

assessment & management of stage I to IV pressure ulcers





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



Greetings from Doris Grinspun Executive Director Registered Nurses Association of Ontario

It is with great excitement that the Registered Nurses Association of Ontario (RNAO) disseminates this 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.

We offer our endless thanks to the many institutions and individuals that are making RNAO's vision for Nursing Best Practice Guidelines (NBPGs) a reality. The Ontario Ministry

of Health and Long-Term Care recognized RNAO's ability to lead this project and is providing multi-year funding. Tazim Virani --NBPG project director-- with her fearless determination and skills, is moving the project 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 and evaluation of each guideline. Employers have responded enthusiastically to the request for proposals (RFP), and are opening their organizations to pilot test the NBPGs.

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

Successful uptake of these NBPGs requires a concerted effort of four groups: nurses themselves, other health-care 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 and evaluating future guidelines. We wish you the best for a successful implementation!

Doris Grinspun, RN, MScN, PhD (candidate)

Executive Director Registered Nurses Association of Ontario

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, 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 health care professionals and administrators who are leading and facilitating practice changes will find this document valuable for the development of policies, procedures, protocols, educational programs, assessment and documentation tools, etc. 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 adapt these guidelines in formats that would be user-friendly for daily use.



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

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





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Disclaimer

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Assessment and Management of Stage I to IV Pressure Ulcers

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summary of recommendations

Practice Recommendations

History and Physical Examination

Recommendation | 1

Conduct a history and focused physical assessment.

Strength of Evidence =C

Psychosocial Assessment Recommendation 2

Conduct a psychosocial assessment to determine the client's ability and motivation to comprehend and adhere to the treatment program.

Strength of Evidence =C

Recommendation | 3

Assess quality of life Strength of Evidence =C



Pressure Ulcer Assessment Recommendation 4

To plan treatment and evaluate its effects, assess the pressure ulcer(s) initially for:

- Stage/Depth;
- Location;
- Size (mm, cm);
- Odour;
- Sinus tracts/Undermining/Tunneling;
- Exudate;
- Appearance of the wound bed; and

 Condition of the surrounding skin (periwound) and wound edges.
 Strength of Evidence =C

Recommendation | 5

Reassess ulcers at least weekly to determine the adequacy of the treatment plan. Strength of Evidence =C

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Recommendation

Vascular assessment (e.g. Ankle/Brachial Pressure Index, Toe Pressure) is recommended for ulcers in lower extremities to rule out vascular compromise. Strength of Evidence =C





Nutrition Assessment and Management

Recommendation | 7

Ensure adequate dietary intake to prevent malnutrition or replace existing deficiencies to the extent that this is compatible with the individual's wishes. *Strength of Evidence =B*

Recommendation | 8

Prevent clinical nutrient deficiencies by ensuring that the patient is provided with optimal nutritional care through one or more of the following:

Strength of Evidence =C

- Consultation with a registered dietitian for assessment.
- Consultation with a speech language pathologist for swallowing assessment.
- A varied, balanced diet to meet clinical needs for healing and co-existing diseases e.g. renal failure and diabetes.
- Nutritional supplements if needed.
- Multivitamin and mineral preparations.
- Enteral tube feeding.
- Parenteral nutrition.
 Strength of Evidence =B
- Ongoing monitoring of nutritional intake, laboratory data and anthropometric data.

Pain

Recommendation 9

Assess all patients for pain related to the pressure ulcer or its treatment. Strength of Evidence =C

Recommendation | 10

Assess location, frequency and intensity of pain to determine the presence of underlying disease, the exposure of nerve endings, efficacy of local wound care and psychological need.

Strength of Evidence =B

Positioning and Support Surfaces Recommendation 11

Refer patients at RISK to appropriate interdisciplinary team members (Occupational Therapist, Physiotherapist, Enterostomal Therapist, etc) with expertise in seating. Postural alignment, distribution of weight, balance, stability, and pressure relief when positioning sitting individuals must be considered. Ensure support surfaces are used appropriately and are properly maintained. *Strength of Evidence =C*



Recommendation | 12

Assess all patients with EXISTING PRES-SURE ULCERS to determine their risk for developing additional pressure ulcers using the "Braden Scale for Predicting Pressure Sore Risk". If the client remains at risk, use a pressure-reducing surface. *Strength of Evidence* =C

Recommendation | 13

If the patient remains at risk for other pressure ulcers, a high specification foam mattress instead of a standard hospital mattress should be used to prevent pressure ulcers in moderate to high risk patients. Strength of Evidence =A

Recommendation | 14

Use a static support surface if the patient can assume a variety of positions without bearing weight on a pressure ulcer and without "bottoming out."

Strength of Evidence =B

Recommendation | 15

Use a dynamic support surface if:

- the patient cannot assume a variety of positions without bearing weight on a pressure ulcer;
- the patient fully compresses the static support surface; or
- the pressure ulcer does not show evidence of healing.

Strength of Evidence =B

Recommendation | 16

Use pressure relief for clients in the Operating Room to reduce the incidence of pressure ulcers post operatively. Strength of Evidence =B

Recommendation | 17

Obtain a seating assessment if a client has a pressure ulcer on a sitting surface that requires relief from pressure or repositioning. *Strength of Evidence* =C

Recommendation | 18

A client who has a pressure ulcer on a seating surface should avoid sitting. If pressure on the ulcer can be relieved, limited sitting may be allowed. Strength of Evidence =C

Ulcer Management: Debridement

Recommendation | 19

Select the method of debridement most appropriate to:

- the client's condition and goals of treatment;
- type, quantity and location of necrotic tissue; and
- depth and amount of fluid.*Strength of Evidence =C*

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Recommendation 20

Sharp debridement should be used if there is urgent need for debridement, as with advancing cellulitis or sepsis. Strength of Evidence =C

Recommendation | 21

Vascular assessment (e.g. Ankle/Brachial Pressure Index, Toe Pressure) is recommended for ulcers in lower extremities prior to debridement to rule out vascular compromise.

Strength of Evidence =C

Recommendation | 22

Foot ulcers with dry eschar need not be debrided if they do not have edema, erythema, fluctuance, or drainage. Assess these wounds daily to monitor for pressure ulcer complications that would require debridement.

Strength of Evidence =C

Recommendation | 23

Prevent or manage pain associated with debridement. Consult with a member of the health care team with expertise in pain management, when appropriate. Strength of Evidence =C



Wound Cleansing Recommendation 24

Do not use skin cleansers or antiseptic agents (e.g. povidine iodine, iodophor, sodium hypochlorite solution, hydrogen peroxide, acetic acid) to clean ulcer wounds. *Strength of Evidence =B*

Recommendation 25

Use normal saline, Ringer's lactate, sterile water or non-cytoxic wound cleansers to clean ulcer wounds. Strength of Evidence =C



Recommendation | 26

Fluid used for cleansing should be warmed at least to room temperature. *Strength of Evidence =B*

Recommendation | 27

Cleanse wounds at each dressing change. Strength of Evidence =C

Recommendation 28

To reduce surface bacteria and tissue trauma, the wound should be gently irrigated with 100 to 150 milliliters of solution.

Strength of Evidence =C







Recommendation | 29

Use enough irrigation pressure to enhance wound cleansing without causing trauma to the wound bed. Safe and effective ulcer irrigation pressures range from 4 to 15 psi. Pressure of 4 to 15 psi is achieved by using:

- 35 milliliter syringe with a 19 gauge angiocath, or
- single-use 100 milliliter saline squeeze bottle.

Strength of Evidence =B

Dressings

Recommendation | 30

Moisture-retentive dressings optimize the local wound environment and promote healing.

Strength of Evidence =A

Recommendation | 31

Consider the following criteria for interactive dressings when selecting a dressing:

- Maintains a moist environment;
- Controls wound exudate, keeping the wound bed moist and the surrounding intact skin dry;
- Provides thermal insulation and wound temperature stability;
- Protects from contamination of outside micro-organisms;
- Maintains its integrity and does not leave fibers or foreign substances within the wound;
- Does not cause trauma to wound bed on removal; and

Is simple to handle, and is economical of costs and time.
 Strength of Evidence = B /C

Recommendation | 32

Consider caregiver time when selecting a dressing. *Strength of Evidence =A*

Recommendation 33

When selecting a dressing consider:

- Etiology of the wound;
- Client's general health status, goals of care and environment;
- Site of the wound;
- Size of the wound, including depth and undermining;
- A dressing that will loosely fill wound cavity;
- Exudate: type and amount;
- Risk of infection;
- Type of tissue involved;
- Phase of the wound healing process;
- Frequency of the dressing change;
- Comfort and cosmetic appearance;
- Where and by whom the dressing will be changed; and

Dressing availability.
 Strength of Evidence =C

Recommendation | 34

Monitor dressings applied near the anus, since they are difficult to keep intact. Consider use of special sacral-shaped dressings. *Strength of Evidence =B*





Adjunctive Therapies Recommendation 35

Refer to physiotherapy for a course of treatment with electrotherapy for Stage III and IV pressure ulcers that have proved unresponsive to conventional therapy. Electrical stimulation may also be useful for recalcitrant Stage II ulcers. *Strength of Evidence =A*

Recommendation | 36

Chronic pressure ulcers may be treated by:

- Electrical stimulation
 (Strength of Evidence = A)
- Vacuum assisted closure and normothermic therapies (Strength of Evidence=B)
- Therapeutic ultrasound (Strength of Evidence = B)
- Ultraviolet light
 (Strength of Evidence = B)
- Pulsed electromagnetic fields (Strength of Evidence = B)
- Growth factors and skin equivalents (Strength of Evidence = C)

Colonization and InfectionRecommendation37

The treatment of infection is managed by wound cleansing, systemic antibiotics, and debridement as needed. Strength of Evidence =A

Recommendation 38

Protect pressure ulcers from sources of contamination, e.g., fecal matter. *Strength of Evidence =B*

Recommendation 39

Follow Body Substance Precautions (BSP) or an equivalent system appropriate for the health care setting and the client's condition when treating pressure ulcers. *Strength of Evidence* =C

Recommendation | 40

Medical management may include initiating a two-week trial of topical antibiotics for clean pressure ulcers that are not healing or are continuing to produce exudate after two to four weeks of optimal patient care. The antibiotic should be effective against gram-negative, gram-positive and anaerobic organisms.

Strength of Evidence =A

Recommendation | 41

Medical management may include appropriate systemic antibiotic therapy for patients with bacteremia, sepsis, advancing cellulitis, or osteomyelitis. *Strength of Evidence =A*

Recommendation | 42

Use sterile instruments to debride pressure ulcers.





Recommendation | 43

To obtain wound culture, cleanse wound with normal saline first. Swab wound bed, not eschar, exudate or edges. Strength of Evidence =C

Recommendation | 44

The use of cytotoxic antiseptics to reduce bacteria in wound tissue is not recommended.

Strength of Evidence =B

Operative Repair of Pressure Ulcers Recommendation 45

Possible candidates for operative repair are medically stable, adequately nourished, are able to tolerate operative blood loss and postoperative immobility. Quality of life, patient preferences, treatment goals, risk of recurrence, and expected rehabilitative outcome are additional considerations. *Strength of Evidence =C*



Discharge/Transfer of Care Arrangements Recommendation 46

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

- Risk factors identified;
- Details of pressure points and skin condition prior to transfer;
- Need for pressure reducing/relieving equipment;
- Need for pressure relieving mattresses, seating, special transfer equipment;
- Details of healed ulcers;
- Stage, site and size of existing ulcers;
- History of ulcers, previous treatments and dressings (generic) used;
- Type of dressing currently used and frequency of change;
- Any allergies to dressing products; and

Need for on-going nutritional support.
 Strength of Evidence =C

Recommendation | 47

Use the RNAO best practice guideline *"Risk Assessment and Prevention of Pressure Ulcers"* (2001). *Strength of Evidence =C*





Education Recommendations

Recommendation | 48

Design, develop, and implement educational programs that reflect a continuum of care. The program should begin with a structured, comprehensive, and organized approach to prevention and should culminate in effective treatment protocols that promote healing as well as prevent recurrence. *Strength of Evidence =C*

Recommendation | 49

Develop educational programs that target appropriate health care providers, patients, family members, and caregivers. Present information at an appropriate level for the target audience, in order to maximize retention and facilitate a carry over into practice. *Strength of Evidence =C*

Recommendation | 50

Involve the patient and caregiver, when possible, in pressure ulcer treatment and prevention strategies and options. Include information on pain, discomfort, possible outcomes, and duration of treatment, if known. Other areas of education may include patient information regarding appropriate support surfaces, as well as roles of various health professionals. Collaborate with patient, family and caregivers to design and implement a plan for pressure ulcer prevention and treatment. *Strength of Evidence* =*C*

Recommendation | 51

Include the following information when developing an educational program on the treatment of pressure ulcers:

- Role of the interdisciplinary team;
- Etiology and pathology;
- Risk factors;
- Individualized program of skin care, quality of life and pain management;
- Uniform terminology for stages of tissue damage based on specific classifications;
- Need for accurate, consistent and uniform assessment, description and documentation of the extent of tissue damage;
- Principles of wound healing;
- Principles of cleansing, debridement and infection control;
- Principles of nutritional support with regard to tissue integrity;
- Product selection (i.e. support surfaces, dressings, topical antibiotics, antimicrobials);
- Principles of postoperative care including positioning and support surfaces;
- Effects or influence of the physical and mechanical environment on the pressure ulcer, and strategies for management;





- Mechanisms for accurate documentation and monitoring of pertinent data, including treatment interventions and healing progress; and
- Principles of patient education related to prevention to reduce recurrence.

Strength of Evidence =*C*

Recommendation | 52

Knowledge and skills related to the assessment and management of pressure ulcers require updating on an ongoing basis. Organizations should provide opportunities for professional development related to the best practice guideline and support its use in daily practice.

Strength of Evidence =C

Organization & Policy Recommendations

Recommendation | 53

Guidelines are more likely to be effective if they take into account local circumstances and are disseminated by an active ongoing educational and training program. Strength of Evidence =C





Recommendation 54

Practice settings need a policy with respect to providing and requesting advance notice when transferring or admitting clients between practice settings when special resources (e.g., surfaces) are required. *Strength of Evidence =C*

Recommendation | 55

Practice settings must ensure that resources are available to clients and staff, e.g. appropriate moisturizers, barriers, dressings, documentation systems, access to equipment and clinical experts, etc. *Strength of Evidence =C*

Recommendation | 56

Practice settings need a policy that requires product vendors to be registered as a regulated health care professional if they provide assessment and/or recommendations on any aspect of pressure ulcer related practice. *Strength of Evidence =C*

Recommendation 57

Practice settings need an interdisciplinary team of interested and knowledgeable persons to address quality improvement in pressure ulcer management. This team requires representation across departments and programs.

Strength of Evidence =*C*





Recommendation | 58

Nursing best practice guidelines can be successfully implemented only where there are adequate planning, resources, organizational and administrative support, as well as the 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 nursing best practice guideline on *Assessment and Management of Stage I to IV Pressure Ulcers. Strength of Evidence =C*



Responsibility for Guideline Development

The Registered Nurses Association of Ontario (RNAO), with funding from the Ontario Ministry of Health and Long-Term Care, has embarked on a multi-year project of nursing best practice guideline development, pilot implementation, evaluation and dissemination. The assessment and management of pressure ulcer guideline is one of seven best practice guidelines that were developed in the second cycle of the project. A panel convened by the RNAO and conducting its work independent of any bias or influence from the Ontario Ministry of Health and Long-Term Care developed the guideline.



Purpose and Scope

Pressure ulcer management includes the principles of pressure ulcer prevention. For this reason, the development panel strongly encourages the implementation of this guideline in conjunction with the RNAO Best Practice Guideline *Risk Assessment and Prevention of Pressure Ulcers (2001)*.

The purpose of this guideline, *Assessment and Management of Stage I to IV Pressure Ulcers*, is to identify nursing care related to assessment, management of tissue load, ulcer care, and the management of bacterial colonization and infection of pressure ulcers. The guideline has relevance to all areas of clinical practice including acute care, chronic care, rehabilitation, community care and long-term care. The guideline focuses on three areas of pressure ulcer care: (1) practice recommendations, including assessment, planning and interventions; (2) education recommendations; and (3) organization & policy recommendations.

This guideline contains recommendations for Registered Nurses (RNs) and Registered Practical Nurses (RPNs). Although the guideline is written for the nurse, wound healing is an interdisciplinary endeavour. Many settings have formalized interdisciplinary teams and the guideline development panel strongly supports this structure. Collaborative assessment and treatment planning with the client is essential. The recommendations made are not binding for nurses and should accommodate patient/family wishes and local circumstances.

It is the intention of this guideline to identify best nursing practices in the assessment and management of pressure ulcers. It is acknowledged that the individual competency of nurses varies between nurses and across categories of nursing professionals (RPNs and RNs) and is based on the knowledge, skills, attitudes and judgment enhanced over time by experience and education. It is expected that individual nurses will perform only those aspects of pressure ulcer assessment and management for which they have appropriate education and experience. Further, it is expected that nurses, both RPNs and RNs, will seek consultation in instances where the patient's care needs surpass the individual nurse's ability to act independently. It is acknowledged that effective patient care depends on a coordinated interdisciplinary approach incorporating ongoing communication between health professionals and patients, ever mindful of the personal preferences and unique needs of each individual patient.





Guideline Development Process

In June of 2000, a panel of nurses with expertise in clinical practice and research in the assessment and management of pressure ulcers, from both institutional and community settings, convened under the auspices of the RNAO.

The first task of the panel was to identify and review existing clinical practice guidelines in order to build on the current understanding of pressure ulcer assessment and management, and to reach consensus on the scope of the guideline. A systematic literature search in addition to a structured Internet search yielded a set of five clinical practice guidelines related to the assessment and management of pressure ulcers. A quality appraisal was conducted on these five guidelines using an adapted tool from Cluzeau et al. (1997). From this systematic evaluation, the following guidelines, and related updates, were identified to adapt and modify:

 Agency for Health Care Policy and Research (AHCPR). (1994). *Treatment of Pressure Ulcers*. Clinical Practice Guideline, Number 15. AHCPR Publication Number 95-0652. Rockville, MD: Agency for Health Care Policy and Research, Public Health Service, U.S. Department of Health and Human Services.

Updates:

Krasner, D. (1999). The AHCPR pressure ulcer infection control recommendations revisited. *Ostomy/Wound Management*, *45*(1A Suppl.), 88S-91S.

Ovington, L. (1999). Dressings and adjunctive therapies. AHCPR guidelines revisited. *Ostomy/Wound Management, 45*(1A Suppl.), 94S-106S.

van Rijswijk, L. & Braden, B. (1999). Pressure ulcer patient and wound assessment: An AHCPR clinical practice guideline update. *Ostomy/Wound Management, 45* (1A Suppl.), 56S-67S.

- 2. Compliance Network Physicians/Health Force Initiative (1999). *Guidelines for the outpatient treatment of chronic wounds and burns*. Berlin: Blackwell Science Ltd.
- 3. Clinical Resource Efficiency Support Team (CREST) (1998). *Guidelines for the Prevention and Management of Pressure Sores*. Belfast, Northern Ireland: CREST Secretariat.





The guideline development panel proceeded to develop a synthesis table of the recommendations from the selected clinical practice guidelines. The panel adapted practice recommendations within these guidelines in order to ensure their applicability to best nursing practice. Systematic and narrative reviews of the literature were used in the development of practice recommendations that could not be extracted from existing guidelines. Panel consensus was obtained for each recommendation.

A draft guideline was submitted to a set of external stakeholders for review. The feedback received was reviewed and incorporated into the final draft guideline. This draft nursing best practice guideline was pilot implemented in selected practice settings in Ontario. Pilot implementation practice settings were identified through a "request for proposal" process conducted by the RNAO. The implementation phase was evaluated, and the guideline was further refined taking into consideration the pilot site feedback and evaluation results, as well as current literature.

Definition of Terms

For clinical terms not identified here, please refer to Appendix A - Glossary.

Clinical Practice Guidelines or Best Practice Guidelines: "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, p. 8).

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





Evidence: "An observation, fact or organized body of information offered to support or justify inferences or beliefs in the demonstration of some proposition or matter at issue" (Madjar & Walton, 2001, p. 28).

Organization & Policy Recommendations: 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: Statements of best practice directed at the practice of health care professionals, which are ideally evidence-based.

Pressure Ulcer: Any lesion 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.

Stages of Pressure Ulcers -

Defined by the National Pressure Ulcer Advisory Panel (NPUAP, 1989)

- Stage I: Non-blanchable erythema of intact skin, the heralding lesion of skin ulceration. In individuals with darker skin, discoloration of the skin may be purplish/bluish or voilaceous (egg plant-like colour) accompanied by localized heat, edema, induration or hardness (NPUAP, 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 ulcers.





Reverse Staging of Pressure Ulcers: As adopted by the NPUAP (1989) and the AHCPR guideline (1994) pressure ulcer staging describes the depth of tissue involvement in a unilateral dimension of deterioration. When pressure ulcers heal, they do not regenerate the same lost tissue. The wound heals with granulation tissue composed of endothelial cells, fibroblasts, collagen and an extracellular matrix. Therefore, to describe a healing pressure ulcer by using the staging of I to IV in reverse order is incorrect. The guideline development panel, therefore, recommends that reverse staging not be used to describe the healing process of a wound (NPUAP, 1995).

Stakeholder: A 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. Stakeholders can be of various types, and can be divided into opponents, supporters and neutrals (Ontario Public Health Association, 1996).

Systematic Review: 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 healthcare 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 (Clarke & Oxman, 1999).

Wound Healing: A cascade of events of the biologic and immunologic system (CREST, 1998). The recognized end point in healing is total wound closure (Robson et al., 1999).

- Acute wounds: Proceed normally through the repair process from injury to healing.
- Chronic wounds: Indolent and fail to heal in a timely and orderly process (Waldrop & Doughty, 2000). Viability of tissue will determine the course and quality of healing (West & Gimbel, 2000).





Wound Healing (Phases): The wound healing response can be divided into distinct but overlapping phases:

- HEMOSTASIS: Protects the body from excessive blood loss and increased exposure to bacterial contamination.
 - Vasoconstriction controls blood loss.
 - Vasodilation and increased capillary permeability to leukocytes and platelets.
 - Formation of clot.
- INFLAMMATION: Prepares wound bed for healing by natural autolysis.
 - Disintegration or liquefaction of tissue or cells by leukocytes and enzymes.
- **PROLIFERATION:** Filling in and coverage of the wound bed.
 - *Neoangiogenesis* is the production of a capillary and arteriole network.
 - *Granulation* is the development of connective tissue.
 - *Contraction* is the mobilizing force of pulling the wound edges together.
 - Epithelialization is the resurfacing and closure of the wound.
- REMODELLING: Maturation of the wound.
 - Tensile strength of the scar tissue increases to not more than 80% of the tensile strength of non-wounded tissue.







Background Context

In Ontario, the impact of pressure ulcers is significant. Between 1998 and 2000, data collected in 41 acute care settings revealed a rate of 19.6 percent (1488/7594) and 19.9 per cent (114/574) in four extended care settings (HillRom, 2000; KCI, 2000). In another independent study in a large urban/rural region, during the same time period, the rate in one large acute care setting was 15-17 per cent (n= 2804) over the three years (Fisher et al., 1996; Harrision, Logan, Joseph & Graham, 1998; Harrision, Wells, Fisher & Prince, 1996). With approximately one-fifth of individuals in these setting suffering from pressure ulcers, the challenge for the future is growing. The Ontario population generally is aging and the level of acuity and complexity of care is rising in all care settings. To advance pressure ulcer management, there is a pressing need to provide standardized continuous care that is evidence-based and focused on the individual. This requires implementing the most current research findings, and when sound research is not available, to compile the best of expert consensus. In addition, governments need to review their policies on funding special products and equipment related to *preventing* and *healing* pressure ulcers. This will help to ensure that all patients, no matter where their care is provided, have *equal access* to best practices related to pressure ulcer care.

Interpretation of Evidence

Best practice demands that nurses be guided by knowledge from scientific sources and by recognized experts in clinical practice where evidence does not currently exist. It is important to clarify that these ratings represent the strength of the supporting evidence to date. The definitions of the strength of evidence supporting the recommendations used to develop this guideline were adapted from AHCPR, 1994:

STRENGTH OF EVIDENCE A: Requires at least two randomized controlled trials (RCTs) as part of the body of literature of overall quality and consistency addressing the specific recommendations.

STRENGTH OF EVIDENCE B: Requires availability of well-conducted clinical studies but no randomized clinical trials on the topic of recommendations.

STRENGTH OF EVIDENCE C: Requires evidence from expert committee reports or opinions and/or clinical experience of respected authorities. Indicates absence of directly applicable studies of good quality.





Practice Recommendations

History and Physical Examination

Recommendation • 1

Conduct a history and focused physical assessment. (Strength of Evidence = C)

Discussion of Evidence

Pressure ulcers should be assessed in the context of the patient's overall physical and psychological health (AHCPR, 1994; Compliance Network Physicians, 1999; Consortium for Spinal Cord Medicine, 2000). A focused physical assessment includes a risk assessment for pressure ulcer development – Appendix B provides a description of the *"Braden Scale for Predicting Pressure Sore Risk"*. The guideline development panel strongly supports consultation with interdisciplinary team members in the assessment process; in particular, the involvement of members who have wound care expertise.

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Psychosocial Assessment

Recommendation • 2

Conduct a psychosocial assessment to determine the client's ability and motivation to comprehend and adhere to the treatment program. (*Strength of Evidence = C*)

Recommendation • 3

Assess quality of life. (*Strength of Evidence = C*)

Discussion of Evidence

The goal of a psychosocial assessment is to collect the information necessary to develop a plan of care with the client that is consistent with individual and family preferences, goals and resources (personal, financial etc). The findings regarding an individual's psychological health and the impact on pressure ulcer development is mixed; however, it is evident that many of the recommendations for prevention and management of existing ulcers require the understanding, cooperation and initiative of clients and their caregivers (Consortium for Spinal Cord Medicine, 2000). These complex behaviours suggest that a psychosocial assessment should be conducted to identify factors for consideration in developing prevention and management strategies.



A complete psychosocial assessment should include, but not be limited to, the following:

- Mental status, depression, client collaboration, learning ability (AHCPR, 1994; Compliance Network Physicians, 1999: Consortium for Spinal Cord Medicine, 2000);
- Social support and social integration in the family (AHCPR, 1994; Compliance Network Physicians, 1999; Consortium for Spinal Cord Medicine, 2000);
- Polypharmacy or overmedication; alcohol and/or drug abuse (AHCPR, 1994);
- Goals, values and lifestyle (AHCPR, 1994; Compliance Network Physicians, 1999);
- Sexuality (AHCPR, 1994);
- Culture and ethnicity (AHCPR, 1994);
- Resources (e.g. availability, utilization and skill of caregivers; finances; positioning, posture and related equipment) of individuals being treated for pressure ulcers in the home (AHCPR, 1994; Compliance Network Physicians, 1999; Consortium for Spinal Cord Medicine, 2000);
- Stressors, including pain as a symptom (AHCPR, 1994); and
- Quality of Life (Compliance Network Physicians, 1999).

The treatment plan should include interventions to address identified psychosocial needs and goals. Follow-up should be planned in cooperation with the individual and caregiver, in consultation with appropriate interdisciplinary team members (AHCPR, 1994).

Pressure Ulcer Assessment

Recommendation • 4

To plan treatment and evaluate its effects, assess the pressure ulcer(s) initially for:

- Stage/Depth;
- Location;
- Size (mm, cm);
- Odour;
- Sinus tracts/Undermining/Tunneling;
- Exudate;
- Appearance of the wound bed; and
- Condition of the surrounding skin (periwound) and wound edges.

(Strength of Evidence = C)





Recommendation • 5

Reassess ulcers at least weekly to determine the adequacy of the treatment plan. (*Strength of Evidence* = *C*)

Recommendation • 6

Vascular assessment (e.g. Ankle/Brachial Pressure Index, Toe Pressure) is recommended for ulcers in lower extremities to rule out vascular compromise. (*Strength of Evidence = C*)

Discussion of Evidence

Consistency of the process for describing pressure ulcers facilitates communication among health care providers and with patients (AHCPR, 1994; Consortum for Spinal Cord Medicine, 2000).

Initial assessment of the pressure ulcer(s) should include:

- Stage/Depth (AHCPR, 1994; Baranoski, 1995; Consortium for Spinal Cord Medicine, 2000; van Rijswijk & Braden, 1999);
- Location (Baranoski, 1995; van Rijswijk & Braden, 1999);
- Size length and width (Consortium for Spinal Cord Medicine, 2000; van Rijswijk & Braden, 1999);
- Odour (CREST, 1998);
- Sinus tracts/Undermining/Tunneling (Consortium for Spinal Cord Medicine, 2000; van Rijswijk & Braden, 1999);
- Exudate type and amount (CREST, 1998; van Rijswijk and Braden, 1999);
- Appearance of the wound bed (Consortium for Spinal Cord Medicine, 2000; van Rijswijk & Braden, 1999); and
- Condition of the surrounding skin (periwound) and wound edges (Consortium for Spinal Cord Medicine, 2000).

There are several classification systems to describe wound stages, however the four-stage National Pressure Ulcer Advisory Panel (NPUAP) system is the method most widely accepted (AHCPR, 1994; Consortium for Spinal Cord Medicine, 2000; CREST, 1998; Ferguson et al., 2000; Ferrell, Josepeson, Norvid & Alcorn, 2000; Orlando, 1998; van Rijswijk & Braden, 1999). Refer to Appendix C for a description of the NPUAP classification system. Appendix D – Wound Measurement, provides a diagram of the recommended technique for measuring a pressure ulcer. Appendix E – Documentation: Wound Assessment Tools provides examples of tools for systematic assessment and documentation.





van Rijswijk and Braden (1999), in reviewing the AHCPR (1994) recommendations, suggest that in order to determine the adequacy of the treatment plan, pressure ulcers should be monitored every time the dressing is changed, and reassessed at least weekly. This **weekly reassessment** should include pressure ulcer measurement. This clinical measurement can be achieved by using a ruler (width/length/depth), other measurement device, transparency tracings or photography (Consortium for Spinal Cord Medicine, 2000). A clean pressure ulcer with adequate vascular supply receiving adequate treatment should show signs of healing within two to four weeks (AHCPR, 1994). If the condition of the patient or of the wound deteriorates, or if the goal of care is healing and no progress can be demonstrated, re-evaluate the treatment plan and/or the presence of complications. Some wounds, however, will not heal. In this case, the goal of healing may be revised to prevent infection, to prevent further deterioration and to provide comfort, so that quality of life is maintained.

Numerous tools have been developed for assessing the healing wound. These assessment tools include, but are not limited to: the Pressure Sore Status Tool (PSST); the National Pressure Ulcer Advisory Panel (NPUAP) Pressure Ulcer Scale for Healing (PUSH), the Wound Healing Scale (WHS), and the Sussman Wound Healing Tool (SWHT). Currently, several of these assessment tools are undergoing validity and reliability testing and their use in practice settings is becoming more widespread (Weir, 2001).

The guideline development panel recommends that vascular assessments, including **Ankle/Brachial Pressure Index** (ABPI) measurements, be used to rule out arterial disease and to determine appropriate therapy for those individuals with pressure ulcers on their lower extremities. Research evidence cautions that Doppler ultrasound measurements of ABPI can be unreliable if operators have not undergone training, adding that reliability can be considerably improved if operators have received appropriate education to undertake this measure (Cornwall, Dore & Lewis, 1996).







Nutrition Assessment and Management

Recommendation • 7

Ensure adequate dietary intake to prevent malnutrition or replace existing deficiencies to the extent that this is compatible with the individual's wishes. (*Strength of Evidence = B*)

Recommendation • 8

Prevent clinical nutrient deficiencies by ensuring that the patient is provided with optimal nutritional care through one or more of the following:

- Consultation with a registered dietitian for assessment.
- Consultation with a speech language pathologist for swallowing assessment.
- A varied, balanced diet to meet clinical needs for healing and co-existing diseases e.g. renal failure and diabetes.
- Nutritional supplements if needed.
- Multivitamin and mineral preparations.
- Enteral tube feeding.
- **Parenteral nutrition.** (*Strength of Evidence = B*)
- Ongoing monitoring of nutritional intake, laboratory data and anthropometric data.
 (Strength of Evidence = C)

Discussion of Evidence

Optimal nutrition facilitates wound healing, maintains immune competence and decreases the risk of infection. Most wounds tend to heal; however malnutrition and clinically evident deficiencies are risk factors for the development of pressure ulcers, and are commonly associated with a delayed healing response. The deficiencies of carbohydrate, protein, fat, vitamins or trace elements associated with reduced nutritional intake and/or chronic losses from the wound surfaces can delay wound healing.

The AHCPR (1994) guideline addresses this issue by indicating that screening for nutritional deficiencies is an important part of the initial assessment, with the goal of nutritional assessment and management being to ensure the diet of the individual with a pressure ulcer contains the nutrients necessary to support healing. The Compliance Network Physicians (1999) refers to nutritional management as a component of systemic treatment for the individual with a pressure ulcer. Nutritional management should address four rules: determine the nutritional





status; ensure adequate nutritional intake; initiate additional nutrient intake and supplementation; and determine vitamin, mineral and trace element deficits and correct them.

The use of a screening tool may be used by nurses to identify those at nutritional risk, however referral to those with expertise in nutritional interventions is necessary to establish an appropriate treatment plan (Ferguson et al., 2000). For a sample tool focusing on nutritional screening and assessment, refer to Appendix F which includes the Mini Nutritional Assessment (MNA). The Mini Nutritional Assessment has been validated for use with adults over the age of 55 (Nestle Clinical Services, 2002). Body Mass Index (BMI) is another nutritional screening tool, which is a valid measurement of weight in relation to health. It is not recommended however, for use as the sole measurement of either body composition or level of fitness. The BMI is available on Health Canada's website at http://www.hc-sc.gc.ca/hppb/nutrition/bmi/index.html. Early identification and intervention to correct malnutrition can alter the healing trajectory in patients with wounds. A nutritional plan should be comprehensive and individualized, and therefore requires a multidisciplinary approach. The involvement of the interdisciplinary team and the patient in addressing nutritional goals is essential for successful outcomes (Maklebust & Sieggreen, 1996).

Nutritional interventions should be staged to meet the nutritional needs of the individual, and move from screening, monitoring of intake and supplementation (when necessary) to more intensive interventions including enteral or parenteral feeding (Consortium for Spinal Cord Medicine, 2000; Maklebust & Sieggreen, 1996). Maklebust and Sieggreen (1996) caution however, "more research is needed to identify markers that predict healing and to establish the relationship between nutrition and pressure ulcer healing" (p. 107).









Pain

Recommendation • 9

Assess all patients for pain related to the pressure ulcer or its treatment. (*Strength of Evidence* = *C*)

Recommendation • 10

Assess location, frequency and intensity of pain to determine the presence of underlying disease, the exposure of nerve endings, efficacy of local wound care and psychological need. (*Strength of Evidence* = B)

Discussion of Evidence

Pain should be assessed routinely and regularly using the same validated tool each time (McCaffery & Pasero, 1999). Assessment tools should be appropriate for the cognitive ability of the patient, and should be easy to use. There are a number of validated tools, some of which are adapted for specific patient populations, however as there are no validated pain assessment tools for use specifically with clients experiencing pressure ulcer pain, the development panel recommends the consistent use of a validated tool. For sample assessment tools that have been tested for validity and reliability in adults, please refer to Appendix G – Tools for Assessment of Pain.

The AHCPR (1994) recommends that the management of pressure ulcer pain should include eliminating or controlling the source of pain (i.e., covering wounds, adjusting support surfaces, and repositioning), as well as providing analgesia to treat procedure-related and wound pain. The successful management of pain is a complex interdisciplinary effort requiring a multifaceted treatment plan, the discussion of which is beyond the scope of this guideline. Accurate assessment and diagnosis of the type of pain, its intensity, and its effect on the person are necessary to plan appropriate interventions or treatments, and are an integral part of overall clinical assessment. For comprehensive recommendations on the assessment and management of pain, and a discussion of the evidence, please refer to the RNAO Nursing Best Practice Guideline *Assessment and Management of Pain (2002a)*.





Positioning and Support Surfaces

Recommendation • 11

Refer patients at RISK to appropriate interdisciplinary team members (Occupational Therapist, Physiotherapist, Enterostomal Therapist, etc) with expertise in seating. Postural alignment, distribution of weight, balance, stability, and pressure relief when positioning sitting individuals must be considered. Ensure support surfaces are used appropriately and are properly maintained. (*Strength of Evidence = C*)

Recommendation • 12

Assess all patients with EXISTING PRESSURE ULCERS to determine their risk for developing additional pressure ulcers using the "Braden Scale for Predicting Pressure Sore Risk". If the client remains at risk, use a pressure-reducing surface. (*Strength of Evidence = C*)

Recommendation • 13

If the patient remains at risk for other pressure ulcers, a high specification foam mattress instead of a standard hospital mattress should be used to prevent pressure ulcers in moderate to high risk patients. (*Strength of Evidence* = A)

Recommendation • 14

Use a static support surface if the patient can assume a variety of positions without bearing weight on a pressure ulcer and without "bottoming out." (*Strength of Evidence* = B)

Recommendation • 15

Use a dynamic support surface if:

- the patient cannot assume a variety of positions without bearing weight on a pressure ulcer;
- the patient fully compresses the static support surface; or
- the pressure ulcer does not show evidence of healing.

(Strength of Evidence = B)




Recommendation • 16

Use pressure relief for clients in the Operating Room to reduce the incidence of pressure ulcers post operatively. (*Strength of Evidence = B*)

Recommendation • 17

Obtain a seating assessment if a client has a pressure ulcer on a sitting surface that requires relief from pressure or repositioning. (*Strength of Evidence* = C)

Recommendation • 18

A client who has a pressure ulcer on a seating surface should avoid sitting. If pressure on the ulcer can be relieved, limited sitting may be allowed. (*Strength of Evidence* = C)

Discussion of Evidence

Pressure is the major causative factor in pressure ulcer formation. **Therefore, pressure ulcers will not heal if the etiology of pressure, shearing, and friction are not addressed**. For clients at **risk** of developing pressure ulcers, or for those with **existing pressure ulcers**, institute the recommendations related to risk assessment and prevention described in the RNAO Nursing Best Practice Guideline *"Risk Assessment and Prevention of Pressure Ulcers" (2001),* available at <u>www.rnao.org</u>. Appendix B provides a sample of the *"Braden Scale for Predicting Pressure Sore Risk"*.

Clients identified at risk of developing a pressure ulcer should receive care on a **low interface pressure mattress**. Cullum, Nelson & Nixon (2001) reported that one systematic review identified four randomized controlled trials (RCTs) that showed the use of "various foam alternatives to the standard hospital mattress reduced the risk of sores (p. 1359)". In comparing foam alternatives, one RCT identified a reduction in pressure ulcers with a "five section foam and fibre replacement compared with a four-inch (10 cm) thick dimpled foam overlay" (p. 1359). Sample sizes were too small in other studies to identify which foam alternatives were most effective for preventing pressure ulcers. The most clear conclusion from this review is that the standard hospital mattress is out performed by a range of foambased, low pressure mattresses and overlays, and also by "higher tech" pressure-relieving beds and mattresses in the prevention of pressure sores (NHS Centre for Reviews and Dissemination, 1995).



Static support surfaces can be used if a patient can assume a variety of positions without "bottoming out" and without bearing weight on a pressure ulcer (AHCPR, 1994). Although pressure ulcers have been shown to heal when a static support surface is used, there is no evidence that one type of static support surface is more effective than another (AHCPR, 1994; Consortium for Spinal Cord Medicine, 2000). The condition of "**bottoming out**" occurs when a mattress overlay, support or wheelchair cushion is compressed by high pressure. A subjective estimate of the amount of compression can be achieved by palpation of the support thickness at the bony prominence (Consortium for Spinal Cord Medicine, 2000). 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 (AHCPR, 1994; Consortium for Spinal Cord Medicine, 2000).

Clients at very high risk of developing pressure ulcers, those who are unable to assume a variety of positions without bearing weight on an ulcer, patients who fully compress the static support surface, or if the pressure ulcer doesn't show signs of healing may benefit from a dynamic support surface (AHCPR, 1994: Consortium for Spinal Cord Medicine, 2000; Royal College of Nursing, 2000). In the acute care setting, the healing of large Stage III or IV pressure ulcers on multiple turning surfaces has been shown to benefit from a low air-loss bed or an air-fluidized bed (AHCPR, 1994; Constorium for Spinal Cord Medicine, 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-multilayer mattress replacements (NHS, 1995). The systematic review conducted by Cullum et al. (2001) indicates that the relative merits of higher-tech constant low pressure and alternating pressure are unclear. Fleck (2001) outlines criteria and selection modalities for the use of support surfaces in the prevention of pressure ulcers. However, whichever surfaces are used for high-risk patients, a thorough skin assessment should be conducted for evidence of tissue damage (Cullum et al., 2001). For a description of the distinctions between a pressure reducing and pressure relieving product, please refer to Appendix H. A checklist for positioning and support surfaces is provided in Appendix I.





Pressure ulcer risk conditions often arise before patients even reach the operating room, particularly in emergency situations. Lying on hard stretchers, dehydration due to the withholding of fluids, and lack of pain management prior to surgery (and resulting lack of movement) all contribute to pressure ulcer risk (Bliss & Simini, 1999). In addition, surgical patients who do not necessarily have predisposing risk factors for developing pressure ulcers may be considered at risk for ulcer formation. During surgery, individuals are immobile and unable to change position; they may be positioned in such a way that body surfaces are exposed to atypical and prolonged pressure; and the anesthesia temporarily creates an absence of sensory perception (Aronovitch, 1999; Beckrich & Aronovitch, 1999; Grous, Reilly & Gift, 1997). A study conducted by Schultz, Bien, Dumond, Brown & Myers (1999) suggests that further work needs to be done to describe the best padding options for specific surgical procedures and that those with specific risk factors (diabetes, advanced age, smaller body size) need to have special guidelines for padding and positioning. Aronovitch (1999) found that the pressure ulcer prevalence rate for patients 20 to 40 years of age was 9.3 per cent, and for those undergoing surgical procedures of three to four hours, the rate was nearly 6 per cent. In this study, no significant relationship was found to link the presence of comorbid conditions related to pressure ulcer risk to ulcer formation. Given the results of these studies, it would seem prudent that diligence should be used in protecting the skin of all patients who enter the operating room. A systematic review conducted by Cullum et al. (2002) supports this conclusion as they identified that the use of pressure relieving overlays on operating tables reduces the incidence of pressure sores. However, they noted in a meta-analysis that it is unclear whether the reduced incidence of pressure sores was because of intraoperative or post-operative pressure relief, or both.

Clients who have a pressure ulcer on a sitting surface that requires relief from pressure or repositioning should be referred for a **seating assessment**. Interface pressure between the ischial tuberosities and seating surfaces is higher while sitting than lying down and must be relieved frequently to prevent tissue damage. Therefore, when a pressure ulcer is present on a seating surface, the individual should avoid sitting or limited sitting may be allowed if pressure on the ulcer can be relieved (AHCPR, 1994; Consortium for Spinal Cord Medicine, 2000).



Ulcer Management

Debridement

Recommendation • 19

Select the method of debridement most appropriate to:

- the client's condition and goals of treatment;
- type, quantity and location of necrotic tissue; and,
- depth and amount of fluid. (Strength of Evidence = C)

Recommendation • 20

Sharp debridement should be used if there is urgent need for debridement, as with advancing cellulitis or sepsis. (*Strength of Evidence* = *C*)

Recommendation • 21

Vascular assessment (e.g. Ankle/Brachial Pressure Index, Toe Pressure) is recommended for ulcers in lower extremities prior to debridement to rule out vascular compromise. (Strength of Evidence = C)

Recommendation • 22

Foot ulcers with dry eschar need not be debrided if they do not have edema, erythema, fluctuance, or drainage. Assess these wounds daily to monitor for pressure ulcer complications that would require debridement. (*Strength of Evidence* = C)

Recommendation • 23

Prevent or manage pain associated with debridement. Consult with a member of the health care team with expertise in pain management, when appropriate.

(Strength of Evidence = C)

Discussion of Evidence

Debridement is the removal of necrotic or devitalized tissue that interferes with wound healing. The removal of this tissue alters the healing environment of a wound by decreasing bacterial concentration and decreasing the risk of the spread of infection (AHCPR, 1994; Compliance Network Physicians, 1999; Consortium for Spinal Cord Medicine, 2000; Maklebust & Sieggreen, 1996). Choice of specific debridement method(s) should be determined by the client's clinical





condition, and includes the client and caregiver's preferences. Other factors to consider are the type, quality, depth and location of the necrotic tissue. A distinction needs to be made between surface and deeper-lying necrotic tissue (AHCPR, 1994; Compliance Network Physicians, 1999; Consortium for Spinal Cord Medicine, 2000). It is preferable to remove devitalized tissue as quickly as possible, however, the clinical circumstances will impact on the method chosen (Consortium for Spinal Cord Medicine, 2000). There are four general categories of debridement: sharp, mechanical, autolytic and enzymatic - definitions can be found in Appendix A.

Sharp debridement removes necrotic tissue through the use of a scalpel, scissor or other sharp instrument.

This is a high-risk procedure!

Debridement with a scalpel should be undertaken with caution and performed by specially trained and experienced health care professionals. Subcutaneous debridement with a scalpel is a controlled act that must be carried out by a physician or the delegate.

The advantages of this method are the immediate effect and the rapid response to the risk of infection (Compliance Network Physicians, 1999). Therefore, it is the preferred method for the treatment of advancing cellulitis or sepsis, as it quickly removes the source of infection. However, it does cause bleeding, may require an anesthetic (for surgical debridement of Stage IV wounds), and has the potential to cause injury to nervous or other viable tissue (AHCPR, 1994; Compliance Network Physicians, 1999; Consortium for Spinal Cord Medicine, 2000; Maklebust & Sieggreen, 1996).

Mechanical debridement includes the use of wet-to-dry dressings at specific intervals, hydrotherapy (whirlpool) and wound irrigation. All of these methods can be utilized alone, or in preparation for surgical (sharp) debridement (AHCPR, 1994). Mechanical debridement is a slow process, can be painful and should be discontinued when necrotic tissue has been removed (Consortium for Spinal Cord Medicine, 2000). Wet-to-dry dressings in particular are non-selective in that they remove both viable and necrotic tissue, and are potentially damaging to granulation and epithelial tissue. It is important to ensure that appropriate and adequate pain management is incorporated into the plan of care when this method is utilized (AHCPR, 1994; Maklebust & Sieggreen, 1996; Ovington, 2002).

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Autolytic debridement is slow, and should not be utilized on infected ulcers (AHCPR, 1994; Compliance Network Physicians, 1999; Consortium for Spinal Cord Medicine, 2000). It may be prudent to avoid all occlusive dressings if anaerobic infection is suspected or cultured, as occlusive dressings are thought to promote an anaerobic environment (CREST, 1998).

The fourth method of debridement is enzymatic. It is a slower method, and useful for those not appropriate for surgical debridement, those in long-term care facilities, those receiving home care and where ulcer infection is not evident (AHCPR, 1994; Consortium for Spinal Cord Medicine, 2000).

In some instances however, debridement may not be appropriate. Situations of this nature would include a limb or digit that is ischemic, and amputation is not possible – these wounds will not heal. In these cases, the necrotic tissue should be kept as dry as possible to prevent odour and infection (CREST, 1998). In addition, for some wounds the removal of eschar is not necessary (e.g. small areas on heels and toes) (AHCPR, 1994; CREST, 1998).

Wound Cleansing

Recommendation • 24

Do not use skin cleansers or antiseptic agents (e.g. povidine iodine, iodophor, sodium hypochlorite solution, hydrogen peroxide, acetic acid) to clean ulcer wounds. (*Strength of Evidence = B*)

Recommendation • 25

Use normal saline, Ringer's lactate, sterile water or non-cytoxic wound cleansers to clean ulcer wounds. (*Strength of Evidence* = *C*)

Recommendation • 26

Fluid used for cleansing should be warmed at least to room temperature. (*Strength of Evidence = B*)

Recommendation • 27

Cleanse wounds at each dressing change. (*Strength of Evidence = C*)





Recommendation • 28

To reduce surface bacteria and tissue trauma, the wound should be gently irrigated with 100 to 150 milliliters of solution. (*Strength of Evidence* = *C*)

Recommendation • 29

Use enough irrigation pressure to enhance wound cleansing without causing trauma to the wound bed. Safe and effective ulcer irrigation pressures range from 4 to 15 psi. Pressure of 4 to 15 psi is achieved by using:

- 35 milliliter syringe with a 19 gauge angiocath, or
- single-use 100 milliliter saline squeeze bottle.

(Strength of Evidence = B)

Discussion of Evidence

Wound cleansing is the process of using non-cytotoxic fluids to reduce the bacterial burden and to remove devitalized tissue, metabolic wastes and topical agents that can delay wound healing (Consortium for Spinal Cord Medicine, 2000). This procedure must be done in such a way as to minimize wound trauma while obtaining a clean wound bed. Routine wound cleansing should be conducted with a minimum of chemical and mechanical trauma (AHCPR, 1994).

Commercial **wound cleaners** (not skin cleansers) may be appropriate when the wound has adherent material, however some have been shown to be toxic to white blood cells (Foresman, et al., 1993).

Normal saline is recommended for all wound types as it is compatible with human tissue and is unlikely to cause cellular damage (AHCPR, 1994: CREST, 1998). It contains no preservatives, and is recommended due to its non-cytotoxic effects in the wound (Consortium for Spinal Cord Medicine, 2000). In addition, it is commonly available and is cost effective (Maklebust & Sieggreen, 1996).

CREST (1998) reports that cleansing solutions should be warmed to body temperature as colder solutions slow down cellular repair. Rolstad, Ovington and Harris (2000) discuss the negative impact that hypothermia can have on the healing wound. They indicate that irrigating wounds with refrigerated solutions can induce hypothermia, and describe Thomas's research (1990) (as cited in Rolstad, Ovington and Harris, 2000) that studied 420 patients and



found that local tissue temperatures were reduced for up to 40 minutes after wound cleansing. It was also discovered that mitosis and leukocyte activities were decreased for up to three hours after cleansing. The temperature of wound tissues should remain as close as possible to normal, however this ideal is difficult to achieve in clinical practice. Therefore, it is recommended that cleansing solutions be kept at a minimum of **room temperature**.

In order to establish and maintain a clean wound bed, the wound should be cleansed at **each dressing change** (AHCPR, 1994; Consortium for Spinal Cord Medicine, 2000). Although there are no randomized controlled trials regarding frequency of cleansing, ulcers should be cleansed prior to each dressing change without causing chemical or mechanical trauma to the wound or surrounding tissue (Consortium for Spinal Cord Medicine, 2000).

To ensure adequate cleansing of the wound bed, a sufficient **volume** of irrigation fluid is essential. The volume suggested for irrigation is between 100 – 150 ml of solution. The AHCPR (1994) guideline recommends a range of **irrigation pressure** between 4 – 15 psi as irrigation pressures below 4 psi have been found to be inadequate for thorough wound cleansing. They report on several studies indicating that pressurized irrigation was more effective in removing wound debris and bacteria than gravity or bulb syringe irrigation. They describe a study by Rodeheaver, Pettry, Thacker, Edgerton & Edlich (1975) which found that the efficiency of wound irrigation in traumatic wounds is markedly improved by delivering the irrigant to the wound under continuous high pressure. Irrigation of the wound with saline solution delivered at 15 pounds per square inch removed 84.8 per cent of the soil infection potentiating factors from the wound. Irrigation pressures that exceed 15 psi may cause wound trauma and force bacteria into the tissue. The use of a 35 mL syringe with a 19-gauge needle or angiocath (AHCPR, 1994; Consortium for Spinal Cord Medicine, 2000; Maklebust & Sieggreen, 1996) achieves a psi of 8. The use of an angiocath rather than a needle is suggested to reduce the danger from needle stick injuries (Maklebust & Sieggreen, 1996).









Dressings

Recommendation • 30

Moisture-retentive dressings optimize the local wound environment and promote healing. (*Strength of Evidence = A*)

Recommendation • 31

Consider the following criteria for interactive dressings when selecting a dressing:

- Maintains a moist environment;
- Controls wound exudate, keeping the wound bed moist and the surrounding intact skin dry;
- Provides thermal insulation and wound temperature stability;
- Protects from contamination of outside micro-organisms;
- Maintains its integrity and does not leave fibers or foreign substances within the wound;
- Does not cause trauma to wound bed on removal; and
- Is simple to handle, and is economical of costs and time.

(*Strength of Evidence = B/C*)

Recommendation • 32

Consider caregiver time when selecting a dressing. (*Strength of Evidence = A*)

Recommendation • 33

When selecting a dressing consider:

- Etiology of the wound ;
- Client's general health status, goals of care and environment;
- Site of the wound;
- Size of the wound, including depth and undermining;
- A dressing that will loosely fill wound cavity;
- Exudate: type and amount;
- Risk of infection;
- Type of tissue involved;
- Phase of the wound healing process;
- Frequency of the dressing change;
- Comfort and cosmetic appearance;
- Where and by whom the dressing will be changed; and
- Dressing availability.

(*Strength of Evidence = C*)





Recommendation • 34

Monitor dressings applied near the anus, since they are difficult to keep intact. Consider use of special sacral-shaped dressings. (*Strength of Evidence = B*)

Discussion of Evidence

The basic functions of the dressing are to protect the wound from contamination; to protect the wound from trauma; to provide compression if bleeding or swelling is anticipated; to apply medications; and to absorb drainage or debride necrotic tissue (Malklebust & Sieggreen, 1996). In addition to these traditional functions, the advent of interactive wound dressings has seen the development of products that work with the environment of the wound to promote wound healing (Consortium for Spinal Cord Medicine, 2000). Appendix J provides a summary of the various categories of wound care products (including dressings), indications and considerations.

In reviewing the AHCPR (1994) guideline regarding dressing selection, Ovington (1999) notes that the primary message, that ulcer management should involve the use of **moisture retentive dressings** versus dry dressing modalities, remains sound. In a systematic review of studies examining dressings and topical agents used in the healing of chronic wounds (Bradley, Cullum, Nelson, Petticrew, Sheldon & Torgerson, 1999) it was determined by a meta-analysis of five reports comparing a hydrocolloid dressing to a traditional treatment (saline-soaked gauze [4] and wet-to-dry and Dakin's solution [1]) that treatment with the hydrocolloid resulted in a statistically significant improvement in the rate of pressure sore healing. By pooling the five trials it was found that the hydrocolloid dressings increased the odds of healing by three-fold. The beneficial effects of a physiologically moist wound environment have been well established in the literature for various acute and chronic wounds (Ovington, 1999). In addition, studies have reported a reduction in caregiver time and overall cost effectiveness with moisture retentive dressings (see discussion below regarding caregiver time). Ovington (2002) reiterates that gauze dressings are not an optimal wound care modality for the client, the nurse or the health care system as they do not effectively support optimal healing and are more labour intensive to use.









There are numerous criteria to consider when selecting an interactive dressing. The need to maintain a moist environment has been previously discussed in the context of moisture retentive dressings. Dressings should not macerate surrounding tissue, as this phenomenon is associated with prolonged healing time (Consortium for Spinal Cord Medicine, 2000). The control of wound exudate, which involves keeping the wound bed moist and the surrounding intact skin dry, is another dressing criteria (AHCPR, 1994, Compliance Network Physicians, 1999; Consortium for Spinal Cord Medicine, 2000). Ovington (1999) reports that a literature review from 1993 to 1998 did not reveal any clinical trials or RCTs focusing on ulcer maceration or desiccation caused by inappropriate dressing selection. However, as many moisture-retentive dressings prevent lateral wicking and ultimately peri-wound maceration, clinical experience would support this feature in a dressing. In addition, it seems prudent to support the concept that a dressing should not dessicate the wound (Ovington, 1999). It also seems prudent to avoid occlusive dressings if anaerobic infection is suspected or cultured, as occlusive dressings are thought to promote an anaerobic environment (CREST, 1998). Odour and bacteria absorbing dressings should be changed daily in cases of wound infection. If purulence or foul odour is present, more frequent cleansing and possibly debridement are required.

Other criteria for the selection of an interactive dressing include:

- Provision of thermal insulation and wound temperature stability (CREST, 1998);
- Protection from contamination of outside micro-organisms (AHCPR, 1994; CREST, 1998);
- Maintenance of dressing integrity, not leaving residual fibers or foreign substances within the wound (Consortium for Spinal Cord Medicine, 2000; CREST, 1998);
- Lack of trauma to wound bed on removal (Compliance Network Physicians, 1999; CREST, 1998); and
- Is simple to handle, and is economical of costs and time (CREST, 1998).

Caregiver time is a significant consideration when selecting a dressing. Caregiver time and staff costs contribute significantly to expenditures related to pressure ulcer care (AHCPR, 1994; Consortium for Spinal Cord Medicine, 2000; Ovington, 1999). In her review of the AHCPR recommendations, Ovington (1999) describes a literature base that includes multiple, clinical, randomized, controlled studies that have documented that caregiver labour costs can exceed the cost of supplies in wound management. The use of moisture-retentive dressings for wound management in general (i.e. not limited to pressure ulcers) has also been reviewed, and the impact of these dressings on reducing caregiver time and overall cost-effectiveness has been supported in the literature. For example, one RCT (Kim, Shin, Park, Oh, Choi & Kim, 1996) found that there was a difference in average treatment time for clients with Stage I and II pressure ulcers

from 20.4 minutes/day (hydrocolloid group) to 201.7 minutes/day (wet-to-dry gauze dressing group). The hospital cost of ulcer treatment was higher in the gauze group compared to the hydrocolloid group – these results indicate that the hydrocolloid occlusive dressing technique offers a less time consuming and less expensive method of treatment compared to conventional techniques.

Current knowledge about wound care principles, assessment parameters and the variety of dressing options allows health care providers to select the right dressing for the wound. The choice of dressing is a clinical one, and is based on the assessment of the individual, the pressure ulcer(s) and the overall goal of care. This choice is not static, and care providers must be vigilant in recognizing conditions that require a change in the treatment plan and a different dressing (Baranoski, 1995; Consortium for Spinal Cord Medicine, 2000). Factors to consider when selecting a dressing include:

- Etiology of the wound (Baranoski, 1995; CREST, 1998)
- Client's general health status, goals of care and environment (Baranoski, 1995; CREST, 1998; Maklebust and Sieggreen, 1996)
- Site of the wound
 (AHCPR, 1994; Consortium for Spinal Cord Medicine, 2000; CREST, 1998; Day et al., 1995; Ovington, 1999)
- Size of the wound, including depth and undermining (AHCPR, 1994; CREST, 1998; Maklebust and Sieggreen, 1996)
- A dressing that will loosely fill wound cavity (AHCPR, 1994; Consortium for Spinal Cord Medicine, 2000)
- Exudate type and amount (AHCPR, 1994; Compliance Network Physicians, 1999; Consortium for Spinal Cord Medicine, 2000; Ovington, 1999)
- Risk of infection

(Consortium for Spinal Cord Medicine, 2000; Compliance Network Physicians, 1999; CREST, 1998)

- Type of tissue involved (Baranoski, 1995; Compliance Network Physicians, 1999; CREST, 1998)
- Phase of the wound healing process (Compliance Network Physicians, 1999; CREST, 1998)
- Frequency of the dressing change (AHCPR, 1994; CREST, 1998; Ovington, 1999)
- Comfort and cosmetic appearance (CREST, 1998)
- Where and by whom the dressing will be changed (AHCPR, 1994; Baranoski, 1995; CREST, 1998)
- Dressing availability (CREST, 1998)





AHCPR (1994) recommends careful monitoring of **sacral dressings** near the anus, as they are difficult to maintain. The sacral location is challenging because of inherent moisture from perspiration, incontinence, and shear forces (Ovington, 1999). A randomized controlled trial (Day et al., 1995) examined 103 patients with Stage II and III sacral pressure ulcers in a prospective, controlled, multi-center clinical study to evaluate and compare dressing performance, safe-ty and efficacy. Patients were randomized to treatment with a triangle-shaped hydrocolloid border dressing, to a different, oval shape hydrocolloid dressing, or to a pressure reducing mattress or bed. It was found that wear time was longest for wounds dressed with the triangle dressing (point applied down), however incontinence reduced the interval between dressing changes in both groups. Healing was more likely to occur in wounds dressed with the triangle border dressing, as those ulcers showed a greater reduction in ulcer width as compared to wounds dressed with the oval dressing.

Adjunctive Therapies

Recommendation • 35

Refer to physiotherapy for a course of treatment with electrotherapy for Stage III and IV pressure ulcers that have proved unresponsive to conventional therapy. Electrical stimulation may also be useful for recalcitrant Stage II ulcers. (*Strength of Evidence = A*)

Recommendation • 36

Chronic pressure ulcers may be treated by:

- electrical stimulation. (Strength of Evidence = A)
- vacuum assisted closure and normothermic therapies. (*Strength of Evidence = B*)
- therapeutic ultrasound. (*Strength of Evidence* = *B*)
- ultraviolet light. (*Strength of Evidence* = *B*)
- pulsed electro magnetic fields. (*Strength of Evidence = B*)
- growth factors and skin equivalents. (*Strength of Evidence = C*)



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Discussion of Evidence

Candidates for adjunctive therapies include individuals with chronic wounds who have failed to respond to optimal standard wound care, those with pre-existing medical conditions that delay wound healing and/or who prefer a non-surgical, conservative option to facilitate wound healing. Prior to initiating an adjunctive therapy, the health care provider must ensure that the patient does not have any contraindications for that treatment modality (Houghton & Campbell, 2001).

Electrical current has been shown to induce cellular action in virtually all phases of the wound-healing cascade (Houghton & Campbell, 2001). Ovington (1999) in her review of the AHCPR (1994) recommendations identified an additional RCT that supported the use of electrical stimulation for the treatment of pressure ulcers. This double-blind study randomized patients to active treatment or sham treatment. After eight weeks of treatment, 58 per cent of actively treated ulcers reached complete healing and 3 per cent of the sham-treated ulcers healed completely. The study concluded that pulsed low-intensity direct current represents a useful approach for the treatment of Stage II and Stage III chronic pressure ulcers by increasing the healing rate. The growth of fibroblasts and keratinocytes may be enhanced by pulsed low-intensity direct current due to changes in calcium homeostasis. Cullum, Nelson and Nixon (2002) report that they identified several RCTs of various quality related to this adjunctive therapy. These studies indicated that electrotherapy improved healing of pressure sores, however they suggest that confirmatory studies in this area are required.

Vacuum assisted closure (topical negative pressure) involves negative pressure (suction) being applied to a wound through an open cell dressing (e.g., foam, felt). Cullum, Nelson & Nixon (2002) found one systematic review related to vacuum assisted closure. This systematic review conducted by Evans and Land (2002) examined effectiveness of topical negative (vacuum assisted closure) pressure in treating people with chronic wounds and attempted to identify an optimum regimen for this therapy. The review found that the two small trials provided weak evidence suggesting that topical negative pressure may be superior to saline gauze dressings in healing chronic human wounds. However, because sample sizes were small and due to some methodological limitations of the trials, the authors caution that the findings must be interpreted with caution. The effect of vacuum closure on cost, quality of life, pain and comfort were not reported in the literature. Further, it was not possible to determine which was the optimum regimen.

The application of **ultrasound** to a wound involves using a transducer and water based gel. The power of ultrasound waves used in wound healing is low in order to avoid heating the





tissues (Cullum, Nelson & Nixon, 2002). There have been several research studies, including RCTs that have assessed the effectiveness of ultrasound in the treatment of chronic pressure ulcers. In addition, reports of the benefits of therapeutic ultrasound on chronic venous ulcers suggest that ultrasound may promote closure of chronic wounds. However, these clinical studies have provided both positive and negative results (Houghton & Campbell, 2001). Cullum, Nelson and Nixon (2002) found one systematic review of three RCTs which indicated that all three RCTs found no evidence of improved pressure sore healing with ultrasound therapy versus no ultrasound therapy.

Ultraviolet light's inhibitory effects on bacterial growth are well established and are believed to occur through direct effects on the nuclear material and bacterial DNA synthesis. There are several clinical reports including RCTs that document the acceleration of infected pressure ulcer wound closure with ultraviolet light treatment. Houghton and Campbell (2001) suggest that these reports, along with recent reports of the action of UV light on antibiotic-resistant organisms, warrant consideration of the use of this modality for the treatment of chronic infected wounds.

Application of **electromagnetic fields** has been shown in clinical reports to significantly accelerate the closure of pressure ulcers, and improvements in the healing rate of chronic leg ulcers has also been discussed in the literature. Additionally, significant changes in local blood flow, skin temperature, subcutaneous tissue oxygenation and local edema have been demonstrated following application of electromagnetic fields (Houghton & Campbell, 2001). However, in a systematic review assessing the effectiveness of electromagnetic therapy in the treatment of pressure ulcers, Flemming and Cullum (2002) found two eligible RCTs in which neither study found a statistically significant difference between the healing rates of electromagnetic therapy treated and control group patients.

Ovington (1999) indicated that **growth factors** and **skin equivalents** as potential pressure ulcer therapies are valid, but there are many different growth factors and skin equivalents, with little data specific to their use in pressure ulcers. In her review of the 1994 AHCPR adjunctive therapy recommendations, she discusses recent research in this area, and provides examples of several clinical studies examining the use of individual growth factors. Her conclusion is that there is sufficient evidence to consider advancing the use of rPDGF-BB (homodimeric recombinant platelet-derived growth factor) to Level B evidence, but that this recommendation should generally remain at Level C.



Colonization and Infection

Recommendation • 37

The treatment of infection is managed by wound cleansing, systemic antibiotics and debridement, as needed. (*Strength of Evidence* = A)

Recommendation • 38

Protect pressure ulcers from sources of contamination, e.g., fecal matter. (*Strength of Evidence = B*)

Recommendation • 39

Follow Body Substance Precautions (BSP) or an equivalent system appropriate for the health care setting and the client's condition when treating pressure ulcers. (Strength of Evidence = C)

Recommendation • 40

Medical management may include initiating a two-week trial of topical antibiotics for clean pressure ulcers that are not healing or are continuing to produce exudate after two to four weeks of optimal patient care. The antibiotic should be effective against gram-negative, gram-positive and anaerobic organisms. (*Strength of Evidence = A*)

Recommendation • 41

Medical management may include appropriate systemic antibiotic therapy for patients with bacteremia, sepsis, advancing cellulitis, or osteomyelitis. (*Strength of Evidence = A*)

Recommendation • 42

Use sterile instruments to debride pressure ulcers. (*Strength of Evidence=C*)

Recommendation • 43

To obtain wound culture, cleanse wound with normal saline first. Swab wound bed, not eschar, exudate or edges. (*Strength of Evidence* = C)

Recommendation • 44

The use of cytotoxic antiseptics to reduce bacteria in wound tissue is not recommended. (*Strength of Evidence* = *B*)





Discussion of Evidence

All chronic wounds will become contaminated, but every chronic wound will not necessarily be infected, even if the wound is heavily colonized. The treatment of pressure ulcer infection is managed by wound cleansing, debridement and systemic antibiotics, as necessary (AHCPR, 1994; Compliance Network Physicians, 1999). **Systemic antibiotics** are not required for pressure ulcers with only clinical signs of local infection. However, exceptions occur when locally infected wounds may require systemic antibiotics, such as when the virulence of the organism and the host defenses are taken into consideration. Indications for systemic antibiotics include: 1) the management of patients with bacteremia; 2) sepsis; 3) advancing cellulitis; or 4) osteomyelitis (AHCPR, 1994).

When clean pressure ulcers are not healing or are continuing to produce exudate after two to four weeks of optimal patient care, medical management may include the initiation of a **two-week trial** of **topical antibiotics**. The selected antibiotic should be effective against gram-negative, gram-positive and anaerobic organisms (AHCPR, 1994). Maklehurst and Siegreen (1996) suggest that their use needs to be monitored closely to identify evidence of sensitivity and their useage limited as prolonged use may facilitate the development of resistant organisms. Antibacterial dressings such as cadexamer iodine and silver may also be considered within the parameters of this treatment regimen. Hypertonic saline dressings are *not* considered to be antimicrobial, however they have shown some effect against MRSA with in-vitro studies (S.Stewart, Mölnlycke Health Care, personal communication, July 9, 2002). Please refer to Appendix K for a listing of commonly used topical antimicrobial agents.

The use of **sterile instruments** to **debride** pressure ulcers was recommended by the AHCPR panel (1994) and was further supported by Krasner (1999) in her review of the recommendations. There were no randomized controlled trials identified in the literature related to the use of sterile versus non-sterile instruments to debride pressure ulcers. This recommendation is supported by the general rules of surgical asepsis (Krasner, 1999).

Krasner (1999) reviewed the AHCPR (1994) guideline recommendations related to clean versus sterile dressings. She reports that although there were no randomized controlled trials on this topic, two quasi-experimental studies suggest that contamination of gauze dressings is easier than clinicians may realize and that clean practices may significantly increase the bioburden of gauze and perhaps other types of dressings. The implications for wound healing outcomes are not known currently, however this is an important area of research, with significant eco-



nomic and social ramifications. In facing colonization and infection issues in pressure ulcer management, clinicians should aim to decrease the bioburden in the wound wherever possible, and "do no harm" (Krasner, 1999, p. 90S). The development panel supports the use of **sterile dressings** in all care settings, whenever possible, in order to decrease the bioburden within pressure ulcers.

Proper technique in obtaining a wound **culture** is critical, and Makelebust and Sieggreen (1996) report that if a standardized technique is used, a quantitative swab technique can accurately document the bioburden in pressure ulcers. Most wounds need some form of preparation prior to the culture in order to reduce the risk of introducing extraneous microorganisms into the specimen (Crow, 1990; Cuzzell, 1993). The exudate that accumulates on the surface of the wound and under dressings contains bacteria that are not the same as those causing infection in the wound. Irrigate wounds with normal saline until all visible debris has been washed away. Successful culturing also involves culturing viable tissue, therefore never swab eschar or yellow fibrous slough. Rotate the swab while pressing firmly on the wound bed, avoiding intact tissue at the wound edges (Cuzzell, 1993). For a diagram of swabbing technique for accurate wound culture results, refer to Appendix L–Wound Cultures: Swabbing Techniques.

The AHCPR (1994) recommends that topical **antiseptics** should not be used to reduce bacteria in wound tissue. They report numerous studies that have documented the toxic effects of exposing wound-healing cells to antiseptics. Makelbust & Sieggreen (1996) describe antiseptics as highly reactive chemicals that indiscriminately destroy cell function, and that the use of antiseptics to decrease the bacterial counts in open wounds is contraindicated.

Protecting pressure ulcers from exogenous sources of bacteria e.g., fecal matter, will facilitate the management of bacterial contamination. Refer to the Discussion of Evidence related to dressing selection and sacral dressings.









Operative Repair of Pressure Ulcers

Recommendation • 45

Possible candidates for operative repair are medically stable, adequately nourished , are able to tolerate operative blood loss and postoperative immobility. Quality of life, patient preferences, treatment goals, risk of recurrence, and expected rehabilitative outcome are additional considerations. (*Strength of Evidence = C*)

Discussion of Evidence

Operative repair of pressure ulcers is an option for clean Stage III or Stage IV pressure ulcers that do not respond to optimal wound care (AHCPR, 1994; Maklebust and Sieggreen, 1996). The high recurrence rate and long duration to achieve complete healing are often given as reasons for surgical closure as an appropriate option (Consortium for Spinal Cord Medicine, 2000). Surgical procedures used to repair pressure ulcers include one or more of the following: direct closure, skin grafting, skin flaps, musculocutaneous flaps and free flaps (AHCPR, 1994; Compliance Network Physicians, 1999).

The decision for surgery is determined in collaboration with the interdisciplinary team and the client. Factors to consider prior to operative repair include: the patient's medical stability, nutritional status, ability to tolerate the recovery period as well as the likelihood that surgery will improve the patients functional status (AHCPR, 1994; Consortium for Spinal Cord Medicine, 2000; Maklebust and Sieggreen, 1996).







Discharge/Transfer of Care Arrangements

Recommendation • 46

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

- Risk factors identified;
- Details of pressure points and skin condition prior to transfer;
- Need for pressure reducing/relieving equipment;
- Need for pressure relieving mattresses, seating, special transfer equipment;
- Details of healed ulcers;
- Stage, site and size of existing ulcers;
- History of ulcers, previous treatments and dressings (generic) used;
- Type of dressing currently used and frequency of change;
- Any allergies to dressing products; and
- Need for on-going nutritional support.

(Strength of Evidence = C)

Recommendation • 47

Use the RNAO best practice guideline *"Risk Assessment and Prevention of Pressure Ulcers"* (2001). (*Strength of Evidence* = *C*)

Discussion of Evidence

Advance notice should be given when transferring a client between settings (e.g. hospital to home/nursing home/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. Discharge/transfer to another setting may require a site visit, client/family conference, and/or assessment for funding of resources to prevent deterioration, recurrence or the development of new pressure ulcers.

In order to ensure a smooth transfer of clients between practice settings, and to provide consistency of pressure ulcer prevention and care, it is essential to ensure that funding and equipment is in place to prevent interruption of the plan of care (RNAO, 2001). Continuity of client care can be enhanced with the communication of specific client information between settings. 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 • 48

Design, develop, and implement educational programs that reflect a continuum of care. The program should begin with a structured, comprehensive, and organized approach to prevention and should culminate in effective treatment protocols that promote healing as well as prevent recurrence. (*Strength of Evidence = C*)

Recommendation • 49

Develop educational programs that target appropriate health care providers, patients, family members, and caregivers. Present information at an appropriate level for the target audience, in order to maximize retention and facilitate a carry over into practice. (Strength of Evidence = C)

Recommendation • 50

Involve the patient and caregiver, when possible, in pressure ulcer treatment and prevention strategies and options. Include information on pain, discomfort, possible outcomes, and duration of treatment, if known. Other areas of education may include patient information regarding appropriate support surfaces, as well as roles of various health professionals. Collaborate with patient, family and caregivers to design and implement a plan for pressure ulcer prevention and treatment. (*Strength of Evidence = C*)









Recommendation • 51

Include the following information when developing an educational program on the treatment of pressure ulcers :

- Role of the interdisciplinary team;
- Etiology and pathology;
- Risk factors;
- Individualized program of skin care, quality of life and pain management;
- Uniform terminology for stages of tissue damage based on specific classifications;
- Need for accurate, consistent and uniform assessment, description and documentation of the extent of tissue damage;
- Principles of wound healing;
- Principles of cleansing, debridement and infection control;
- Principles of nutritional support with regard to tissue integrity;
- Product selection (i.e. support surfaces, dressings, topical antibiotics, antimicrobials);
- Principles of postoperative care including positioning and support surfaces;
- Effects or influence of the physical and mechanical environment on the pressure ulcer, and strategies for management;
- Mechanisms for accurate documentation and monitoring of pertinent data, including treatment interventions and healing progress; and
- Principles of patient education related to prevention to reduce recurrence. (Strength of Evidence = C)

Recommendation • 52

Knowledge and skills related to the assessment and management of pressure ulcers require updating on an ongoing basis. Organizations should provide opportunities for professional development related to the best practice guideline and support its use in daily practice. (*Strength of Evidence = C*)

The educational recommendations identified in this section have been adapted from the educational recommendations in the AHCPR (1994) guideline. Health care organizations are responsible for developing and implementing educational programs that facilitate the translation of the current evidence base for pressure ulcer prevention, assessment and management into treatment strategies (AHCPR, 1994). Educational resources for clinicians and educators are described in Appendix M.





Organization & Policy Recommendations

Recommendation • 53

Guidelines are more likely to be effective if they take into account local circumstances and are disseminated by an active ongoing educational and training program. (Strength of Evidence = C)

Recommendation • 54

Practice settings need a policy with respect to providing and requesting advance notice when transferring or admitting clients between practice settings when special resounces (e.g. surfaces) are required. (*Strength of Evidence* = C)

Recommendation • 55

Practice settings must ensure that resources are available to clients and staff, e.g. appropriate moisturizers, barriers, dressings, documentation systems, access to equipment and clinical experts, etc. (*Strength of Evidence* = C)

Recommendation • 56

Practice settings need a policy that requires product vendors to be registered as a regulated health care professional if they provide assessment and/or recommendations on any aspect of pressure ulcer related practice. (*Strength of Evidence* = C)

Recommendation • 57

Practice settings need an interdisciplinary team of interested and knowledgeable persons to address quality improvement in pressure ulcer management. This team requires representation across departments and programs. (*Strength of Evidence = C*)





Recommendation • 58

Nursing best practice guidelines can be successfully implemented only where there are adequate planning, resources, organizational and administrative support, as well as the 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 nursing best practice guideline on Assessment and Management of Stage I to IV Pressure Ulcers. (Strength of Evidence = C)

A description of the "Toolkit: Implementation of Clinical Practice Guidelines" is available in Appendix N.

Evaluation & Monitoring

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





	Structure	Process	Outcome
Objectives	To evaluate the supports available in the organization that allow for nurses to appropriately assess and manage pressure ulcers.	To evaluate changes in practice that lead towards improved assessment and management of pressure ulcers.	To evaluate the impact of implementing the recommendations.
Organization/ Unit	 Review of best practice guideline recommendations by organizational committee(s) responsible for policies/ procedures. Availability of pressure reducing/relieving support surfaces for use by clients identified at risk for pressure ulcer development. 	• Modification to policies/ procedures consistent with the recommendations of the best practice guideline.	 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.
Nurse	 Availability of educational opportunities re. pressure ulcer assessment and management within organization. Number of nurses attending educational sessions re. pressure ulcer assessment and management. Availability of ongoing support for clinical application of educational content. 	 Percentage of nurses self-reporting: Adequate assessment of client risk for developing pressure ulcers. Monitoring the healing process of existing pressure ulcers. Documenting stage, location and size of existing pressure ulcers. Need for positioning/ support surfaces for client with, or at risk of, pressure ulcers. Assessing and documenting the client's experience of pain related to pressure ulcer and its care. 	 Evidence of documentation in client record consistent with the BPG recommendations regarding: Assessment Positioning/ Support Surfaces Ulcer Management Patient teaching Referral
Client		 Client reports pain relief/reduction related to pressure ulcer care. Client reports discharge teaching appropriate to his/her care needs and setting of care. 	 Reduction in wound volume/area/depth (healing wound). Absence of Stage I pressure ulcers (prevention). Referrals to professionals with expertise in pressure ulcer care are appropriate.
Financial costs	 Wound care products and auxiliary supplies. Support surface expenses. Length of stay. 	 Nursing human resource expenditures related to pressure ulcer prevention, assessment and management. 	





Assessment and Management of Stage I to IV Pressure Ulcers

Process for Update/Review of Guideline

The Registered Nurses Association of Ontario proposes to update the nursing best practice guidelines as follows:

- 1. Following dissemination, 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 Guideline project staff will regularly monitor for new research, systematic reviews and randomized controlled trials.
- 3. Based on the results of the monitor, project staff may recommend an earlier revision period. Appropriate consultation with a team of members comprising 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, guideline project staff will commence the planning of the review process as follows:
 - a. Invite 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. Compile feedback received, questions encountered during the dissemination phase as well as other comments and experiences of implementation sites.
 - c. Compile new clinical practice guidelines in the field, systematic reviews, meta-analysis papers, technical reviews, randomized controlled trial research and other relevant literature.
 - d. Develop a detailed work plan with target dates for deliverables.

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





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Appendix A: Glossary

Abscess: A circumscribed collection of pus that forms in tissue as a result of acute or chronic localized infection. It is associated with tissue destruction and frequently swelling (AHCPR, 1994).

Analgesia: Relief of pain without loss of consciousness (AHCPR, 1994).

Antimicrobial: An agent that inhibits the growth of microbes (AHCPR, 1994).

Antiseptic (Topical): Product with antimicrobial activity designed for use on skin or other superficial tissues; may damage cells (AHCPR, 1994).

Anthropometric: Evaluation of nutritional status. Areas include weight, mid-arm muscle circumference, skin fold measures and head circumference.

Bacteremia: The presence of viable bacteria in the circulating blood (AHCPR, 1994).

Body Substance Isolation (BSI): A system of infection-control procedures routinely used with all patients to prevent cross-contamination of pathogens. The system emphasizes the use of barrier precautions to isolate potentially infectious body substances (AHCPR, 1994).

Bottoming Out: Expression used to describe inadequate support from a mattress overlay or seat cushion as determined by a "hand check". To perform a hand check, the caregiver places an outstretched hand (palm up) under the overlay or cushion below the pressure ulcer or that part of the body at risk for a pressure ulcer. If the caregiver feels less than an inch of support material, the patient has bottomed out and the support surface is therefore inadequate (AHCPR, 1994).

Cell migration: Movement of cells in the repair process.

Cellulitis: Inflammation of cellular or connective tissue. Inflammation may be diminished or absent in immunosuppressed individuals (AHCPR, 1994).

Colonized: The presence of bacteria on the surface or in the tissue of a wound without indications of infection such as purulent exudate, foul odour, or surrounding inflammation. All Stage II, III, and IV pressure ulcers are colonized (AHCPR, 1994).





Contaminated: Containing bacteria, other microorganisms, or foreign material. The term usually refers to bacterial contamination and in this context is synonymous with colonized. Wounds with bacterial counts of 10⁵ organisms per gram of tissue or less are generally considered contaminated; those with higher counts are generally considered infected (AHCPR, 1994).

Culture (Bacterial): Removal of bacteria from wound for the purpose of placing them in a growth medium in the laboratory to propagate to the point where they can be identified and tested for sensitivity to various antibiotics. Swab cultures are generally inadequate for this purpose (AHCPR, 1994).

Culture (Swab): Techniques involving the use of a swab to remove bacteria from a wound and place them in a growth medium for propagation and identification. Swab cultures obtained from the surface of a pressure ulcer are usually positive because of surface colonization and should not be used to diagnose ulcer infection (AHCPR, 1994).

Dead Space: A cavity remaining in a wound (AHCPR, 1994).

Debridement: Removal of devitalized tissue and foreign matter from a wound. Various methods can be used for this purpose:

Autolytic Debridement: The use of synthetic dressings to cover a wound and allow eschar to self-disgest by the action of enzymes present in wound fluids (AHCPR, 1994).

Enzymatic (Chemical) Debridement: The topical application of proteolytic substances (enzymes) to breakdown devitalized tissue (AHCPR, 1994).

Mechanical Debridement; Removal of foreign material and devitalized or contaminated tissue from a wound by physical forces rather than by chemical (enzymatic) or natural (autolytic) forces. Examples are wet-to-dry dressings, wound irrigations, whirlpool, and dextranomers (AHCPR, 1994).

Sharp Debridement. Removal of foreign material or devitalized tissue by a sharp instrument such as a scalpel. Laser debridement is also considered a type of sharp debridement (AHCPR, 1994).

Dehiscence: Separation of the layers of a surgical wound (AHCPR, 1994).

Deterioration: Negative course. Failure of the pressure ulcer to heal, as shown by wound enlargement that is not brought about by debridement (AHCPR, 1994).





Disinfection: A process that eliminates many or all pathogenic microorganisms on inanimate objects, with the exception of bacterial spores. Disinfection of pressure ulcers is neither desirable nor feasible (AHCPR, 1994).

Donut-Type Device: A rigid, ring-shaped device created to relieve pressure on the sitting surface (AHCPR, 1994).

Dynamic Devices: Pressure-reducing device designed to change its support characteristics in a cyclical fashion e.g. alternating-air mattresses and mechanical seats that change shape and redistribute pressure (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.

Electrical Stimulation: The use of an electrical current to transfer energy to a wound. The type of electricity that is transferred is controlled by the electrical source (AHCPR, 1994).

Epithelial Tissue: Outer most layer of skin, which is avascular and has 5 layers which is constantly being renewed every 45 – 75 days.

Epithelialization: The stage of tissue healing in which epithelial cells migrate (move) across the surface of a wound. During this stage of healing, the epithelium appears the colour of "ground glass" to pink (AHCPR, 1994).

Erythema: Redness of the skin.

Blanchable Erythema. Reddened area that temporarily turns white or pale when pressure is applied with a fingertip. Blanchable erythema over a pressure site is usually due to a normal reactive hyperemic response (AHCPR, 1994).

Nonblanchable Erythema. Redness that persists when fingertip pressure is applied. Nonblanchable erythema over a pressure site is a symptom of a Stage I pressure ulcer (AHCPR, 1994).

Eschar: Thick, hard, black, leathery, necrotic, devitalized tissue (AHCPR, 1994).





Fascia: A sheet or band of fibrous tissue that lies deep below the skin or encloses muscles and various organs of the body (AHCPR, 1994).

Fluctuance: Wavelike motion, indicative of the presence of fluid, used to describe the appearance of wound tissue (AHCPR, 1994).

Friction: Mechanical force exerted when skin is dragged across a coarse surface such as bed linens (AHCPR, 1994).

Full Thickness Tissue Loss: The absence of epidermis and dermis (AHCPR, 1994).

Granulation Tissue: The pink/red, moist tissue that contains new blood vessels, collagen, fibroblasts, and inflammatory cells, which fills an open, previously deep wound when it starts to heal (AHCPR, 1994).

Growth Factors: Proteins that affect the proliferation, movement, maturation, and biosynthetic activity of cells. For the purposes of this guideline, these are proteins that can be produced by living cells (AHCPR, 1994).

Healing: A dynamic process in which anatomical and functional integrity is restored. This process can be monitored and measured. For wounds of the skin, it involves repair of the dermis (granulation tissue formation) and epidermis (epithelialization). Healed wounds represent a spectrum of repair: they can be ideally healed (tissue regeneration), minimally healed (temporary return of anatomical continuity), or acceptably healed (sustained functional and anatomical result). The acceptably healed wound is the ultimate outcome of wound healing but not necessarily the appropriate outcome for all patients (AHCPR, 1994).

Primary Intention Healing. Closure and healing of wound edges using sutures, staples, steristrips or skingrafts.

Secondary Intention Healing. Closure and healing of a wound by the formation of granulation tissue and epithelization.

Hydrotherapy: Use of whirlpool or submersion in water for wound cleansing (AHCPR, 1994).





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). Definition for 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 5 of the 10 cases on the surgical unit had 2 ulcers during the one-month period the incidence rate would be 15%. It is important to make the formula you are using explicit.

Induration: Engorgement of tissues, evidenced as a hard, elevated area of inflammation.

Infection: The presence of bacteria or other microorganisms in sufficient quantity to damage tissue or impair healing. Clinical experience has indicated that wounds can be classified as infected when the wound tissue contains 10⁵ or greater microorganisms per gram of tissue. Clinical signs of infection may not be present, especially in the immuno-compromised patient or the patient with a chronic wound (AHCPR, 1994).

Infection (Clinical): The presence of bacteria or other microorganisms in sufficient quantity to overwhelm the tissue defenses and produce the inflammatory signs of infection – e.g., purulent exudate, odour, erythema, warmth, tenderness, edema, pain, fever, and elevated white cell count.

Local Clinical Infection: A clinical infection that is confined to the wound and within a few millimeters of its margins.

Systemic Clinical Infection: A clinical infection that extends beyond the margins of the wound. Some systemic infectious complications of pressure ulcers include cellulitis, advancing cellulitis, osteomyelitis, meningitis, endocarditis, septic arthritis, bacteremia, and sepsis (AHCPR, 1994).

Inflammatory Response: A localized protective response elicited by injury or destruction of tissues that serves to destroy, dilute, or wall off both the injurious agent and the injured tissue. Clinical signs include pain, heat, redness, swelling, and loss of function. Inflammation may be diminished or absent in immunosuppressed patients (AHCPR, 1994).




Interdisciplinary: A process where health care professionals representing expertise from various health care disciplines participate in a prevention based program standardizing and practicing pressure ulcer management.

Irrigation: Cleansing by a stream of fluid, preferably saline (AHCPR, 1994).

Ischemia: Deficiency of blood supply to a tissue, often leading to tissue necrosis (AHCPR, 1994).

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 variable inflated to adjust the level of pressure relief (AHCPR, 1994).

Maceration: Softening of tissue by soaking in fluids. In this context, it refers to degenerative changes and disintegration of skin when it has been kept too moist (AHCPR, 1994).

Malnutrition: State of nutritional insufficiency due to either inadequate dietary intake or defective assimilation or utilization of food ingested (AHCPR, 1994).

Mechanical Loading: The contribution of mechanical forces e.g., pressure, friction, and shear to the development of pressure ulcers (AHCPR, 1994).

Microbiologic States of the Wound:

- Clean free of bacterial proliferation eliciting no response from the host
- **Contamination** the presence of bacteria on the wound surface without proliferation
- **Colonization** presence and proliferation of bacteria eliciting no response from the host
- Infection invasion of bacteria which proliferates and elicits a response from the host e.g., erythema, pain, warmth, edema, exudates (Gilchrist, 1997).

Moisture: In the context of this document, moisture refers to skin moisture that may increase the risk of pressure ulcer development and impair healing of existing ulcers. Primary sources of skin moisture include perspiration, urine, feces, drainage from wounds, or fistulas (AHCPR, 1994).

Necrosis/Necrotic Tissue: describes devitalized (dead) tissue, e.g. eschar and slough.

Partial Thickness: Loss of epidermis and possible partial loss of dermis.





Polypharmacy: The administration of many drugs concurrently, usually meaning that a patient is receiving an excessive number of medications. Polypharmacy may negatively affect adherence to the pressure ulcer treatment plan (AHCPR, 1994).

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

Pressure reduction: 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, 1995).

Pressure reducing surface: A surface that lowers pressure as compared to a standard hospital mattress or chair surface but **does not consistently reduce** pressure to less than capillary closing pressure (Wound, Ostomy and Continence Nurses Society, 1987). May be referred to as "static".

Pressure relief: consistently reduces the interface pressure between the body surface and resting surface below capillary closing pressure. (AHCPR, 1994; Mulder, Fairchild & Jeter, 1995)

Pressure relieving surface: A surface that **consistently reduces** pressure below capillary closing pressure (WOCN, 1987). May be referred to as "dynamic".

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 1 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 Study: A prevalence study is defined as 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 of the survey with the population that is currently being managed by an organization.

PSI (pounds per square inch): A unit of pressure measurement. In this case, it is a measure of the pressure exerted by a stream of fluid against one square inch of skin and wound surface. PSI (greater than) 15 is injurious to tissue (AHCPR, 1994).





Purulent Discharge/Drainage A product of inflammation that contains pus – e.g., cells (leukocytes, bacteria) and liquefied necrotic debris (AHCPR, 1994).

Recalcitrant: A recalcitrant wound is a chronic wound which has failed to respond to optimal standard wound care (Houghton & Campbell, 2001).

Repositioning: Any change in body position that relieves pressure from tissue overlaying bony prominences. Periodic repositioning of chair-bound and bedfast individuals is one of the most basic and frequently used methods of reducing pressure. The overall goal of repositioning is to allow tissue reperfusion and thus prevent ischemic tissue changes. The term "repositioning" implies a sustained relief of pressure, not just a temporary shift. Specific repositioning techniques and the frequency of repositioning should be individualized according to the patient's level of risk and the goals of care (AHCPR, 1994).

Sepsis: The presence of various pus-forming and other pathogenic organisms or their toxins, in the blood or tissues. Clinical signs of blood-borne sepsis include fever, tachycardia, hypotension, leukocytosis, and a deterioration in mental status. The same organism is often isolated in the both the blood and the pressure ulcer (AHCPR, 1994).

Shear: 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, and the extent to which the body makes contact with the support surface (AHCPR, 1994).

Sinus Tract: A cavity or channel underlying a wound that involves an area larger than the visible surface of the wound (AHCPR, 1994). It is a pathway that can extend in any direction from the wound surface, which results in dead space with potential for abscess formation.

Skin Equivalent: A material used to cover open tissue that acts as a substitute for nascent (beginning) dermis and epidermis and that has at least some of the characteristics of human skin (e.g., amniotic tissue, xenografts, human allografts). For the purpose of this guideline, only tissue with viable, biologically active cells is given this designation (AHCPR, 1994).

Slough: Necrotic (dead) tissue in the process of separating from viable portions of the body (AHCPR, 1994). It is seen as the accumulation of dead cellular debris on the wound surface, and tends to be yellow in colour due to the large amounts of leukocytes present. However, yellow tissue is not always indicative of slough but may be subcutaneous tissue, tendon or bone instead.





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).

Support Surfaces: Special beds, mattresses, mattress overlays, or seat cushions that reduce or relieve pressure while sitting or lying (AHCPR, 1994).

Air-Flotation Bed: Generic descriptor for low-air-loss beds and air-fluidized beds (AHCPR, 1994).

Air-Fluidized Bed: Class of support surfaces that uses a high rate of air flow to fluidize fine particulate material (such as sand) to produce a support medium that has characteristics similar to a liquid (AHCPR, 1994).

Alternating-Air Mattress Or Overlay: Mattress or overlay with interconnecting air cells that cyclically inflate and deflate to produce alternating high and low pressure intervals. Cells with larger depth and diameter produce greater pressure relief over the body (AHCPR, 1994).

Donut-Type Device: A rigid, ring-shaped device created to relieve pressure on the sitting surface. This device is not recommended, because even though pressure is relieved in the tissue over the center of the ring, pressure in tissue resting on the ring causes vascular congestion and may impede circulation to the tissues (AHCPR, 1994).

Dynamic Device (or Dynamic Support Surface): Pressure-reducing device designed to change its support characteristics in a cyclical fashion. Examples include alternating-air mattresses and mechanical seats that change shape and redistribute pressure (AHCPR, 1994).

Foam Mattress Overlay: Thick foam slab with a textured surface designed to be placed on top of the standard hospital mattress to reduce pressure by enveloping the body. Its effectiveness is influenced by its thickness, density, and stiffness (AHCPR, 1994).

Low-Air-Loss Bed: 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 (AHCPR, 1994).

Mattress Replacement System: Mattress with pressure-reducing or pressure-relieving features that can be placed on an existing bed frame (AHCPR, 1994).

Overlay: General term used to describe support surfaces placed on top of a standard hospital mattress (AHCPR, 1994).





Static Air Mattress: A vinyl mattress overlay composed of interconnected air cells that are inflated with a blower before use. The shifting of air among the cells distributes pressure uniformly over the support area to create a floatation effect.

Static Device (or Static Support Surfaces): Pressure-reducing devices designed to provide support characteristics that remain constant – i.e., do not cycle in time. Examples include foam overlays, cushions, and water mattresses (AHCPR, 1994).

Static Water Mattress: A vinyl mattress overlay composed of interconnected components that are filled with water to distribute pressure uniformly over the support surface to create a floatation effect (AHCPR, 1994).

Surfactants: A surface-active agent that reduces the surface tension of fluids to allow greater penetration (AHCPR, 1994).

Tissue Biopsy: Use of a sharp instrument to obtain a sample of skin, muscle, or bone (AHCPR, 1994).

Tissue Load: The distribution of pressure, friction, and shear on tissue (AHCPR, 1994).

Topical Antibiotic: A drug known to inhibit or kill microorganisms that can be applied locally to a tissue surface (AHCPR, 1994).

Topical Antiseptic: Product with antimicrobial activity designed for use on skin or other superficial tissues; may damage some cells (AHCPR, 1994).

Trochanter: Bony prominence on the upper part of the femur.

Tunneling: A passageway under the surface of the skin that is generally open at the skin level; however, most of the tunneling is not visible (AHCPR, 1994).

Underlying Tissue: Tissue that lies beneath the surface of the skin such as fatty tissue, supporting structures, muscle, and bone (AHCPR, 1994).

Undermining: A closed passageway under the surface of the skin that is open only at the skin surface. Generally it appears as an area of skin ulceration at the margins of the ulcer with skin overlaying the area. Undermining often develops from shearing forces (AHCPR, 1994).





Appendix B: Braden Scale for Predicting Pressure Sore Risk

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 surface.	2. Very limited Responds only to painful stimuli. Cannot communicate discomfort except by moaning or restlessness, or has a sensory impairment that limits the ability to feel pain or discomfort over half 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 half 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 opti- mum 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 assis- tance. 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.





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3. Slightly limited Responds to verbal commands but cannot always communicate discomfort or need to be turned, or has some sensory impairment that limits ability to feel pain or discomfort in 1 or 2 extremities.	4. No impairment Responds to verbal commands, has no sensory deficit that 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. Walks frequently 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, 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 com- pletely during move. Maintains good position in bed or chair at all times.	NOTE: Patients with a total score of 16 or less are considered to be at risk of developing pressure ulcers. (15 or 16=low risk; 13 or 14=moderate risk; 12 or less=high risk)	
	TOTAL SCORE	





Appendix C: Staging of Wounds

National Pressure Ulcer Advisory Panel (1989)

Stage I: Non-blanchable erythema of intact skin, the heralding lesion of skin ulceration. In individuals with darker skin, discolouration of the skin may be purplish/bluish or voilaceous (egg plant-like colour), accompanied by localized heat, edema, induration or hardness (NPUAP, 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 ulcers.

When slough or necrotic tissue and/or black discoloured tissue is present, it is impossible to stage the ulcer until the devitalized tissue is removed (Weir, 2001). Many practitioners describe pressure ulcers presenting in this manner as Stage X.

Pictures courtesy of KCI Medical Canada, Inc.











Appendix D: Wound Measurement

Illustrated by: Nancy A. Bauer, Hon BA, B. Comm, RN, CETN





Appendix E: Documentation: Wound Assessment Tools

The assessment tools included are examples of assessment tools that have been adapted to reflect the care setting. They are included as examples only - neither tool has been formally tested for validity and reliability.



SAMPLE 1: Wound Assessment Tool

Barton, P. & Parslow, N. (1996). *Wound care: A comprehensive guide for community nurses*. Toronto, Ontario: St. Elizabeth Health Care.

SAMPLE 2: Wound Assessment Tool

St. Joseph's Care Group Thunder Bay, Ontario







SAMPLE 1: Wound Assessment Tool

	Name: Address: Age: Diagnosis: Other: Diagram of Wound				
Date:	Initial Assessment	Junio Julio	o, would		
Location				 	
Length/Width (cm.)					
Stage/Depth (cm.)					
Undermining/tunnelling (cm.)					
Wound base					
Ulcer margins					
Exudate					
Odour				 	
Culture (date)					
Periwound skin					
Sensation					
Interventions (mattress, overlay cushion)					
Debridement Yes/ No Type					
COMMENTS:				 	
Treatment appropriate Yes/No					
Changes in treatment (date)					
Nurse's Signature					



Reprinted with permission. "Wound Care: A Comprehensive Guide for Community Nurses", p. 83, 1996. Barton and Parslow. St. Elizabeth Health Care.



SAMPLE 2: Wound Assessment Tool

St. Joseph's Care Group, Thunder Bay, Ontario

Wound Location

Dressing

82

1 Date & time		┣			┣						\vdash			<u> </u>										
2 Periwound Skin																								
3 Wound Base (tissue type)																								
4 Exudate (amount)																								
5 Dressing (describe)																								
6 Interventions																								
7 Length/Width (cm)	L W T		5			≥	Г	 \geq	н	≥	F	Ħ	2		3	E	≥	⊢	L	3	F	1	≥	H
8 Depth (cm)																								
9 Stage (Pressure Ulcer only)																								
10 Undermining/tunnelling (cm)																								
11 Odour																								
12 Pain Scale Score																								
13 PUSH Tool Score																								
14 Debridement																								
15 Culture (date)																								
16 Initials/ Classification																								

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Document wound location and draw wound on body chart (one wound only per sheet) Complete addressograph

Where assessment of an item remains unchanged from the previous assessment, enter an " in the appropriate box. For initial assessment, complete <u>all</u> boxes. 1. Fill in date and time of assessment.

At each dressing change:

2. Describe Periwound Skin (surrounding wound) as N (normal – colour pink or normal for ethnic group with minimal firmness around wound), R (bright red &/or blanchable), P (dark red or purple &/or non-blanchable), W **3.** Document tissue type in the wound bed using the numbers 0 to 4: (white, moist, macerated), E (no-pitting edema), E+ (pitting edema).

- 0 Closed/resurfaced: Wound completely covered with epithelium (new skin).
- l Epithelial Tissue: For superficial wounds, new pink or shiny skin growing in from the edges or as islands on the wound surface.
 - 2 Granulation Tissue: Pink or beefy red tissue with a shiny, moist, granular appearance.
- strings or thick clumps, or is mucinous. Score as a "3" if there is any 3 - Slough: Yellow or white tissue that adheres to the wound bed in amount of slough present and necrotic tissue is absent.
 - 4 Necrotic Tissue (eschar): Black, brown or tan tissue that adheres softer than surrounding skin. Score a "4" if there is any necrotic firmly to the wound bed or edges and may be either firmer or tissue present.
- Estimate the amount of exudate (drainage) present after removal of the dressing and before cleansing. Estimate the drainage as: 0 -none; 1 -light; 2 -moderate; or 3 -heavy 4

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- Document interventions, eg. Pressure relief mattress, seat cushion, trapeze, State dressing type including width and length of packing, if appropriate. ы. . 0
 - elevate heels as appropriate.

Weekly and PRN:

- 7. Measure longest length in centimeters. Measure widest point (width) at 90 degrees to length. Multiply length x width to determine surface area and document: $0 \quad 0 \text{ cm}^2$
 - $3.1-4.0~\mathrm{cm^2}$ $7 4.1 - 8.0 \, cm^2$ 9
 - < 0.3
- $8.1 12.0 \ cm^2$ 8 $0.3-0.6~\mathrm{cm}^2$

2

- 9 12.1 24 cm^2 $10 > 24 \text{ cm}^2$ $0.7 - 1.0 \text{ cm}^2$ ო
 - $1.1 2.0 \, \mathrm{cm^2}$ 4
- $2.1 3.0 \ cm^2$ ß
- Measure greatest depth in centimeters. œ.
- Document Stage for pressure ulcers only according to the following scale: I, II, III, IV, X. 6.
- 10. Measure in centimeters the greatest depth of undermining or tunnelling (0 for none).
- 11. Document odour as: 0 indicating no odour, + for slight, or ++ for foul odour.
- Document the client's expressed level of pain at dressing change using the 5 point pain scale. 12.
- 13. For pressure ulcer only, calculate PUSH Tool Score by adding items 3, 4, and 7 to obtain a total score. A comparison of total scores indicates improvement or deterioration in pressure ulcer healing.

PRN:

- 14. Identify the type of debridement, eg. surgical, chemical (collagenase, hygeol) or "n/a" for not applicable.
- 15. Indicate the date specimen obtained for culture or "n/a" for not applicable.
 - 16. Sign name and classification.



Nestle	Mini Nutrition MN	al Assessment A®		
it name:	First name:	Sex:	Date:	
e: Weight, kg:	Height, cm:	I.D. Number:		
mplete the screen by filling d the numbers for the scree	in the boxes with the appropriate numbe m. If score is 11 or less, continue with the	rrs. e assessment to gain a Malnutrition Ir	dicator Score.	
Screening		J How many full meals does the p	atient eat daily?	
Has food intake declined over th	e past 3 months due to loss of appetite,	0 = 1 meal 1 = 2 meals 2 = 3 meals		
0 = severe loss of appetite	swallowing difficulties?	K Selected consumption markers	for emtain intako	
 moderate loss of appetite no loss of appetite 		At least one serving of dairy (milk_cheese_woourt per da	products	
Weight loss during the last 3 mo	nths	 Two or more servings of legit or eons per week? 	umes	
1 = does not know	3 kg (6.6 lbs)	Meat, fish or poultry every d	ay yes no	
2 = weight loss between 1 an 3 = no weight loss	id 3 kg (2.2 and 6.6 lbs)	0.5 = if 2 yes		
Mobility		L Concernos turo or more concine		<u> </u>
0 = bed or chair bound 1 = able to get out of bed/cha	ir but does not go out	of fruits or vegetables per day?	5	
2 = goesout		U = no I = ye	rs	
Has suffered psychological stre in the past 3 months	ss or acute disease	M How much fluid (water, juice, co 0.0 = less than 3 cups	thee, tea, milk) is consu	imed per day?
0 = yes 2 =	no	0.5 = 3 to 5 cups 1.0 = more than 5 cups		\Box . \Box
Neuropsychological problems 0 = severe dementia or depre	ession	N Mode of feeding		
1 = mild dementia 2 = no psychological problem	ns	0 = unable to eat without as: 1 = self-fed with some difficu	sistance ulty	
Body Mass Index (BMI) (weight	tin ka) / (height in m)?	2 = self-fed without any prob	olem	
0 = BMI less than 19 1 = BMI 19 to less than 21		O Self view of nutritional status 0 = views self as being main	ourished	
2 = BMI 21 to less than 23 3 = BMI 23 or greater		1 = is uncertain of nutritional 2 = views self as having no n	l state utritional problem	
creening score (subtotal m	av 14 aviate)	P In comparison with other people	e of the same age.	
2 points or greater Normal - not	at risk - no need to complete assessment	how does the patient consider h	nis/her health status?	
1 points or below Possible main	utrition – continue assessment	0.5 = does not know		
Accoment		2.0 = better		□.□
Assessment		Q Mid-arm circumference (MAC)	in cm	
Lives independently (not in a nu 0 = no 1 =	rsing home or hospital) yes	0.5 = MAC 21 to 22		
Takes more than 3 prescription	drugs per day	1.0 = MAC 22 or greater		Ш.Ц
0 = yes 1 =	no	R Celf circumference (CC) in cm 0 = CC less than 31	1 = CC 31 or greater	
Pressure sores or skin ulcers 0 = ves 1 =	no 🗌	Assessment (max. 16 points)		
		Screening score		
opyright - Société des P	roduits Nestlé S.A. Reprinted	Total Assessment (max. 30 po	ints)	
ith permission.		Malnutrition Indicator Sco	re	
		17 to 23.5 points at risk of	fmalnutrition	
		Less than 17 points malnour	rished	

Less than 17 points malnourished



RNAO

Appendix G: Tools for Assessment of Pain

SAMPLE 1 – Visual Analogue Scale (VAS)

No Pain	Pain as bad as it
	could possibly be

The patient indicates intensity of pain on a 10cm. line marked from no pain at one end to pain as bad as it could possibly be at the other end.

SAMPLE 2 – Numeric Rating Scale (NRS)



The patient rates pain on a scale from 0 to 10.

SAMPLE 3 – Verbal Rating Scale (VRS)



The patient rates the pain on a Likert scale verbally, e.g. "none", "mild pain", "moderate pain", "severe pain", "very severe pain" or "worst possible pain".



Name:			Active 🗖	Resting 🗖 Time: _	
o no pain	2 mild	discomforting	distressing	8 horrible	10 excruciating
Regular pain Me Month:	edication:		Rescue/PRN me	dication	
Date or Time					
FACIAL SCORE					
10					
8					
6					
4					
2					
0					
PRN medication	1				

SAMPLE 4 - Facial Grimace & Behaviour Checklist Flow Charts

Facial Grimace Score: The facial grimace scale scores the level of pain (from 0-10 on the left) as assessed by the caregiver observing the facial expressions of the resident. Assessment is done once daily or more (14 days are indicated above). This assessment of the degree of discomfort should be done at the same time every day and during the same level of activity. **Note if rescue/PRN medication is given; yes (y), no (n) or dose.**

Behaviour Checklist

10 – always	8 –	mostly	6 –	often	4 -	occasio	nally	2 –	rarely	0 -	never		
Date or Time													
BEHAVIOUR													
eats poorly													
tense													
quiet													
indicates pain													
calls out													
paces													
noisy breathing	J												
sleeps poorly													
picks													
PRN medicatio	n												

Behaviour Checklist: Behaviour changes can be used to assess pain or distress, and thereby evaluate the efficacy of interventions. At the top of the scoring graph, when the specific behaviour has been observed, it can be rated from 10 (always) to 0 (never). The behaviours being rated and scored over 24 hours are listed down the left column. This chart scores 9 different behaviours over 14 days. The caregiver can expand on the checklist, i.e., rocking, screams, etc. Note if rescue/PRN medication given. Both tools may be adapted for individual use.

(The Facial Grimace & Behaviour Checklist are used with permission from Saint Joseph's Health Centre, Sarnia. Palliative Care Research Team.)

Reprinted with Permission. Brignell, A. (ed) (2000). Guideline for developing a pain management program. A resource guide for long-term care facilities, 3rd edition.





Appendix H: Distinctions between Pressure Reduction and Pressure Relief Products

Compiled by Kathryn Kozell (reviewed 2002)

Product	Advantages	Disadvantages
1. Pressure-r	eduction products	
Overlays: Two-inch foam	 low cost; light weight.	 comfort measures only, little pressure reduction; moisture retention; short life span.
Overlays: Three-to-four-inch foam	 low cost; light weight; transportable; convolution decreases pressure. 	 moisture retention; increased dermal temperature; short life span; loss of flame retardence when washed; bacterial contamination; improper use increases radiant pressure.
Air-filled mattresses	 ease of cleaning; light weight; versatility; documented effectiveness. 	 lack of moisture reduction; over inflation or under inflation can increase pressure; accidental puncture possible; patching difficult; air lost through use; proper setup and ongoing care difficult.
Dynamic air mattresses	 ease of cleaning; constant air flow; decreased moisture; lightweight. 	 pump rental increases costs; need continuous electrical source; puncture possible; proper setup and maintenance are ongoing.
Gel-filled mattresses	 ease of cleaning; durable, work well for obese patients. 	 cost; weight; lack of air flow; moisture accumulates.
Water-filled mattresses	 low-cost; ease of cleaning; significant pressure reduction; one-time charge. 	 overfilling or under filling reduces effectiveness; weight; puncture or leakage possible; time and expertise required to set-up; displacement of water by trunk of body increases pressure at heels; "bottoming out" can occur at buttocks.
Replacement mattresses	 reduction in use of overlays and specialty beds; potential for reduction in pressure ulcer-related expenses without additional staff time; cost effectiveness over time. 	 initial cost; quoted life span questionable; failure to use specialty beds when warranted.



Product	Advantages	Disadvantages
2. Pressure-r	elief specialty beds	
Low-air loss beds	 permeable membrane; covering decreases moisture; proper calibration results in interface pressures <25 mm Hg; postural positioning changes pressure. 	 cost; no temperature control; improper calibration possible; time required to perform test; patient turning necessary to decrease pulmonary complications.
Air-fluidized high-air loss beds	 permeable membrane precludes friction and shear; negation of maceration produced by incontinence or perspiration; decreased pain; ease of patient movement; patient may lie flat to reduce edema at flap site; pressures <25 mm Hg. 	 rental cost; significant fluid loss, up to 2400 ml/day; contraindicated for patients on limited intake; can dry out wounds; weight of device; inadequate positioning – transfers difficult on some units; motion sickness; contraindicated in patients with unstable neurological status.
3. Kinetic spo	ecialty beds	
Kinetic therapy low-air loss beds	 patient turned automatically 200 times/day; short term use; total pressure relief; eliminates friction, shear, maceration. 	 rental cost; small framed patients at high risk of falls; motion sickness; no temperature control.





Appendix I: Positioning & Support Surfaces – A Checklist

When considering the impact of pressure, shear and friction on the client, review the following while planning care. Don't forget to:

Avoid positioning patients on a pressure ulcer. (*Strength of Evidence* = C)

- Avoid positioning immobile patients directly on their trochanters and use devices such as pillows and foam wedges to position a pressure ulcer off the support surface. (*Strength of Evidence = C*)
- Avoid positioning immobile patients with pressure directly on their heels and use devices such as pillows and foam wedges to position a pressure ulcer off the support surface, while avoiding pressure on the Achilles' tendon. (*Strength of Evidence = C*)
- □ Use positioning devices such as pillows or foam to prevent direct contact between bony prominence (such as knees or ankles). (*Strength of Evidence* = *C*)
- Avoid using donut-type devices. (*Strength of Evidence = C*)
- □ Maintain the head of the bed at the lowest degree of elevation consistent with medical conditions and other restrictions. Limit the amount of time the head of the bed is elevated. (*Strength of Evidence* = C)

Establish a written repositioning schedule. (*Strength of Evidence = C*)

Individuals who are able should be taught to shift their weight every 15 minutes. Reposition the sitting individual so the points under pressure are shifted at least every hour. Consider the use of a wheelchair with a tilt mechanism. (Strength of Evidence = C)





Appendix J: Wound Care Products

Wound Cleansers

Examples	Description	Indications	Considerations
Normal Saline	 Normal saline preferred. physiologic. 	 Cleanses wound debris with minimal trauma. 	 Levels of toxicity vary among commercial wound cleansers.
Shur-Clens	not harmful to tissue.		Some contain antimicrobial agents, which may be toxic to
Saf-Clens	Commercial wound cleansers		new tissue. Read literature
Dermagran cleanser	 may contain surfactants to assist with removal 		determine safety.
Restore	of debris.		Cleansers contain mild preservatives, which stabilize
Other	provides variable pressures		the product but may cause
	flush to15 psi).		irritation and increase toxicity.
			• Ease of use facilitates patient independence.
			• Risk of contamination is reduced in unclean situations.
Ranked according to toxicity AHCPR (1994)			Caution - Wound cleansers
			are for wounds. Skin cleansers are for intact skin only.

Moisture Retentive: Transparent Films

	<u> </u>		
Bioclusive	• Semi-permeable	Wounds at risk for	• Can be cut to accommodate
	adhesive sheets.	contamination.	difficult areas or used as
Flexifix Opsite			adhesive strips to waterproof
	 Impermeable to water 	 Protects intact skin from 	dressing edges.
MeFilm	molecules and bacteria.	friction or irritants.	
			 Moisture resistance allows
Opsite	 Incapable of absorbing 	 Secondary cover dressing to 	for bathing.
	moisture.	enhance moisture and odour	
Tegaderm		containment.	 Use with caution on fragile
	 Transparency permits 		peri-wound skin.
Others	wound visualization.	 A flexible outer dressing 	
		for uneven areas.	 For removal, stretch product
	 Some are shaped to fit 		to break adhesive bond and
	problem areas.	 Superficial wounds, skin 	prevent skin stripping.
		breaks with minimal drainage.	
	 Non-sterile roll is intended 		 Decrease wound pain by
	for use on intact skin or as a	 Supports autolytic 	protecting superficial nerve
	secondary cover dressing.	debridement.	endings.
			 Use of liquid skin barriers on
			peri-wound skin increases
			adhesion.
Reprinted with permis	• Not suitable if skin is		
Caring for Oncology V	evidencing yeast infection.		





Moisture Retentive: Non-Adherents

Examples	Description	Indications	Considerations
NON-IMPREGNATED Alldress ETE Melolite Mepitel Primapore Release Tegapore Telfa Others IMPREGNATED/ TULLE Adaptic Bactigras Fucidin Jelonet Sofratulle	 Varied densities, sizes and shapes of woven mesh. Some have plastic coating to create semi-occlusion. Minimal absorption capability. Mepitel is a silicone mesh. Tulle dressings contain petrolatum. Some tulle dressings contain minimal amounts of antibiotic. *see Appendix K - Topical Antimicrobial Agents 	 Wound contact layer to: Protect fragile tissue. Maintain some wound hydration. Protect post-operative incision. Prevent painful dressing adherence. Enhances action of hydrogels. 	 Silicone mesh dressings can remain in place up to 7 days. Outer absorbent dressings can be replaced as needed. Plastic coated products may macerate peri-wound skin. Protect skin with suitable barrier. Layering tulle dressings increases semi-occlusion. Slight overlap onto peri- wound skin stabilizes dressing and decreases pain. Most require secondary cover dressing to absorb drainage and enhance stability. Some are self-adhesive.
			 Products containing antiseptics and antibiotics reported to assist with local bacterial control in a contaminated wound. Long term use increases risk of local sensitization and the development of resistant bacteria. Infection requires appropriate systemic management. Consider alternative product if dressing adheres.

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Description	Indications	Considerations
 Available as adhesive sheets, powders or pastes. May contain goldin codium 	 Wounds with minimal drainage. 	Sneets can be customized to fit difficult areas.Size must
carboxymethylcellulose, and	Wounds requiring	beyond wound margins
pectin.Sheet dressings have an	debridement.	to ensure adherence and wear time.
occlusive polyurethane outer layer.	 Promotes granulation. 	• Use of additional tapes or
 Thickness, size, absorption capability, and transparency 	• Protects from contamination.	transparent film dressings to edges may improve stability
varies. • Minimal to moderate	• As an aesthetic cover dressing.	in areas of high stress.
absorbency.	• A moisture retentive	• Caution with use of
• Some have tapered or	secondary dressing over an	adhesive dressings on
adhesive borders to increase stability.	absorbent filler.	fragile peri-wound skin.
 Powders and pastes may be used to fill superficial wound 	 Protects underlying skin from tang injury 	Dressings create an occlusive barrier
depths but not for use in	nom tape injury.	occlusive barrier.
deep wounds or when base		 May remain in place for
is not visible.		3-7 days. Frequency of
Interactive dressings		amount of drainage and
		before leakage occurs.
• Do not confuse characteristic		
odour with infection.		 Can be used over absorbent alginates or hydrofibers to
		contain drainage. Change
A State		by 3-4 days.
A DE TON		 Not advised for copiously
1		draining wounds.
1		 If signs and symptoms of
The second		clinical infection should
		develop, such as uncharac-
	5	colour of exudate, fever or
- Car	10	cellulitis, a bacterial culture
Land Contraction	E.	of the wound site should be
Contraction of the second second		taken. Appropriate medical
A Carrier of the		treatment should be initiated.
The seals		increased frequency of dressing
	1 ca	changes or temporary
2		change of treatment. Use is
		not appropriate if anaerobic
		infection suspected.
		• Use liquid skin barriers on
		peri-wound skin to decrease
	 Description Available as adhesive sheets, powders or pastes. May contain gelatin, sodium carboxymethylcellulose, and pectin. Sheet dressings have an occlusive polyurethane outer layer. Thickness, size, absorption capability, and transparency varies. Minimal to moderate absorbency. Some have tapered or adhesive borders to increase stability. Powders and pastes may be used to fill superficial wound depths but not for use in deep wounds or when base is not visible. Interactive dressings. Do not confuse characteristic odour with infection. 	DescriptionIndications• Available as adhesive sheets, powders or pastes.• Wounds with minimal drainage.• May contain gelatin, sodium carboxymethylcellulose, and pectin.• Wounds requiring debridement.• Sheet dressings have an occlusive polyurethane outer layer.• Promotes granulation.• Thickness, size, absorption capability, and transparency varies.• Promotes granulation.• Some have tapered or adhesive borders to increase stability.• Protects from contamination.• Bowders and pastes may be used to fill superficial wound depths but not for use in deep wounds or when base is not visible.• Protects underlying skin from tape injury.• Do not confuse characteristic odour with infection.• Protects underlying skin from tape injury.

increase adherence.

Wound Hydration: Hydrocolloids

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Wound Hydration: Hydrogels

Examples	Description	Indications	Considerations
Curagel	 Polymers with high water content. 	Granulating wounds.	 Monitor closely for infection during autolysis.
DuoDERM Gel	 Moisture donating. 	 Prevents dressing adherence, bleeding or pain. 	Protect peri-wound skin from
Hypergel	Non-toxic	Wounds requiring	maceration with suitable
Intrasite Gel	Non adharant	debridement.	• Cross batch scabar to
Normlgel	• Non-auterent.	Minimally exudating	promote penetration of gel.
Nu-Gel		wounds.	• Gel can be applied to gauze
Puriclens	• Available as liquid gels, in solid sheets or imbedded into gauze dressings.	 Maintains wound moisture, decreasing need for frequent changes. 	ribbon packing to fill deep areas and promote autolytic debridement.
Restore Gel	Viscosities of liquid gels vary	-	Secondary dressing is
Tegagel	• Hypergel only for		required to retain moisture,
Woun'Dres	debridement of black eschar.		to stabilize gels over wounds.
Others	 Additives to gels include: Pectin in Duoderm gel (creates an acidic pH, reported to inhibit bacteria) Antimicrobials in Puriclens 		• Can be used in combination with transparent films, foams, hydrocolloids or other non-adherent cover dressing.
	to assist in odour control Collagen in WounDres (undetermined henefit)		 Not advised for copiously draining wounds.
			• Wear time varies from 1 to 3 days according to amount of drainage (read product monograph).
500	(F. C.		 Sheet gels can be cut to slightly larger than wound.
			 Prevent contamination of opened product when handling and storing. Discard by 7 days.
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Assessment and Management of Stage I to IV Pressure Ulcers

Examples	Description	Indications	Considerations
Algisite Calcicare	Absorbs moderate to large amounts.	• Wounds with visible depth requiring soft filler.	 Remove residue by flushing with saline. Some fiber residue can be reabsorbed.
Curasorb	 Sheets or fibrous ropes of calcium sodium alginate. 	• Exudating wounds during autolytic debridement.	 If dressing dries and adheres
Fibracol	• Seaweed derivative.	• Bleeding wounds.	review product choices. Select alternative or extend
Kaltostat	• Applied in dry state.	• Post sharp debridement.	wear time of alginate.
Melgisorb	 As drainage is absorbed, it converts to a gelatinous 	 Reduces the need for bulky dressings. 	• Maximum wear time 4 days.
Seasorb Tegagen	mass.Hemostatic capabilities.		 Requires moisture retentive cover dressing to avoid drying by evaporation.
	 Calcium and sodium interact to promote clotting. 		 Occlusive cover dressings can enhance absorptive capabilities.
	Non-adhesive.Fibracol contains collagen.		 Maintains wound cleansing in gel state.
	 Tegagen offers a choice of a high gelling or a high integrity product. Review 		 Controls drainage at wound base assisting with bacterial control.
	product monograph and wound needs.		• Product absorbs colour and odour of existing drainage.
	52		 May appear green-tinged and induce a slight odour. Therefore, evaluate for infection after cleansing.
			 Low tensile strength. Avoid packing into narrow, deep sinuses where dressing retrieval could be difficult.
	A SAME		

Absorbent Dressings: Alginates

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Examples	Description	Indications	Considerations
HYDROFIBER Aquacel	 Soft, non-woven fibrous sheet or packing strip of sodium carboxymethyl- cellulose. Highly absorbent. Apply dry. Converts to a solid gel when activated by moisture. Fibers maintain integrity in gel-state, facilitating intact removal. Non-adhesive. Vertically absorbs, contains drainage. 	 Pack wounds with a visible base. Supports debridement of exudating wounds. Prevents trauma to fragile wound tissue. Manages large amounts of drainage. Prevents leakage and peri-skin breakdown. Promotes comfort. Decreases dressing bulk. 	 Concentrates drainage. Dressing can extend beyond wound margin onto peri-skin. Requires moisture-retentive cover dressing. Flush to remove all residue. Product may slightly increase in size with absorbing action. Pack lightly into wound depth. Caution for wounds without a visible base. Vertical absorption prevents maceration of peri-wound skin. Layering dressing increases absorption capability. Wear time is 1-4 days depending on volume of drainage. Tensile strength decreases when over-saturated. Compatible with other dressings. Not compatible with ointments or creams.
HYPERTONIC SALINE GAUZE Curasalt Mesalt	 Sheet or ribbon gauze, impregnated with salt concentrate. Product absorbs drainage, becoming an isotonic normal saline dressing. 	 Copiously draining wounds. Debridement of slough. Infected wounds. 	 Apply Mesalt in dry state to wound. May damage granulation tissue if drainage is minimal. Adequate wound drainage is essential to prevent dressing adherence or damage from concentrated salts. Evaluate for alternative product choice when drainage decreases or wound base becomes clean. May be painful for sensitive patient. Consider risk of loose fibers if cutting products. Moisture-retentive cover dressing is advised.

Absorbent Dressings: Hydrofiber, Hypertonic Gauze

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Assessment and Management of Stage I to IV Pressure Ulcers

Examples	Description	Indications	Considerations
Examples	Description		Considerations
FOAMS	 Non-adherent polyurethane foam. 	 Absorbs moderate to copious amounts of drainage. 	 Product integrity is maintained despite
Allevyn	• Some are semi-occlusive and	 Sustains autolytic 	copious discharge.
Cutinova	only for use as cover dressings. Others may be used to fill	debridement during wound cleansing phase.	 Secure dressing with slight pressure to enhance
Hydrasorb	wound defect. Read product monograph.	Aesthetic cover dressing.	absorption.
Lyofoam Extra	Bordered adhesive products may provide occlusion	Reduces dressing bulk.	 May not support autolysis if drainage is minimal.
Polymem	 Flexibility and moldability 	• Protects peri-wound skin from irritation	 Porous foams may not maintain moist wound base,
	varies.	and maceration.	requiring suitable cover dressing.
			 Preshaped cavity dressings must fit wound size and
			shape. Do not overpack. Assure product has contact
au on			with wound base.
1 - 24			 Do not cut preshaped cavity dressings.
C.			• Extend wear time as volume
-			maximum of 4 to 7 days.
			 Maintain peri-wound skin with a protective barrier*
			if drainage is excessive.
			• Some occlusive products facilitate odour containment.
			 Foam dressings do not provide pressure relief.
			* See: Skin Barriers

Absorbent Dressings: Foams

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	0		
Examples	Description	Indications	Considerations
COMPOSITES CombiDERM N/A CombiDERM ACD Tielle	 Highly absorbent multi- layered island dressings. Inner layers absorb and retain drainage, preventing pooling at wound base. Combination of several products prevents lateral migration of drainage. 	 Copiously draining wounds. Maintains autolytic debridement. Aesthetic cover. Reduces dressing bulk. Improves integrity of macerated skin. 	 Non adherent to wound base. Wear time determined by volume of drainage (2 – 7 days). Patient independence is enhanced by ease of application. Some products are self-adhesive to skin. Adhesive styles may facilitate odour containment.
CHARCOAL Actisorb CarboFLEX Carbonet Odour Absorbent Dressing	 Products containing odour absorbent charcoal layered within product. Ability to absorb odour varies. Some contain silver to enhance antibacterial capability. CarboFlex contains alginate and hydrofiber in the contact layer to also absorb drainage. 	 Any odorous wound: during autolytic debridement. malignant cutaneous lesion. infection. 	 Ensure underlying infection has been evaluated and treated, prior to use. Choose highly absorptive products when drainage is copious. Some products can be applied directly to the wound base. Other products become inactivated when wet. Ensure that dressing edges are sealed for maximum odour containment.

Absorbent Dressings: Composites, Odour Specific

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Examples	Description	Indications	Considerations
LIQUID Coloplast ConvaCare No Sting Skin Gel Skin Prep Sween Others	 Quickly drying liquid to provide a thin layer of skin protection. Durability varies. Some contain alcohol of variable amounts. Available as moistened wipes, applicators or spray. 	 Protects peri-wound skin from maceration, irritation or tape injury. Useful when drainage small to moderate amount. Enhances adhesion of cover dressings. 	 Products containing alcohol can cause transient burning or stinging if skin is broken. Products without alcohol increase comfort. Allow product to dry before cover dressing is applied. Not for use on open wounds.
CREAMS, PASTES, OINTMENTS Aloe Vesta Baza Calmoseptine Critic-Aid Durable BarrierCream Extra Protective Cream Proshield Plus Sween Triple Care Unisalve Zinc oxide paste Others	 Durability of products vary according to viscosity. Pastes are most viscous. Products containing zinc have some antimicrobial benefits. Creams provide some hydration. Calmoseptine contains calamine to soothe itching. 	• Increased protection of peri-wound skin when drainage moderate to copious.	 Pastes do not require regular removal or reapplication. Only replenish when required. Some may interfere with seal of adhesive product. Read product monograph.
SOLID Coloplast Premier Stomahesive Thin Hydrocolloids	• Solid adhesive sheets of varying sizes/densities.	 Wounds with copious drainage requiring sustained peri-wound skin protection. Use under adhesive tapes to prevent skin stripping. 	 Replace by 7 days or if drainage migrates underneath. Cut barrier to fit close to wound margins. Thin hydrocolloid sheets promote healing of peri-wound skin irritation.

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Appendix K: Topical Antimicrobial Agents

Arout	Mahiala	Ya.	eor. Aureus	Succession of the second	service Comments
Agent Cadexomer Iodine****	Yellow-brown paste/ointment	چ ۲	چ ۲	* *	Releases iodine slowly, less toxic to granulating tissue, broad spectrum, including virus and fungus.
Fusidic Acid* cream/ointment**	Glycerin cream or lanolin ointment	~	~		Lanolin in ointment base may act as a sensitizer.
Gentamicin sulphate* cream/ointment	Alcohol cream base or petrolatum ointment	2	~	~	Good broad spectrum vs gram negatives.
Metronidazole gel/cream***	Wax – glycerin cream and carbogel 940/propylene glycol gel				Good anaerobe coverage and wound deodorizer.
Mupuricin 2% ointment/cream***	Propylene glycol ointment	~	~		Good for MRSA. Excellent topical penetration.
Polymyxin B sulphate – Bactracin zinc***	White petrolatum ointment or cream	2	2	~	Broad spectrum. Low cost. Ointment contains increasing allergen bacitracin (#q in North America).
Polymyxin B sulphate – Bacitracin zinc – neomycin**	White petrolatum ointment	~	~	~	Neomycin is a potent sensitizer and may cross react in 40% of cases to aminoglycosides.
Silver sulfadiazine***	Water miscible cream	~	r	~	Do not use in sulfa sensitive individuals.
Silver (ionized)****	Absorbent bilayered sheet + alginate (absorbent) + foam (moisture control)	~	~	~	Ionized silver is activated with sterile water. Saline will precipitate the silver as silver chloride.

* Used systemically

** Contains common sensitizer

*** Non-sensitizing and will not cause resistance with topical use

**** Provides moisture balance +/- autolytic debridement

Copyright Dr. R. Gary Sibbald. Reprinted with permission. Krasner, D. & Sibbald, R. G. (1999). Local aspects of diabetic foot ulcer care: Assessment, dressings and topical agents. M.E. Levin, D.N. O'Neal, & J.H. Bowker (Eds). In The Diabetic Foot, 6th edition, St. Louis, MO: Mosby.



Appendix L: Wound Cultures: Swabbing Techniques



Note: Tissue biopsy or aspiration may provide for a more accurate analysis. Consult with MD.

Reprinted with permission. *Wound Care: A Comprehensive Guide for Community Nurses*, p. 12, 1996. Barton and Parslow.

Originally reprinted from: Chronic Wound Care, 1st Edition, p273, Health Management Publications Inc., 1990.





Appendix M: Educational Resources

Clinicians and educators will find the following resources useful on various levels. Users are encouraged to review and critique these resources based on their specific needs.

Educational Slides:

1) NPUAP Educational Slides

Slide Set One: Pressure Ulcer Basics Slide Set Two: Understanding Incidence and Prevalence Studies Slide Set Three: Strategies for Pressure Ulcer Prevention Slide Set Four: Pressure Ulcer Treatment

To order, visit http://www.npuap.org/slide_set_describe.htm.

2) Association for the Advancement of Wound Care(AAWC) Slide Sets

The *AAWC* Educational Slide Set Series is designed and has been successfully used to assist healthcare providers and educators in teaching, learning and lecturing about wound and skin care. These slides contain no logos or identification markers on the pictures.

AAWC SLIDE SET #1 TYPES OF WOUNDS

This set contains a variety of wounds as seen during a usual week in a wound care setting.

To order, visit http://www.aawcone.com/sldeset1/aawc_slide_set.htm





Wound Related Websites:

The development panel recommends the websites below as appropriate starting points for wound care information. These sites have links to a variety of web-based resources related to pressure ulcer prevention, assessment and management.

Agency for Healthcare Research and Quality (AHRQ previously AHCPR)

http://www.ahrq.gov

The AHRQs mission is to support research designed to improve the outcomes and quality of health care, reduce its costs, address patient safety and medical errors, and broaden access to effective services. The research sponsored, conducted, and disseminated by the Agency for Healthcare Research and Quality (AHRQ) provides information that helps people make better decisions about health care

Canadian Association for Enterostomal Therapy

http://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. endorses the Canadian Nurses Association Vision of Nursing and believes that all persons with the following conditions are entitled to the comprehensive services of an Enterostomal Therapy Nurse: abdominal stomata (opening), fistulae, draining wound, and selected disorders of the integumentary (skin), gastrointestinal, and genitourinary systems. The C.A.E.T. believes Enterostomal Therapy Nursing is a specialty area of nursing practice and is committed to professional development and excellence in Enterostomal Therapy Nursing. The C.A.E.T. promotes education, research and standards for Enterostomal Therapy Nursing Practice.









Canadian Association of Wound Care

http://www.cawc.net/ The CAWC facilitates Best Practice through excellence in •Education •Clinical Practice •Public Policy •Research •International Partnerships

European Pressure Ulcer Advisory Panel

www.epuap.org

The EPUAP was created to lead and support all European countries in the efforts to prevent and treat pressure ulcers. The mission statement of this group is "*to provide the relief of persons suffering from or at risk of pressure ulcers, in particular through research and the education of the public*".

National Pressure Ulcer Advisory Panel

www.npuap.org

The NPUAP provides multidisciplinary leadership for improved patient outcomes in pressure ulcer prevention and management through Education, Public Policy, & Research.

Wound, Ostomy and Continence Nurses Society

http://www.wocn.org

The Wound, Ostomy and Continence Nurses Society (WOCN) is a professional, international nursing society of more than 3700 nurse professionals who are experts in the care of patients with wound, ostomy and continence problems.

Wound Care Products:

Companies manufacturing wound care products often have educational resource material specific to product use. Many also have educational programs about wound care in general, and pressure ulcer assessment and management specifically. When selecting educational resources, filter out promotional aspects of the material. Contact your company specific representatives to determine educational resources that may be appropriate for your specific needs and clinical setting.





Appendix N

Toolkit: Implementation of Clinical Practice Guidelines

Best practice guidelines can only be successfully implemented if there are: adequate planning, resources, organizational and administrative support as well as appropriate facilitation. In this light, RNAO, through 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.

- 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 off the RNAO website. For more information, an order form or to download the "Toolkit", please visit the RNAO website at www.rnao.org.







Nursing Best Practice Guideline assessment & management of stage I to IV pressure ulcers





This project is funded by the Ontario Ministry of Health and Long-Term Care





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