Recommendation 3.5

Massaging over bony prominences **and reddened areas** should be avoided

Level IV Evidence

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.

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.

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Additional Literature Support

WOCN (2010)

Recommendation 3.6

Implementation of intraoperative pressure management devices is recommended for surgical procedures lasting more than 90 minutes.

Level Ib Evidence

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:

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

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(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).

Additional Literature Support
WOCN (2010).

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).

Recommendation 3.7 a

Before implementing localized pressure management devices (e.g. heel boots, wedges, etc.) consider:

- 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.

Level IV Evidence

NEW

Discussion of Evidence

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.

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.

NEW

Recommendation 3.7b

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.

Level III Evidence

NEW

Discussion of Evidence

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 & Nompleggia, 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).

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.

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.

NEW

Recommendation 3.8

Protect skin from excessive moisture and incontinence to maintain skin integrity:

- **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.

Level III Evidence

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.

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.

Consider the impact of incontinence products on pressure, friction and shear and use the minimum number of layers/amounts.

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Additional Literature Supports

Bots & Apotheker (2004).

Jolley et al. (2004).

Reddy et al. (2006).

Recommendation 3.9

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:

- 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.**

Type III Evidence

The following information replaces the discussion of evidence found on pgs. 35-36 of the 2005 guideline.

Discussion of Evidence

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:

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.

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):

- 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.

Additional Literature Supports

Langkamp-Henken et al. (2005).

NPUAP & EPUAP (2009).

Schols et al. (2004).

Theaker (2005).

WOCN (2010).

Recommendation 3.10

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**.

Type IV Evidence

The following is an addition to the discussion of evidence found on pg. 36 of the original guideline.

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.

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.

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).

Education Recommendations

Recommendation 5.1a

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.

Level III Evidence

Recommendation 5.1b

Programs should be directed at all levels of health care providers including clients, family or caregivers.

Level III Evidence

Recommendation 5.1 from the original guideline is divided into 5.1a and 5.1b for clarity.

Additional Literature Supports

Association for the Advancement of Wound Care (2009).

Bergquist-Beringer et al. (2009).

NPUAP & EPUAP (2009).

Tweed & Tweed (2008).

Recommendation 5.2

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:

- 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).**

Level IIb Evidence

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:

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.

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).

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.

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).

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Additional Literature Supports
Gunningberg (2004b).
Howe, L. (2008).
Tetterton et al. (2004).

Organization and Policy Recommendations

Recommendation 6.1

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.

Level IV Evidence

The following information is an addition to the discussion of evidence found on pg. 41 of the 2005 guideline under the heading "Organizational Commitment".

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.

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Recommendation 6.2

Guidelines are more likely to be effective if they take into account local circumstances and are disseminated by ongoing educational and training programs.

Level III Evidence

✓

The following information is an addition to the discussion of evidence found on pg. 41 of the 2005 guideline under the heading "Implementation Strategies".

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.

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Table 1 - Bundle of Measures (Baldelli & Paciella, 2008, p. 138)

- 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

Recommendation 6.3

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:

- 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.

✓

In this regard, a panel of nurses, researchers and administrators developed the RNAO *Toolkit: Implementation of Clinical Practice Guideline* (2002) based on available evidence, theoretical perspectives and consensus. The Toolkit is recommended for guiding the implementation of the RNAO guideline *Risk Assessment and Prevention of Pressure Ulcers* (2005). Level IIb Evidence	
The following information is an addition to the discussion of evidence found on pg. 41 of the 2005 guideline under the heading "Implementation Strategies" 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.	+
Additional Literature Supports Davies, Edwards, Ploeg & Virani (2008). Ploeg, Davies, Edwards, Gifford & Elliott-Miller (2007).	
## Recommendation 6.4 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.** Level IIa Evidence	
The following information is an addition to the discussion of evidence found on pg. 41 of the 2005 guideline under the heading "Implementation Strategies" 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.	+

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 11per 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. 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).	
Recommendation 6.5 Interventions and outcomes should be monitored and documented using prevalence and incidence studies, surveys and focused audits. Level III Evidence	✓
Recommendation 6.6 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. Level III Evidence	NEW
Recommendation 6.7 Embed annual prevalence of pressure ulcer studies into assessment of risk/quality and professional practice. Level III Evidence	NEW
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". 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.	+

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.

Level III Evidence

NEW

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:

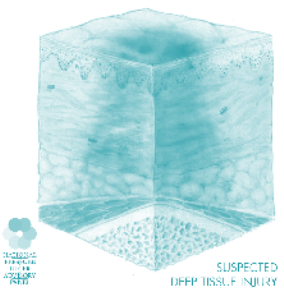
Additional tools for assessment of pressure ulcer risks are added.

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_presure_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

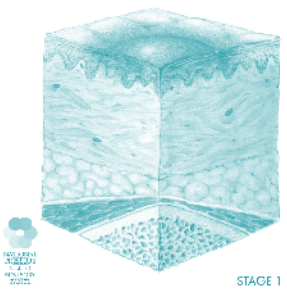
Appendix E: Staging of Pressure Ulcers on page 64 of the 2005 guideline is replaced by the following information. Note the change in the title of the appendix. Used with permission of the National Pressure Ulcer Advisory Panel & July 5, 2011.

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.

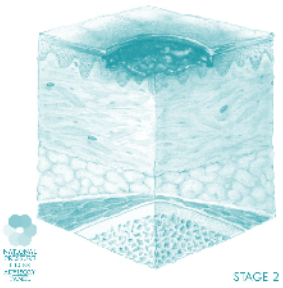
Category/ Stage I: Intact skin with non-blanchable redness of a localized area usually over a bony prominence. Darkly pigmented skin may not have visible blanching; its color may differ from the surrounding area.



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).

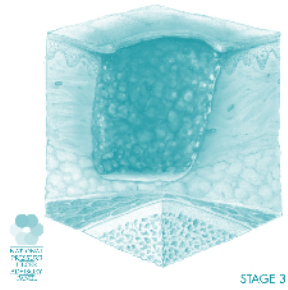
Category/Stage II: Partial thickness, loss of dermis presenting as a shallow open ulcer with a red pink wound bed, without slough. May also present as an intact or open/ruptured serum-filled blister.

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.



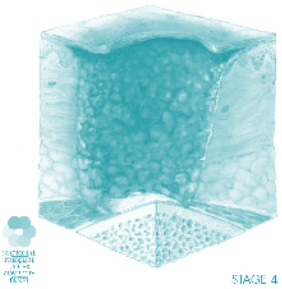
Category/Stage III: Full thickness tissue loss. Subcutaneous fat may be visible, but bone, tendon or muscles are not exposed. Slough may be present but does not obscure the depth of tissue loss. May include undermining and tunneling.

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.



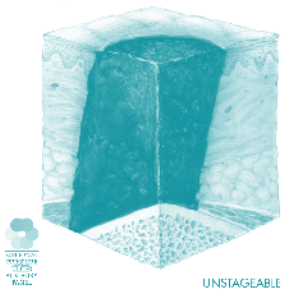
Category/Stage IV: Full thickness skin loss with exposed bone, tendon or muscle. Slough or eschar may be present on some parts of the wound bed. Often includes undermining and tunneling.

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 determines. 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.asp?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
❑ **Bed mobility:** Ability to move from to and from lying position, turn and position body in bed	0 - ❑ Self performance 1 - ❑ Support required
❑ **Walk in room:** How resident walks between locations in own room	0 - ❑ Self performance 1 - ❑ Support required
❑ **Bowel Continence:** Control of bowel movement, with appliance, or bowel program	0 - ❑ Yes 1 - ❑ No
❑ **Weight Change :** weight loss - 5% or more in last 30 days or 10% or more in last 180 days	0 - ❑ No 1 - ❑ Yes
❑ **Hx of resolved pressure ulcers:** Resident has a PU that was resolved in last 90 days	0 - ❑ No 2 - ❑ Yes
❑ **Pain Symptoms:** Frequency that resident complains or shows evidence of pain	0 - ❑ No pain 1 - ❑ Pain daily
❑ **Shortness of Breath**	0 - ❑ No 1 - ❑ 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., Coutts, 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, Coutts, Sibbald	Validated Risk Assessment Score or Pressure Ulcer Description			
Ability to change position in bed (i.e. bed mobility)		**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
	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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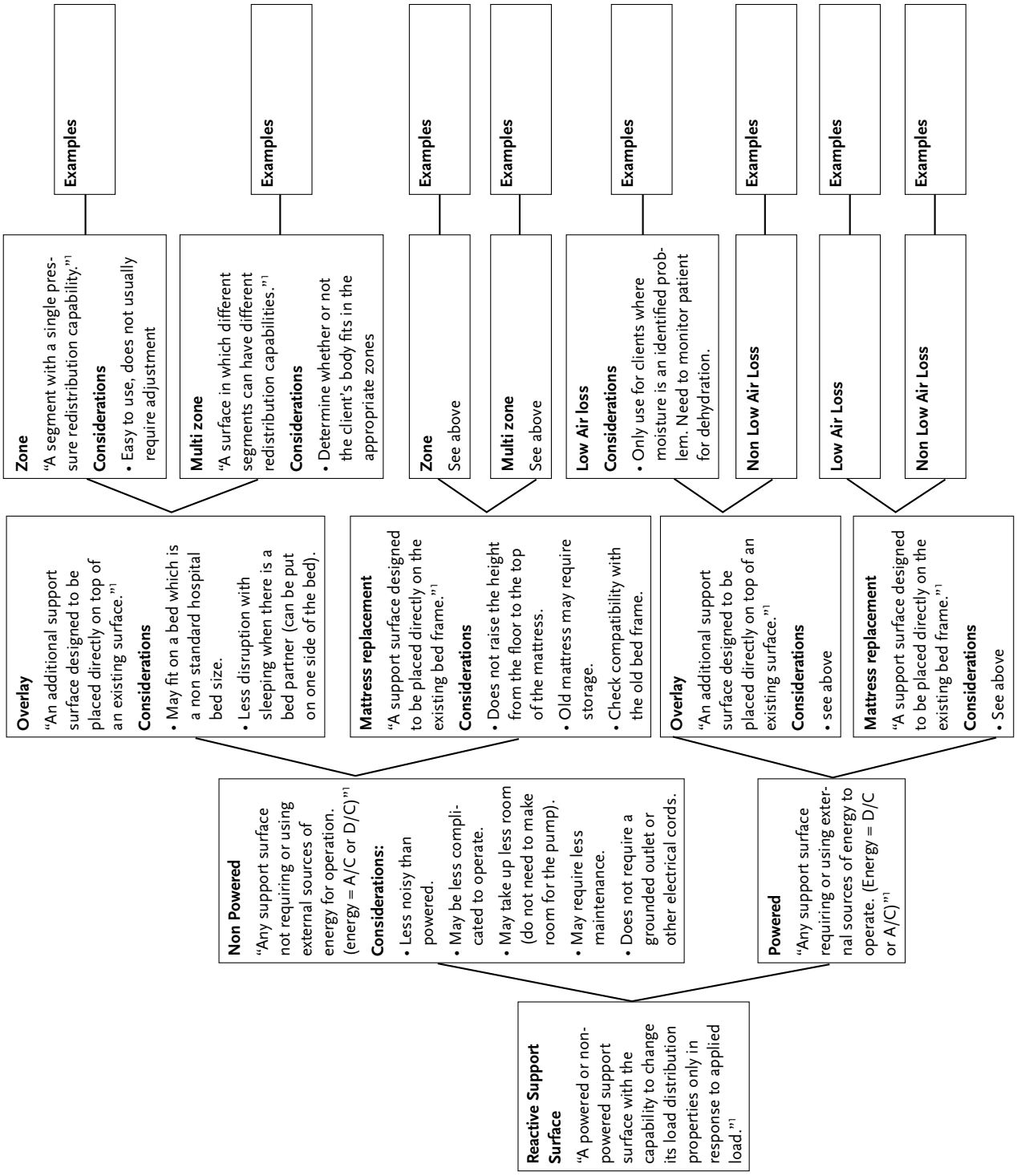

[1]National Pressure Ulcer Advisory Panel, Support Surface Standards Initiative: Terms and Definitions version 01/29/2007 http://www.npuap.org/NPUAP_S3I_TD.pdf. Accessed 03/21/ 2007.

Figure 3 Active Support Surface

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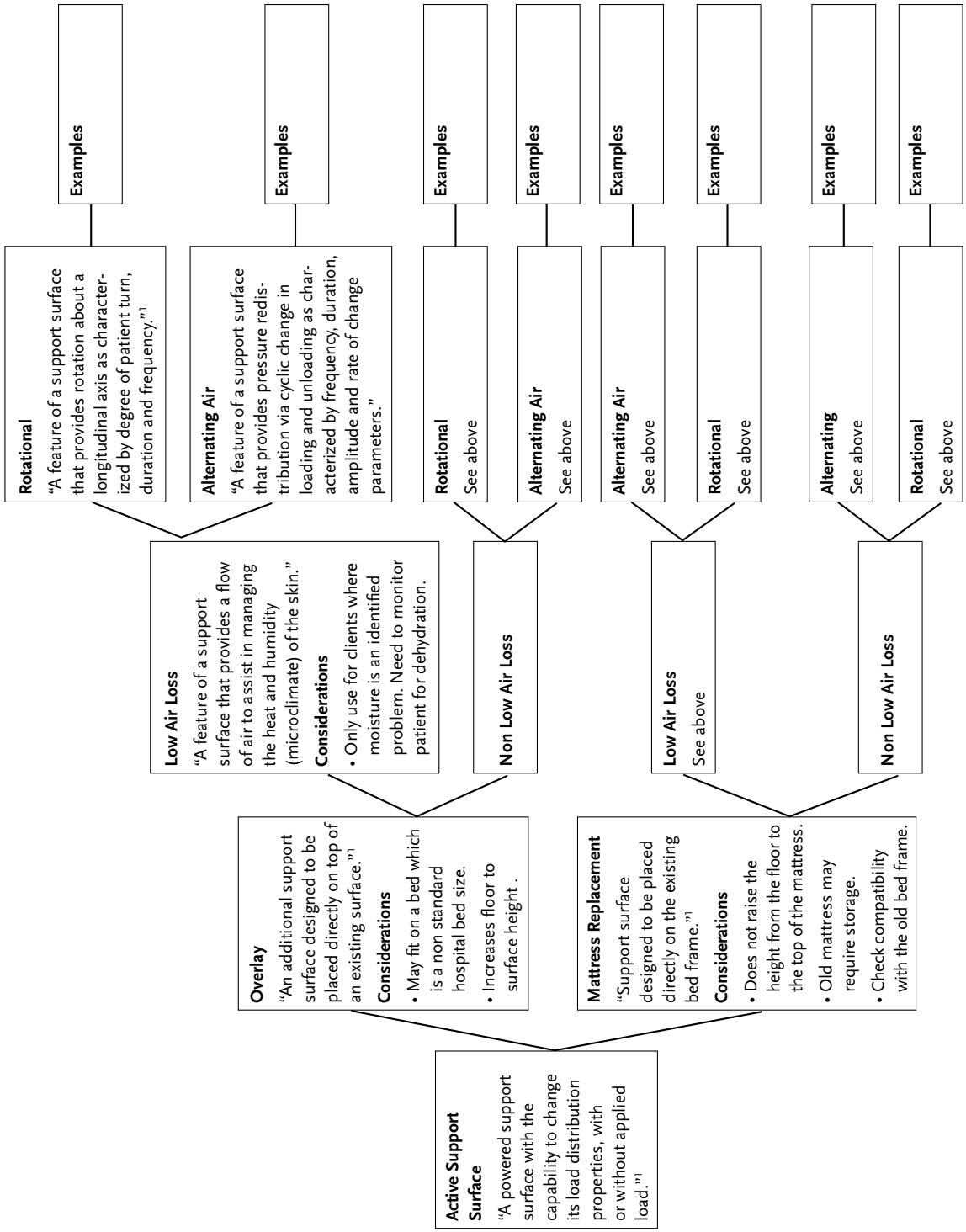


[1]National Pressure Ulcer Advisory Panel, Support Surface Standards Initiative: Terms and Definitions version 01/29/2007 http://www.npuap.org/NPUAP_S3I_TD.pdf. Accessed 03/21/ 2007.

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

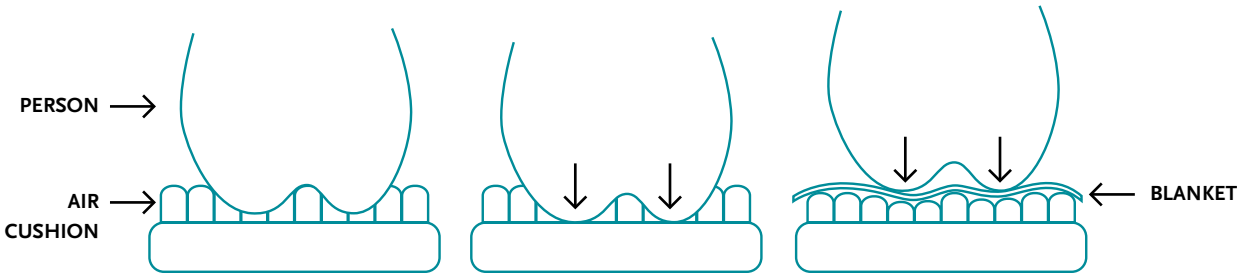
A seating and mobility assessment requires a specialized expertise. As a result, all clients at risk of developing pressure ulcers, or who have pressure ulcers and sit in a wheelchair or other chairs should be referred to an occupational or physical therapist with an expertise in seating and mobility. 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 pummel. The pummel 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).

Infaltion of Air Cushions

Concept: The persone should be "floating" in the cushion not sitting "on top of" the sushion.



RIGHT: The cushion forms around the shape of the buttocks

WRONG: Not enough air. The person is not "floating" in the cushion

WRONG: Anything placed between the person and the cushion decreases it's effectiveness. The person is weight bearing on the bony prominences because they can not sink down into 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

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.

Notes

Notes

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Nursing Best Practice Guideline

Risk Assessment & Prevention of Pressure Ulcers

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