NATIONAL GUIDELINE CLEARINGHOUSE™ (NGC) GUIDELINE SYNTHESIS

MANAGEMENT AND TREATMENT OF PRESSURE ULCERS

Guidelines

1. **Consortium for Spinal Cord Medicine (CSCM) Clinical Practice Guidelines**. Pressure ulcer prevention and treatment following spinal cord injury 2000 (reviewed 2005). J Spinal Cord Med 2001 Spring;24(Suppl 1):S40-101. [448 references] PubMed
2. **Registered Nurses' Association of Ontario (RNAO)**. Assessment and management of stage I to IV pressure ulcers. Toronto (ON): Registered Nurses' Association of Ontario (RNAO); 2007 Mar. 112 p. [118 references]
3. **Wound, Ostomy, and Continence Nurses Society (WOCN)**. Guideline for prevention and management of pressure ulcers. Glenview (IL): Wound, Ostomy, and Continence Nurses Society (WOCN); 2003. 52 p. (WOCN clinical practice guideline; no. 2). [141 references]

INTRODUCTION

A direct comparison of the Consortium for Spinal Cord Medicine (CSCM), Registered Nurses' Association of Ontario (RNAO), and Wound, Ostomy, and Continence Nurses Society (WOCN) recommendations for the treatment of pressure ulcers is provided in the tables below.

The guidelines differ somewhat in scope. In addition to addressing treatment of pressure ulcers, CSCM and WOCN address ulcer prevention, a topic that is beyond the scope of this synthesis. (Note: see the synthesis, Prevention of Pressure Ulcers). While the RNAO and WOCN guidelines provide recommendations for the general population of adults at risk for pressure ulcers (including adults in acute and long-term care facilities), the CSCM guideline focuses specifically on persons with spinal cord injury.

All three guideline groups reviewed the recommendations of the 1994 Agency for Health Care Policy and Research (AHCPR) guideline, "Treatment of Pressure Ulcers". (NGC note: because of its 1994 publication date, the AHCPR guideline does not meet criteria for inclusion in NGC). RNAO also reviewed both the CSCM and the WOCN guidelines.

The tables below provide a side-by-side comparison of the key attributes of each guideline, including specific interventions and practices that are addressed. The language used in these tables, particularly in Table 3, Table 4, and Table 5 is in most cases taken verbatim from the original guidelines:

- Table 1 provides a quick-view glance at the primary interventions considered by each group.

- Table 2 provides a comparison of the overall scope of both guidelines.
- Table 3 provides a more detailed comparison of the specific recommendations offered by each group for the topics under consideration in this synthesis, including:
    - Assessment
    - Treatment
        - Care Plans
        - Wound Care
        - Infection Management
        - Management of Tissue Load
        - Pain Management
        - Nutrition and Hydration
        - Surgical Intervention
        - Adjuvant Therapy
        - Reassessment and Ongoing Care
- Table 4 lists the potential benefits and harms associated with the implementation of each guideline as stated in the original guidelines.
- Table 5 presents the rating schemes used by the guideline groups to rate the level of evidence and/or the strength of the recommendations.

A summary discussion of the areas of agreement and areas of differences among the guidelines is presented following the content comparison tables.

Abbreviations used in the text and table:

- AHCPR, Agency for Health Care Policy and Research (now the Agency for Healthcare Research and Quality, AHRQ)
- ABPI, Ankle/Brachial Pressure Index
- CSCM, Consortium for Spinal Cord Medicine
- NPUAP, National Pressure Ulcer Advisory Panel
- RNAO, Registered Nurses' Association of Ontario
- WOCN, Wound, Ostomy, and Continence Nurses Society

TABLE 1: COMPARISON OF INTERVENTIONS AND PRACTICES CONSIDERED
("✓" indicates topic is addressed)

	CSCM (2000 reviewed 2005)	RNAO (2007)	WOCN (2003)
Assessment	✓	✓	
Management			
• Care Plans	✓	✓	✓

• Wound Care	✓	✓	✓
• Infection Management	✓	✓	✓
• Management of Tissue Load	✓	✓	✓
• Pain Management		✓	✓
• Nutrition and Hydration	✓	✓	✓
• Surgical Intervention	✓	✓	✓
• Adjuvant Therapy	✓	✓	✓
• Reassessment and Ongoing Care	✓	✓	✓

TABLE 2: COMPARISON OF SCOPE AND CONTENT	
Objective and Scope	
CSCM (2000 reviewed 2005)	• To provide guidance and assistance in the decisions required to restore health, independence, control, and self-esteem to people with spinal cord injury • To provide a conceptual framework within which to develop effective strategies for preventing and treating pressure ulcers
RNAO (2007)	• To present nursing best practice guidelines on the assessment and management of stage I to IV pressure ulcers • To identify nursing care related to assessment, management of tissue load, ulcer care, and the management of bacterial colonization and infection of pressure ulcers
WOCN (2003)	• To present an evidence-based guideline for pressure ulcer prevention and management

	• To improve cost-effective patient outcomes as well as increase wound research in the areas where there are gaps between research and practice
Target Population	
CSCM (2000 reviewed 2005)	• United States • Adolescents and adults with spinal cord injury (SCI)
RNAO (2007)	• Canada • Patients in the adult population from all areas of clinical practice with or at risk for developing pressure ulcers
WOCN (2003)	• United States • Patients with or at risk for developing pressure ulcers
Intended Users	
CSCM (2000 reviewed 2005)	Advanced Practice Nurses Allied Health Personnel Health Plans Hospitals Managed Care Organizations Nurses Occupational Therapists Patients Physicians Psychologists/Non-physician Behavioral Health Clinicians Social Workers
RNAO (2007)	Advanced Practice Nurses Nurses

WOCN (2003)	Advanced Practice Nurses Allied Health Personnel Health Care Providers Nurses Physical Therapists Physician Assistants Physicians

TABLE 3: COMPARISON OF RECOMMENDATIONS FOR MANAGEMENT OF PRESSURE ULCERS	
ASSESSMENT	
CSCM (2000 reviewed 2005)	**<u>Assessment Following Onset of a Pressure Ulcer</u>** **Assessment of the Individual With a Pressure Ulcer** Perform an initial comprehensive assessment of the individual with a pressure ulcer, to include: • Complete history • Physical examination and laboratory tests • Psychological health, behavior, cognitive status, and social and financial resources • Availability and utilization of personal care assistance • Positioning, posture, and related equipment *(Scientific evidence: I, II, III, V; Grade of recommendation: A, B, C; Strength of panel opinion: Strong)* **Assessment of the Pressure Ulcer** Describe in detail an existing pressure ulcer. Include the following parameters: • Anatomical location and general appearance • Size (length width, depth, and wound area) • Stage • Exudate/odor • Necrosis

	• Undermining • Sinus tracts • Infection • Healing (granulation and epithelialization) • Wound margins/surrounding tissue *(Scientific evidence: I, II, V; Grade of recommendation: A, B, C; Strength of panel opinion: Strong)*
RNAO (2007)	**<u>Assessment</u>** **Recommendation 1.1** Conduct a history and focused physical assessment. *(Level of Evidence = IV)* *<u>Discussion of Evidence</u>* Pressure ulcers should be assessed in the context of the patient's overall physical and psychological health. A focused physical assessment includes a risk assessment for pressure ulcer development - Appendix C in the original guideline document provides a description of the *Braden Scale for Predicting Pressure Sore Risk.* A French translation of this scale has recently been shown to be reliable and valid in clinical practice. 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. **Recommendation 1.2** Conduct a psychosocial assessment to determine the client's goals and their ability and motivation to comprehend and adhere to the treatment plan of care options. *(Level of Evidence = IV)* **Recommendation 1.3** Assess quality of life from the client's perspective. *(Level of Evidence = IV)* **Recommendation 1.6** Assess all patients for pain related to the pressure ulcer or its

	treatment. *(Level of Evidence = IV)* **Recommendation 1.7** 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. *(Level of Evidence = IIb)* **Recommendation 1.8** 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." *(Level of Evidence = IV)* **Recommendation 1.10** Vascular assessment (e.g., clinical assessment, palpable pedal pulses, capillary refill, ankle/brachial pressure index and toe pressure) is recommended for ulcers in lower extremities to rule out vascular compromise. *(Level of Evidence = IV)* *Discussion of Evidence* 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. It is cautioned, however, that ABPI readings may be unreliable and falsely elevated due to calcification of vessels in patients who have diabetes. Furthermore, research evidence indicates that Doppler ultrasound measurements of ABPI can be also unreliable if operators have not undergone training, adding that reliability can be considerably improved if operators have received appropriate education to undertake this measure.
WOCN (2003)	**Assessment** • Perform risk assessment on entry to a healthcare setting and repeat on a regularly scheduled basis or when there is a significant change in the individual's condition. ***Level of evidence = C.***

	• **Acute care**: Perform initial assessment at admission and reassess at least every 48 hours or whenever the patient's condition changes or deteriorates. • **Long-term care**: Perform initial assessment at admission. Reassess weekly for the first 4 weeks, then quarterly after that, and whenever the resident's condition changes or deteriorates. • **Home-health care**: Perform initial assessment at admission and reassess every visit. • Identify high-risk settings and groups to target prevention efforts to minimize risk. ***Level of evidence = C.*** • Inspect skin and bony prominences at least daily. Any skin changes should be documented including a description of the skin changes as well as any action taken. ***Level of evidence = C.*** • Assess for cognition, sensation, immobility, friction, shear, and incontinence. ***Level of evidence = C.*** • Perform nutritional assessment on entry into a new healthcare setting and whenever there is a change in the individual's condition that may increase the risk of malnutrition. ***Level of evidence = C.*** • Assess laboratory parameters to determine nutritional status, which may include albumin or pre-albumin, transferring, and total lymphocyte count. ***Level of evidence = C.*** • Assess nutrition to measure effectiveness of nutritional interventions. ***Level of evidence = C.*** • Assess for history of prior ulcer and presence of current ulcer, previous treatments, or surgical interventions that increase risk for additional pressure ulcers. ***Level of evidence = C.*** • Assess and monitor pressure ulcer(s) at each dressing change, and reassess and measure at least weekly, including location, tissue type, size, tunneling, exudates, presence/absence of infection, wound edges, stage, periwound skin, pain, and adherence to prevention and treatment. ***Level of evidence = C.*** • Assess for factors that impede healing status, such as comorbid conditions or medications. ***Level of evidence = C.*** • Partial thickness ulcers (stage II) should show evidence of healing within 1 to 2 weeks. Reduction in wound size following 2 weeks of therapy for Stage III and IV pressure ulcers has also been found to predict healing. If the condition of the patients or the wound deteriorates, reevaluate the treatment plan as soon as evidence of deterioration is noted. ***Level of evidence = B.*** • Assess for potential complications such as fistula, abscess, osteomyelitis, bacteremia, cellulites, and cancer. ***Level of evidence = C.***
TREATMENT	
Care Plans	

CSCM (2000 reviewed 2005)	A comprehensive treatment plan includes assessment of risk, health status of the individual, and status of the pressure ulcer. The elements of a treatment plan include cleansing, debridement, dressings, surgery, nutrition and management of tissue loads. These elements represent standard treatment procedures as reflected in current literature and practice. However, new research and innovative approaches are being developed in the areas of adaptive therapies.
RNAO (2007)	**<u>Assessment</u>** **Recommendation 1.2** Conduct a psychosocial assessment to determine the client's goals and their ability and motivation to comprehend and adhere to the treatment plan of care options. *(Level of Evidence = IV)* *<u>Discussion of Evidence</u>* 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. 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 • Social support and social integration in the family • Polypharmacy or overmedication; alcohol and/or drug abuse • Goals, values and lifestyle • Sexuality • Culture and ethnicity • 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 • Stressors, including pain as a symptom • Quality of life 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.
WOCN (2003)	• Implement appropriate strategies/plans to: a. Attain/maintain intact skin b. Prevent complications c. Promptly identify or manage complications d. Involve patient and caregiver in self-management • Implement cost-effective strategies/plans that prevent and treat pressure ulcers
Wound Care	
CSCM (2000 reviewed 2005)	**Cleansing** Cleanse pressure ulcers at each dressing change. • Use minimum mechanical force when cleaning with gauze, cloth, or sponge. • Use enough irrigation pressure to enhance cleansing without causing trauma to the wound. • Use normal saline or wound cleansers. • Avoid antiseptic agents. • Consider hydrotherapy for ulcers containing large amounts of exudate and necrotic tissue. *(Scientific evidence: I, III, V; Grade of recommendation: A, C; Strength of panel opinion: Strong)* **Debridement** Debride devitalized tissue from pressure ulcers using a method appropriate to the ulcer's status and the individual's condition and goals. • Debride areas in which there is eschar and devitalized tissue *(Scientific evidence: V; Grade of recommendation: C; Strength of panel opinion: Strong)* Refer to Table 7 in the original guideline document for a comparison of debridement methods. **Dressings** Use dressings that will keep the ulcer bed continuously moist and the surrounding intact skin dry.

	• Use a dressing that controls exudate, but does not desiccate the ulcer bed or macerate surrounding tissue. • Loosely fill pressure ulcer cavities with dressing material to avoid dead space; avoid overpacking the ulcer. • Monitor the placement of all dressings, especially those in anatomical areas in which they are difficult to keep intact. • Perform dressing changes on a specific schedule based on assessment of the individual, the ulcer, and the condition of the dressing. Consult the dressing manufacturer's package insert for general information and about the frequency of dressing changes. *(Scientific evidence: I, II; Grade of recommendation: A, B; Strength of panel opinion: Strong)* Refer to Table 8 in the original guideline document for a comparison of major dressing categories.
RNAO (2007)	**<u>Local Wound Care</u>** **<u>Assessment</u>** **Recommendation 3.1a** To plan treatment and evaluate its effectiveness, assess the pressure ulcer(s) initially for: • Stage/Depth • Location • Surface Area *(length x width)* (mm^2, cm^2) • Odour • Sinus tracts/Undermining/Tunneling • Exudate • Appearance of the wound bed • Condition of the surrounding skin (periwound) and wound edges *(Level of Evidence = IV)* *<u>Discussion of Evidence</u>* There are several classification systems to describe wound stages, however the NPUAP system is the method most widely accepted. Refer to Appendix H in the original guideline document for a description of the NPUAP classification system. Appendix I - Wound Measurement (see the original guideline document), provides a diagram of the recommended technique for measuring pressure ulcer surface area and undermining. Combining multiple measurement techniques may help to more accurately monitor and evaluate pressure ulcers. This clinical measurement can

be achieved by using a ruler (width/length/depth), other measurement devices, transparency tracings or photography. *Length* is measured as the longest axis of the wound. *Width* is measured at 90 degrees to the length at the next longest axis.

Sibbald, Orsted et al. (2006) suggest that the MEASURE mneumonic can be used to guide a consistent approach to local wound assessment, though it is also emphasized that assessment must occur within the context of a global assessment of the particular client and environment. Refer to Appendix J in the original guideline document for a description of MEASURE.

Numerous tools have been developed for documenting wound assessment. These assessment tools include, but are not limited to: the Pressure Sore Status Tool (PSST); the NPUAP, Pressure Ulcer Scale for Healing (PUSH), the Wound Healing Scale (WHS), and the Sussman Wound Healing Tool (SWHT). Appendix K — Documentation: Wound Assessment Tools (see the original guideline document) provides examples of tools for systematic assessment and documentation.

A clean pressure ulcer with adequate vascular supply receiving adequate treatment should show signs of healing within two to four weeks. 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 and dignity is maintained.

Recommendation 3.1b

Conduct a comprehensive reassessment weekly to determine wound progress and the effectiveness of the treatment plan. Monitor for variances from assessment with each dressing change. Identification of variances indicates need for reassessment.

(Level of Evidence = IV)

Debridement

Recommendation 3.2a

Lower extremity ulcers or wounds in patients who are gravely palliative 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.

(Level of Evidence = IV)

Recommendation 3.2b

Prior to debridement on ulcers on the lower extremities, complete a vascular assessment (e.g., clinical assessment, palpable pedal pulses, capillary refill, ankle/brachial pressure index, and toe pressure) to rule out vascular compromise.

(Level of Evidence = IV)

Recommendation 3.2c

Determine if debridement is appropriate for the patient and the wound.

(Level of Evidence = IV)

Discussion of Evidence

Given the risk and patient safety concerns associated with debridement procedures, the panel strongly emphasizes the need for caution in selecting debridement as an appropriate intervention.

In some instances 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. The eschar provides a barrier to external contamination in a non-healing wound. The topical application of a drying, antimicrobial agent, such as betadine, may be beneficial. In addition, for some wounds the removal of eschar is not necessary (e.g., small areas on heels and toes).

Vascular assessment is essential to ensure patient safety and to determine appropriate treatment options. Although it is recognized that false positive results are possible with palpable pedal pulses and capillary refill assessment, in cases where diagnostic tests are unavailable, these assessments are recognized as useful to support decision making.

Recommendation 3.2d

If debridement is indicated, select the appropriate method of debridement considering:

- Goals of treatment (e.g., healability)
- Client's condition (e.g., end of life, pain, risk of bleeding, patient preference, etc.)
- Type, quantity, and location of necrotic tissue

- The depth and amount of drainage
- Availability of resources

(Level of Evidence = IV)

Recommendation 3.2e

Sharp debridement should be selected when the need is urgent, such as with advancing cellulitis or sepsis, increased pain, exudate, and odour. Sharp debridement must be conducted by a qualified person.

(Level of Evidence = IV)

Recommendation 3.2f

Use sterile instruments to debride pressure ulcers.

(Level of Evidence = IV)

Discussion of Evidence

The general categories of debridement are: sharp (or surgical), enzymatic, autolytic, biologic and mechanical. Refer to Appendix L in the original guideline document for a description of key factors in deciding on a method of debridement.

NGC Note: Refer to p. 36 of the original guideline document for additional discussion of the debridement methods mentioned above.

Wound Cleansing

Recommendation 3.4a

Do not use skin cleansers or antiseptic agents (e.g., povidone iodine, iodophor, sodium hypochlorite solution, hydrogen peroxide, acetic acid) to clean ulcer wounds.

(Level of Evidence = III)

Recommendation 3.4b

Use normal saline, Ringer's lactate, sterile water, or non-cytotoxic wound cleansers for wound cleansing.

(Level of Evidence = IV)

Recommendation 3.4c

Fluid used for cleansing should be warmed at least to room temperature.

(Level of Evidence = III)

Recommendation 3.4d

Cleanse wounds at each dressing change.

(Level of Evidence = IV)

Recommendation 3.4e

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

(Level of Evidence = IV)

Recommendation 3.4f

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 pounds per square inch (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

(Level of Evidence = IIa)

Appendix P in the original guideline document provides a summary of the various wound care cleansers, indications and considerations.

Management Approaches

Recommendation 3.5a

For comprehensive wound management options, consider the following:

- Etiology of the wound
- Client's general health status, preference, goals of care, and environment
- Lifestyle
- Quality of life
- Location of the wound
- Site of the wound, including depth and undermining
- Pain
- A dressing that will loosely fill wound cavity

- Exudate: type and amount
- Risk of infection
- Risk of recurrence
- 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
- Product availability
- Adjunctive therapies

(Level of Evidence = IV)

Recommendation 3.5b

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

(Level of Evidence = Ia)

Recommendation 3.5c

Consider caregiver time when selecting a dressing.

(Level of Evidence = Ib)

Recommendation 3.5d

Consider the following criteria when selecting an interactive dressing:

- Maintains a moist environment *(Level of Evidence = Ia)*
- Controls wound exudate, keeping the wound bed moist and the surrounding intact skin dry *(Level of Evidence = IV)*
- Provides thermal insulation and wound temperature stability *(Level of Evidence = IV)*
- Protects from contamination of outside micro-organisms *(Level of Evidence = IV)*
- Maintains its integrity and does not leave fibres or foreign substances within the wound *(Level of Evidence = IV)*
- Does not cause trauma to wound bed on removal *(Level of Evidence = IV)*
- Client/patient preference *(Level of Evidence = IV)*
- Is simple to handle, and is economical in cost and time *(Level of Evidence = IV)*

Recommendation 3.5e

Monitor dressings applied near the anus, since they are difficult to

	keep intact. Consider use of special sacral-shaped dressings. *(Level of Evidence = Ib)* Appendix Q in the original guideline document provides a summary of various categories of wound dressings, indications and considerations.
WOCN (2003)	**Interventions: Treatment** • Cleanse the wound at each dressing change with a noncytotoxic cleanser, minimizing trauma to the wound. ***Level of evidence = C.*** • Consider the use of high-pressure irrigation to remove slough or necrotic tissue. • Debride the ulcer of devitalized tissue. ***Level of evidence = C.*** • Do not debride dry, black eschar on heels that are nontender, nonfluctuant, nonerythematous and nonsuppurative. ***Level of evidence = C.*** • Perform wound care using topical dressings determined by wound, patient needs, cost, caregiver time, and availability. ***Level of evidence = C.*** • Choose dressings that provide a moist wound environment, keep the periwound skin dry, control exudates, and eliminate dead space. ***Level of evidence = C.*** • Reassess the wound with each dressing change to determine whether modifications are needed as the wound heals or deteriorates. ***Level of evidence = C.***
Infection Management	
CSCM (2000 reviewed 2005)	**<u>Treatment</u>** **Nonsurgical** Topical antibiotics may be used if routine measures do not result in wound healing after several weeks. Broad spectrum agents, such as 1 percent silver sulfadiazine cream, may be used, although cross-sensitivity to other sulfonamides may occur. Mupirocin calcium cream 2 percent may be applied for pressure ulcers infected with *Staphylococcus aureus* and *Streptococcus pyogenes*. Prolonged use may result in overgrowth of nonsusceptible microorganisms, including fungi. **Preoperative Care** • Assess, treat, and optimize the following factors preoperatively: • Local wound infection

	• Osteomyelitis *(Scientific evidence: II, III, V; Grade of recommendation: C; Strength of panel opinion: Strong)* **<u>Complications of Pressure Ulcers</u>** **Nonsurgical** • Identify the presence of tissue and/or bone infection. • Obtain quantitative tissue and/or bone cultures in ulcers not responding to routine therapeutic measures. • Obtain a tissue and/or bone biopsy to confirm infection, if necessary. *(Scientific evidence: III, V; Grade of recommendation: C; Strength of panel opinion: Strong)* • Management of cellulitis, osteomyelitis, and sepsis requires antibiotics. **Surgical** • Identify potential complications of surgical intervention, including: • Wound dehiscence/wound separation • Delayed infection and abscess • Hematoma and seroma *(Scientific evidence: None; Grade of recommendation: Expert consensus; Strength of panel opinion: Strong)*
RNAO (2007)	**<u>Control Bacteria/Infection</u>** **Recommendation 3.3a** The treatment of infection is managed by wound cleansing, systemic antibiotics, and debridement, as needed. *(Level of Evidence = Ib)* **Recommendation 3.3b** Protect pressure ulcers from sources of contamination, e.g., fecal matter *(Level of Evidence = IIa)*

Recommendation 3.3c

Follow Body Substance Precautions (BSP) or an equivalent protocol appropriate for the healthcare setting and the client's condition when treating pressure ulcers.

(Level of Evidence = IV)

Recommendation 3.3d

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.

(Level of Evidence = Ib)

Recommendation 3.3e

Medical management may include appropriate systemic antibiotic therapy for patients with bacteremia, sepsis, advancing cellulitis or osteomyelitis.

(Level of Evidence = Ib)

Recommendation 3.3f

To obtain a wound culture, cleanse wound with normal saline first. Swab wound bed, not eschar, slough, exudate, or edges.

(Level of Evidence = IV)

Recommendation 3.3g

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

(Level of Evidence = IIb)

Discussion of Evidence

Refer to Appendix M in the original guideline document for a description of the clinical signs and symptoms of wound infection.

Please refer to Appendix N in the original guideline document for a listing of commonly used topical antimicrobial agents.

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 a standardized quantitative swab technique can accurately document the bioburden in pressure ulcers. Though there remains much debate surrounding approaches to wound culture sampling, the panel supports the Levine method as it has recently emerged in the literature and current practice as the best approach for obtaining semi-quantitative wound culture swabs. This represents a change from the previously recommended zig-zag method. Most wounds need some form of preparation prior to the culture in order to reduce the risk of introducing extraneous microorganisms into the specimen. 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. Ensure that the swab is moist or alternatively, add normal saline to the wound bed and/or swab. Rotate the swab tip in a 1 cm^2 area of the cleanest and deepest part of the wound and/or area of granulation, using enough pressure to release tissue exudate for a period of five seconds. This may be painful so warn the patient of the possibility of pain. Ensure adequate pain management and pre-medicate (e.g., topical wound analgesia) if possible. For a diagram of swabbing technique for accurate wound culture results, refer to Appendix O — Wound Cultures: Swabbing Techniques (see the original guideline document).
WOCN (2003)	**Interventions: Treatment** • Manage wound infections and differentiate between contamination, colonization, and infection. ***Level of evidence = C.*** • Obtain a quantitative culture or tissue biopsy if high levels of bacteria (>10^5) are suspected in a wound exhibiting clinical signs of infection such as absence of healing. • Use topical antibiotics in wounds cautiously and selectively. ***Level of evidence = C.*** • Consider use of topical antimicrobials if a high level of bacteria is present (>10^5). ***Level of evidence = C.*** • Use systemic antibiotics in the presence of bacteremia, sepsis, advancing cellulitis, or osteomyelitis. ***Level of evidence = C.***
Management of Tissue Load	
CSCM (2000 reviewed	**Support Surfaces and Positioning for Managing Tissue Loads**

2005)	Bed Positioning Use bed-positioning devices and techniques to prevent and treat pressure ulcers. Use devices and techniques that are compatible with the bed type and the individual's health status. • Avoid positioning individuals directly on a pressure ulcer. • Avoid positioning individuals directly on the trochanter. • Use cushions and positioning aids to relieve pressure on pressure ulcers or vulnerable skin areas by elevating them away from the support surface. • Avoid close cutouts or donut-type cushions. • Prevent contact between bony prominences. • Limit the amount of time the head of the bed is elevated. • Develop, display, and use an individualized positioning regimen and repositioning schedule. *(Scientific evidence: II, V; Grade of recommendation: B, C; Strength of panel opinion: Strong)* Bed Support Surfaces Use pressure-reducing bed support surfaces for individuals who are at risk for or who have pressure ulcers. • Select a static support surface for individuals who can be positioned without weight bearing on an ulcer and without bottoming out on the support surface. • Select a dynamic support surface if the individual cannot be positioned without pressure on an ulcer, when a static support surface bottoms out, if there is no evidence of ulcer healing, or if new ulcers develop. • Use low-air loss and air-fluidized beds in the treatment of pressure ulcers if one or more of the following conditions exist: • Pressure ulcers on multiple turning surfaces • Compromised skin temperature and moisture control in the presence of large stage III or IV pressure ulcers *(Scientific evidence: I, II, V; Grade of recommendation: A, B, C; Strength of panel opinion: Strong)* Wheelchair Positioning Prescribe wheelchairs and seating systems according to individualized anthropometric, ergonomic, and functional principles. • Obtain specific body measurements for optimal selection of seating system dimensions. • Measure the effects of posture and deformity on interface pressure distribution.

	• Prescribe a power weight-shifting wheelchair system for individuals who are unable to independently perform an effective weight shift. • Use clinical judgment as well as objective data in determining the compatibility of the individual's shape with the seating system. *(Scientific evidence: II, III, V; Grade of recommendation: B, C; Strength of panel opinion: Strong)* Evaluate the individual's postural alignment, weight distribution, balance, stability, and pressure reduction capabilities to establish a proper sitting schedule. • Avoid positioning the wheelchair-seated individual directly on a pressure ulcer. • Allow limited sitting in individuals capable of performing weight shifts every 15 minutes. • Reposition the wheelchair-seated individual at least every hour; if this is not possible and the individual is unable to perform weight shifts, return the individual to bed. *(Scientific evidence: II, III; Grade of recommendation: B, C; Strength of panel opinion: Strong)* <u>Wheelchair Support Surfaces</u> Use appropriate wheelchair cushions with all individuals with spinal cord injury. • Inspect and maintain all wheelchair cushions at regularly scheduled intervals. *(Scientific evidence: II, V; Grade of recommendation: B, C; Strength of panel opinion: Strong)*
RNAO (2007)	**<u>Assessment</u>** **Recommendation 1.9** 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. *(Level of Evidence = Ia)* Clients identified at risk of developing a pressure ulcer should

receive care on a **low interface pressure mattress.**

Discussion of Evidence

Even when using a high specification foam mattress, other pressure management devices, such as overlays, can be used in combination as needed. Importantly, **despite the use of any pressure management device, repositioning should also be used to prevent further pressure ulcers**. Additional strategies, particularly for special needs pediatric and geriatric populations, can be designed in consultation with the interdisciplinary team.

For further discussion of prevention strategies, the reader is encouraged to consult the RNAO Nursing Best Practice Guideline *Risk Assessment and Prevention of Pressure Ulcers* (Revised) (2005) (See the National Guideline Clearinghouse [NGC] summary of the RNAO guideline).

Management of Causative/Contributing Factors

Recommendation 2.1

Choose the support surface which best fits with the overall care plan for the client considering the goals of treatment, client bed mobility, transfers, caregiver impacts, ease of use, cost/benefit, etc. Ensure ongoing monitoring and evaluation to ensure that the support surface continues to meet the client's needs and that the surface is used appropriately and is properly maintained. If the wound is not healing, consider the total care plan for the client before replacing the surface.

(Level of Evidence = IV)

Recommendation 2.2

Pressure management of the heels while in bed should be considered independently of the support surface.

(Level of Evidence = III)

Recommendation 2.4

Obtain a seating assessment if a client has a pressure ulcer on a sitting surface.

(Level of Evidence = IV)

Recommendation 2.5

Refer patients at RISK to appropriate interdisciplinary team members (Occupational Therapist, Physiotherapist, Enterostomal Therapist, etc). Utilize those with expertise in seating, postural alignment, distribution of weight, balance, stability, and pressure management when determining positioning for sitting individuals. Ensure support surfaces are used appropriately and are properly maintained.

(Strength of Evidence = IV)

Recommendation 2.6

A client with a pressure ulcer on the buttocks and or trochanter should optimize mobilization. If pressure on the ulcer can be managed, encourage sitting as tolerated.

(Strength of Evidence = IV)

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* (Revised) (2005), available at www.rnao.org/bestpractices. Appendix C in the original guideline document provides a sample of the *Braden Scale for Predicting Pressure Sore Risk.*

Importantly, the panel recognizes that the use of support surfaces may be limited by the availability of resources. As there are many factors which may result in the poor healing of pressure ulcers, the panel suggests an exploration of alternative measures to support healing prior to proceeding to a powered support surface (e.g., nutrition, transferring strategies).

All surfaces should be checked to ensure they are not "bottoming out". 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. 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.

WOCN (2003)	**Interventions: Treatment** • Reduce friction and shear. ***Level of evidence = C.*** • Turn patient every 2 hours. ***Level of evidence = C.*** • Utilize positioning devices to avoid placing patient on an ulcer. ***Level of evidence = C.*** • Maintain the head of the bed at 30 degrees elevation for supine positions and 30 degrees or less for side-lying. ***Level of evidence = C.*** • Use pressure relief such as low air loss or air-fluidized mattresses/beds for individuals with Stage III or IV ulcers or those with multiple ulcers over several turning surfaces. ***Level of evidence = A.*** • Shift weight for chair-bound individuals every 15 minutes; if patient cannot perform shifts, caregivers should reposition every hour. ***Level of evidence = C.*** • Limit time in chair and use pressure-relief chair cushions in the presence of pressure ulcers on sitting surfaces. ***Level of evidence = C.*** • Manage fecal and urinary incontinence. ***Level of evidence = C.*** • Select underpads, diapers, or briefs that are absorbent to wick effluent away from the skin. ***Level of evidence = C.***
Pain Management	
CSCM (2000 reviewed 2005)	No recommendations offered.
RNAO (2007)	**Recommendation 1.6** Assess all patients for pain related to the pressure ulcer or its treatment. *(Level of Evidence = IV)* **Recommendation 1.7** 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. *(Level of Evidence = IIb)* *Discussion of Evidence* Pain should be assessed routinely and regularly using the same validated tool each time. Assessment tools should be appropriate for

	the cognitive ability of the patient, and should be easy to use. Although there are a number of validated tools, some of which are adapted for specific patient populations, there are no validated pain assessment tools for use specifically with clients experiencing pressure ulcer pain. However, recent studies have supported the use of the McGill Pain Questionnaire, the Modified Functional Independence Measure (FIM) in combination with the Visual Analogue scale, and the Faces Rating Scale, particularly with cognitively and sensory impaired elderly, to assess pain related to pressure ulcers or associated treatment. For sample assessment tools that have been tested for validity and reliability in adults, please refer to Appendix E in the original guideline document - 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. Case and pilot studies indicate topical analgesia may be useful in treating pressure ulcer pain. Overall, however, 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 an 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* (Revised) (2007) (see the National Guideline Clearinghouse [NGC] Summary of this RNAO guideline). **Recommendation 3.2g** Prevent or manage pain associated with debridement. Consult with a member of the healthcare team with expertise in pain management. Refer to the Registered Nurses' Association of Ontario (RNAO) *Best Practice Guideline Assessment and Management of Pain* (Revised) (2007). *(Level of Evidence = IV)*
WOCN (2003)	Implement measures to eliminate or control pain. ***Level of evidence = C.*** • Turn and reposition patient off ulcer(s) • Use appropriate support surfaces • Use appropriate analgesics to treat procedure-related as well as

	chronic pain (e.g., premedicate as needed prior to dressing change, debridement) • Refer to pain clinic for chronic pressure ulcer pain
Nutrition and Hydration	
CSCM (2000 reviewed 2005)	**Nutrition** • Assess nutritional status of all spinal-cord injury individuals on admission and as needed, based on medical status, including: • Dietary intake • Anthropometric measurements • Biochemical parameters (prealbumin, total protein, albumin, hemoglobin, hematocrit, transferrin, and total lymphocyte count) *(Scientific evidence: II, III, V; Grade of recommendation: B, C; Strength of panel opinion: Strong)* • Provide adequate nutritional intake to meet individual needs, especially for: • Calories (or energy) • Protein • Micronutrients (zinc, vitamin C, vitamin A, and vitamin E) • Fluids *(Scientific evidence: II, III, V; Grade of recommendation: B, C; Strength of panel opinion: Strong)* • Implement aggressive nutritional support measures if dietary intake is inadequate or if an individual is nutritionally compromised. *(Scientific evidence: II; Grade of recommendation: B; Strength of panel opinion: Strong)*
RNAO (2007)	**Recommendation 1.4** Ensure adequate dietary intake to prevent malnutrition or replace existing deficiencies to the extent that this is compatible with the individual's wishes. *(Level of Evidence = III)* **Recommendation 1.5** Prevent clinical nutrient deficiencies by ensuring that the patient is

provided with optimal nutritional support through one or more of the following:

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

Discussion of Evidence

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.

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. For a sample tool focusing on nutritional screening and assessment, refer to Appendix D in the original guideline document which includes the Mini Nutritional Assessment (MNA). The Mini Nutritional Assessment has been validated for use with adults over the age of 55.

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/fn-an/nutrition/weights-poids/guide-ld-adult/bmi_chart_java-graph_imc_java-eng.php. 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.

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.

WOCN (2003)	**Interventions: Treatment** Ensure adequate nutrient and fluid intake to maximize the potential for wound healing: 35 to 40 kcalories per kg of body weight/day for total calories and 1.0 to 1.5 g protein/kg of body weight/day for total protein. ***Level of evidence = C.***
Surgical Intervention	
CSCM (2000 reviewed 2005)	**Reassessment** <u>Surgical</u> Refer appropriate individuals with complex, deep stage III pressure ulcers (i.e., undermining, tracts) or stage IV pressure ulcers for surgical evaluation. When surgery is indicated, include the following tenets of surgical treatment: • Excising of ulcer, surrounding scar, bursa, soft tissue calcification, and underlying necrotic or infected bone • Filling dead space, enhancing vascularity of the healing wound, and distributing pressure off the bone • Resurfacing with a large regional pedicle flap, with suture line away from the area of the direct pressure, and one that does not encroach on adjacent flap territories • Preserving options for future potential breakdowns *(Scientific evidence: V; Grade of recommendation: C; Strength of panel opinion: Strong)* **Preoperative Care** Assess, treat and optimize the following factors preoperatively: • Local wound infection • Nutritional status • Bowel regulation • Severe spasm and contractures • Comorbid conditions • Previous ulcer surgery • Smoking • Osteomyelitis • Urinary tract infection • Heterotopic ossification *(Scientific evidence: II, III, V; Grade of recommendation: B, C; Strength of panel opinion: Strong)*

	Postoperative Care Be cognizant of postoperative care procedures. • Position the individual in a manner that keeps pressure off a fresh surgical site. • Use an air-fluidized bed when pressure on the surgical flap is unavoidable. • Progressively mobilize the individual to a sitting position over at least 4 to 8 weeks to prevent reinjury of the ulcer or surgical site. • Provide subsequent patient education on pressure management and skin inspection. *(Scientific evidence: V; Grade of recommendation: C; Strength of panel opinion: Strong)* **Complications of Pressure Ulcers** Surgical Identify potential complications of surgical intervention, including: • Wound dehiscence/wound separation • Delayed infection and abscess • Hematoma and seroma *(Scientific evidence: None; Grade of recommendation: Expert consensus; Strength of panel opinion: Strong)*
RNAO (2007)	**Surgical Intervention** **Recommendation 3.7** Possible candidates for operative repair are medically stable, adequately nourished and are able to tolerate operative blood loss and postoperative immobility. *(Level of Evidence = IV)* *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. The high recurrence rate and long duration to achieve complete healing are often given as reasons for surgical closure as an appropriate option. 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. 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 patient's functional status.
WOCN (2003)	**Interventions: Treatment** Evaluate the need for operative repair for patients with Stage III and IV ulcers who do not respond to conservative therapy. ***Level of evidence = C.*** • Prior to surgery, the patient should be in an optimal state, and factors associated with impaired healing should be controlled. • Operative procedures include direct closure, skin grafts, and flaps. • A two-stage procedure with separation of wound debridement from the reconstruction is preferable. • Types of flaps used to cover pressure ulcers include fasciocutaneous and myocutaneous flap. The fasciocutaneous flap reportedly provides a better long-term result in surgical reconstruction of pressure ulcers than the myocutaneous flap. • Postoperatively, the operated region must be relieved of pressure with gradual increase in tissue load, and the patient rehabilitated and educated in self-investigation, pressure relief, nutrition and prophylaxis. There is limited evidence supporting the use of either flotation mattresses or air-fluidized beds for post-operative patients. • Surgical reconstructive options for individuals with recurrent Stage III or IV ulcers or multiple pressure ulcers may be limited because of previous surgeries, a shortage of available tissue, and impaired vascularity of the area (Niazi, Salzberg, Bryne, & Viehbeck, 1997). Some patients may not be surgical candidates because of malnutrition, immobility, lack of compliance with treatment regimens, and other chronic diseases. • Rates of surgical complications and recurrence are high. • The risk/benefit of surgery must be discussed with the patient/caregivers.
Adjuvant Therapy	
CSCM (2000 reviewed 2005)	**Treatment** <u>Nonsurgical</u>

	Electrical Stimulation Use electrical stimulation to promote closure of stage III or IV pressure ulcers combined with standard wound care interventions. *(Scientific evidence: I, II; Grade of recommendation: A; Strength of panel opinion: Strong)* <u>Adjunctive Therapies</u> Literature reviews were done for several adjunctive wound therapies, including those that used physical forms of energy, such as ultraviolet radiation, low-energy laser radiation, normothermia, ultrasound, subatmospheric pressure therapy, hyperbaric oxygen, topical agents, cytokine growth factors, and nonantibiotic systemic drugs. These reviews did not provide sufficient supporting evidence to justify recommending them for the treatment of pressure ulcers in individuals with spinal cord injury.
RNAO (2007)	**<u>Adjunctive Therapies</u>** **Recommendation 3.6a** 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. *(Level of Evidence = Ib)* **Recommendation 3.6b** Chronic pressure ulcers may be treated by: • Electrical stimulation *(Level of Evidence = Ib)* • Ultraviolet light C *(Level of Evidence = IIa)* • Warming therapy *(Level of Evidence = Ib)* • Growth factors *(Level of Evidence = Ib)* • Skin equivalents *(Level of Evidence = IV)* • Negative pressure wound therapy *(Level of Evidence = IV)* • Hyperbaric oxygen *(Level of Evidence = IV)* *<u>Discussion of Evidence</u>* 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.
WOCN (2003)	**Interventions: Treatment** Consider adjunctive therapies to enhance the healing of recalcitrant Stage III and IV wounds such as: • Growth Factors--platelet-derived growth factor-BB (rPDGF-BB). ***Level of evidence = A.*** • Electrical stimulation. ***Level of evidence = A.*** • Noncontact normothermic radiant heat therapy. ***Level of evidence = A.*** • Topical negative pressure (i.e., vacuum-assisted wound closure). ***Level of evidence = A.***
Reassessment and Ongoing Care	
CSCM (2000 reviewed 2005)	**Reassessment** Monitor and assess the pressure ulcer on a consistent, ongoing basis to determine the adequacy of the plan of care. • Monitor the pressure ulcer at each dressing change. • Document ulcer assessment at least weekly and every time the condition of the pressure ulcer or the individual changes. *(Scientific evidence: None; Grade of recommendation: Expert consensus; Strength of panel opinion: Strong)* Modify the treatment plan if the ulcer shows no evidence of healing within 2 to 4 weeks. • Review individual risk factors when assessing the healing of pressure ulcers. • Evaluate healing progress using an instrument or other quantitative measurements. *(Scientific evidence: I, V; Grade of recommendation: A, C; Strength of panel opinion: Strong)* **Complications of Pressure Ulcers** <u>Nonsurgical</u> • Identify the potential complications of immobility associated with pressure ulcer management and implement preventive and therapeutic measures for:

	• Nutritional deficiencies and dehydration • Decreased range of motion • Deconditioning (cardiopulmonary, cardiovascular, and musculoskeletal) *(Scientific evidence: III, V; Grade of recommendation: C; Strength of panel opinion: Strong)* • Manage hypergranulation tissue that may impede ulcer healing. *(Scientific evidence: V; Grade of recommendation: C; Strength of panel opinion: Strong)* • Identify the potential psychosocial impacts of pressure ulcers and immobility and provide referral for therapeutic interventions based upon the individual's characteristics and circumstances. Refer to appropriate resources for problem resolution, including: • Vocational rehabilitation services • Peer counseling and support groups • Formal psychotherapy and/or family therapy *(Scientific evidence: III, V; Grade of recommendation: C; Strength of panel opinion: Strong)* <u>Surgical</u> • Identify potential complications of surgical intervention, including: • Wound dehiscence/wound separation • Delayed infection and abscess • Hematoma and seroma *(Scientific evidence: None; Grade of recommendation: Expert consensus; Strength of panel opinion: Strong)*
RNAO (2007)	A clean pressure ulcer with adequate vascular supply receiving adequate treatment should show signs of healing within two to four weeks. 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 and dignity is maintained. **<u>Management of Causative/Contributing Factors</u>** **Recommendation 2.1** Choose the support surface which best fits with the overall care plan

for the client considering the goals of treatment, client bed mobility, transfers, caregiver impacts, ease of use, cost/benefit, etc. Ensure ongoing monitoring and evaluation to ensure that the support surface continues to meet the client's needs and that the surface is used appropriately and is properly maintained. If the wound is not healing, consider the total care plan for the client before replacing the surface.

(Level of Evidence = IV)

Recommendation 3.1b

Conduct a comprehensive reassessment weekly to determine wound progress and the effectiveness of the treatment plan. Monitor for variances from assessment with each dressing change. Identification of variances indicates need for reassessment.

(Level of Evidence = IV)

Discharge/Transfer of Care Arrangements

Recommendation 4.1

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 management/mobility equipment (e.g., support surfaces, seating, special transfer equipment, heel boots)
- 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
- Need for on-going nutritional support

(Level of Evidence = IV)

Recommendation 4.2

Use the Registered Nurses' Association of Ontario Best Practice Guideline Risk Assessment and Prevention of Pressure Ulcers (Revised) (2005) (see the National Guideline Clearinghouse [NGC] summary of the RNAO guideline).

(Level of Evidence = IV)

WOCN (2003)	**Interventions: Treatment** Monitor vigilantly for recurrence of any pressure ulcers, and emphasize to patients and families that measures to prevent and manage pressure ulcers are lifelong endeavors. ***Level of evidence = C.***

TABLE 4: BENEFITS AND HARMS	
Benefits	
CSCM (2000 reviewed 2005)	The benefits of clinical practice guidelines for the spinal cord medicine practice community are numerous. Among the more significant applications and results are the following: • Clinical practice options and care standards • Medical and health professional education and training • Building blocks for pathways and algorithms • Evaluation studies of clinical practice guidelines use and outcomes • Research gap identification • Cost and policy studies for improved quantification • Primary source for consumer information and public education • Knowledge base for improved professional consensus building *Additional benefits include:* • Reduced incidence and recurrence of pressure ulcer in patients with spinal cord injury
RNAO (2007)	• Guideline implementation is intended to help nurses in a variety of health care settings with the assessment and management of stage I to stage IV pressure ulcers in Canadian clients. • Appropriate evaluation and management of pressure ulcers may help promote wound healing, prevent further skin breakdown, and decrease the incidence and severity of pressure ulcers. • 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.
WOCN (2003)	• Early identification of individuals at risk for developing pressure ulcers and early prevention measures.

	• Appropriate strategies/plans to: • Attain/maintain intact skin • Prevent complications • Promptly identify or manage complications • Involve patient and caregiver in self-management • Cost-effective strategies/plans that prevent and treat pressure ulcers
Harms	
CSCM (2000 reviewed 2005)	Mechanical debridement is slow, can be painful, and should be discontinued when necrotic tissue has been removed. Bleeding, the need for anesthesia and its associated risks, and possible injury to nervous or other viable tissue are the main disadvantages of sharp or surgical debridement techniques.
RNAO (2007)	• Debridement may not be appropriate for a limb or digit that is ischemic, and amputation is not possible. • Debridement with a scalpel should be undertaken with caution and performed by specially trained and experienced health care professionals. It causes bleeding, may require anesthetic (for surgical debridement of Stage IV wounds), and has the potential to cause injury to nervous or other viable tissue. • Mechanical debridement is a slow process, can be painful, and should be discontinued when necrotic tissue has been removed. Wet-to-dry dressings in particular are nonselective 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. • Autolytic debridement is slow and should not be utilized on infected ulcers. 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. • Prolonged use of topical antibiotics may facilitate the development of resistant organisms. • Commercial wound cleansers (not skin cleaners) may be appropriate when the wound has adherent material; however, some have shown to be toxic to white blood cells. • Irrigation pressures that exceed 15 pounds per square inch (psi) may cause wound trauma and force bacteria into the tissue. • Avoid occlusive dressings if anaerobic infection is suspected or cultured, as occlusive dressings are thought to promote an anaerobic environment. • The growth of fibroblasts and keratinocytes may be enhanced by pulsed low-intensity direct current due to changes in calcium

	homeostasis.
WOCN (2003)	• Wounds treated with topical antibiotics may develop resistant organisms over time. • Topical creams, ointments, and gels containing antibiotics may cause sensitivity reactions. • Rates of surgical complications and recurrence are high. • Complications rates have been reported at 7% to 49%. • Osteomyelitis has been cited as the major cause of breakdown after surgery and biopsy is recommended to rule out osteomyelitis in Stage IV pressure ulcer patients.

TABLE 5: EVIDENCE RATING SCHEMES AND REFERENCES	
CSCM (2000 reviewed 2005)	**Hierarchy of the Levels of Scientific Evidence:** I. Large randomized trials with clear-cut results (and low risk of error) II. Small randomized trials with uncertain results (and moderate to high risk of error III. Nonrandomized trials with concurrent or contemporaneous controls IV. Nonrandomized trials with historical controls V. Case series with no controls **Categories of the Strength of Evidence Associated With the Recommendations** A. The guideline recommendation is supported by one or more level I studies B. The guideline recommendation is supported by one or more level II studies C. The guideline recommendation is supported only by level III, IV, or V studies **Levels of Panel Agreement with the Recommendation** *Based on a 5-point scale (1 corresponding to neutrality; 5 representing maximum agreement)* Low: Mean agreement score of 1.00 to 2.32 Moderate: Mean agreement score of 2.33 to 3.66

	Strong: Mean agreement score of 3.67 to 5.00 **Note:** If the literature supporting a guideline recommendation came from two or more levels, the number and the level of evidence supporting the studies are reported (e.g., a guideline recommendation that is supported by two studies, one a level III and the other a level V, the scientific evidence would be indicated as III, V). Likewise, if a guideline recommendation is supported by literature that crossed two categories, both categories are reported (e.g., a recommendation that includes both level II and III studies would be classified as category B, C).
RNAO (2007)	**Levels of Evidence** **Ia**: Evidence obtained from meta-analysis or systematic review of randomized controlled trials. **Ib**: Evidence obtained from at least one randomized controlled trial. **IIa**: Evidence obtained from at least one well-designed controlled study without randomization. **IIb**: Evidence obtained from at least one other type of well-designed quasi-experimental study without randomization. **III**: Evidence obtained from well-designed non-experimental descriptive studies, such as comparative studies, correlation studies and case studies. **IV**: Evidence obtained from expert committee reports or opinions and/or clinical experiences of respected authorities.
WOCN (2003)	**Rating Scheme for the Strength of the Evidence** Each article was assigned a level of evidence rating scheme using the following criteria: **Level I**: A randomized controlled trial (RCT) that demonstrates statistically significant difference in at least one important outcome defined by $p<.05$. **Level II**: A RCT that does not meet Level I criteria. **Level III**: A nonrandomized trial with contemporaneous controls selected by some systematic method. A control may have been selected because of its perceived suitability as a treatment option for individual patients. **Level IV**: A before-and-after study or a case series of at least 10 patients using historical controls or controls drawn from other studies.

	Level V: A case series of at least 10 patients with no controls. **Level VI**: A case report of fewer than 10 patients. **Level of Evidence Rating** **Level A**: Two or more RCTs on pressure ulcers in humans (at Levels I or II), meta-analysis of RCTs, or Cochrane Systematic Review of RCTs **Level B**: One or more controlled trials on pressure ulcers in humans or two or more supporting trials in an animal model (at Level III) **Level C**: One supporting controlled trial, at least two supporting case series that were descriptive studies on humans, or expert opinion. Where a level of evidence rating is not included, the information presented represents a consensus of the panel members.

GUIDELINE CONTENT COMPARISON

The Consortium for Spinal Cord Medicine (CSCM), Registered Nurses' Association of Ontario (RNAO) and Wound, Ostomy, and Continence Nurses Society (WOCN) present recommendations for treatment of pressure ulcers. All three guidelines provide explicit reasoning behind their judgments, ranking the level of evidence for each major recommendation. The CSCM and WOCN guidelines are somewhat broader in scope, providing recommendations for the prevention of pressure ulcers in addition to treatment. For prevention recommendations RNAO refers readers to their guideline *Risk Assessment and Prevention of Pressure Ulcers*. CSCM also addresses areas where more research is needed.

The content of the CSCM guideline is tailored to individuals with spinal cord injury. It considers some issues not addressed by RNAO and WOCN, including the need for individualized wheelchair prescribing and additional aspects of positioning relevant to wheelchair-bound patients.

Areas of Agreement

Assessment/Diagnosis

The guidelines are in general agreement that the pressure ulcer should be assessed within the context of the patient's physical and psychosocial health, including functional, nutritional, and cognitive status and comorbidities. They also agree that initial assessment of a pressure ulcer should include careful evaluation and documentation of the wound characteristics, including its location, size, and

depth; existence of tunneling, undermining, and sinus tracts; color of the wound and surrounding tissue; drainage; and odor.

As a recommended initial assessment tool for characterizing ulcer stage, the National Pressure Ulcer Advisory Panel (NPUAP) four-stage system is recommended by both RNAO and WOCN. RNAO acknowledges that there are several classification systems to describe wound stages, but states that the NPUAP system is the method most widely accepted. CSCM notes that, while the NPUAP system is one of several systems developed to describe the depth of pressure ulcers and is the most commonly used, other systems use more descriptive criteria and possess good interrater reliability.

Treatment

Wound Care

The guidelines agree that pressure ulcers should be carefully cleansed, debrided, and dressed. Non-cytotoxic cleansers, specifically normal saline solution, should be used rather than antiseptic solutions. There is overall agreement that irrigation pressure should be strong enough to enhance cleansing without causing trauma to the wound bed.

The guidelines are also in agreement that the method of debridement (autolytic, enzymatic, mechanical, or sharp debridement) should be selected based on the patient's condition, treatment goals, and the amount of eschar and necrotic tissue in the wound. RNAO and WOCN recommends against debridement of dry, black eschar on heels that are nontender, nonfluctuant, nonerythematous and nonsuppurative.

The guidelines also agree that wound dressings should keep the ulcer bed continuously moist and the surrounding tissue dry. The type of dressing should be chosen based on wound characteristics.

Infection Management

WOCN emphasizes the need to distinguish between infection, contamination, and colonization of the wound. All three guidelines agree that clean wounds not responding to treatment within 2 to 4 weeks can be treated with a two-week trial of topical antibiotics. WOCN recommends that topical antibiotics be used cautiously and selectively and be considered when high levels of bacteria are present. The WOCN guideline also notes that wounds treated with topical antibiotics may develop resistant organisms over time. RNAO notes that the topical antibiotic should be effective against gram-negative, gram-positive and anaerobic organisms. All three guidelines agree that when infection is suspected, an appropriate deep tissue culture or biopsy should be obtained. There is also overall agreement that systemic antibiotics are appropriate when there is evidence of cellulitis, osteomyelitis, or sepsis.

Tissue Load Management

All three guidelines address tissue load management, including the need to protect tissue by minimizing pressure and shear. All three guidelines address positioning, use of pressure-reducing devices, and lifting and positioning aids both to aid healing of pressure ulcers and prevent development of new ulcers. The CSCM guideline, targeting care for persons with spinal cord injury, provides the most extensive recommendations concerning wheelchair positioning, including the need to prescribe wheelchairs according to individualized anthropometric, ergonomic, and functional principles and to regularly inspect wheelchair cushions.

Pain Management

RNAO also recommends that pain be assessed routinely and regularly using the same validated tool each time. RNAO and WOCN specifically note the need for management of pain associated with debridement.

Nutritional Support

The guidelines are in general agreement that measures should be taken to assess nutritional status and ensure adequate nutrition and hydration. CSCM and WOCN point out the need for optimal protein intake to promote wound healing. RNAO and CSCM consider the need for nutritional supplements. RNAO also notes that there are a number of appropriate steps to take to ensure that the patient is provided with optimal nutritional support. These steps include consultation with a dietitian, consultation with a speech language pathologist for swallowing assessment, or enteral tube feeding (among others).

Surgical Intervention

All three guidelines recommend that surgical intervention be considered for Stage III and IV ulcers that have not responded to conservative therapy. RNAO notes that 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 functional status. CSCM addresses surgery in the greatest detail, including recommendations for preoperative and postoperative care and potential post-surgery complications in persons with spinal cord injury.

Adjuvant Therapy

All three guidelines address the use of adjuvant therapies when an ulcer has not responded to conventional therapy. All agree that electrical stimulation is an appropriate therapy to consider. There are differences, however, among the guidelines concerning the effectiveness of other adjuvant therapies; these differences are discussed below.

Reassessment and Ongoing Care

The guidelines are in general agreement that pressure ulcers should be monitored at each dressing change and reassessed at least weekly.

CSCM points out the need to identify the potential psychosocial impacts of pressure ulcers and immobility in persons with spinal cord injury and to provide

referral for therapeutic interventions such as vocational rehabilitation, peer counseling, support groups, and psychotherapy.

Areas of Differences

Adjuvant Therapy

Although there is general agreement that electrical stimulation is an appropriate therapy to consider, there is less agreement concerning other adjuvant therapies. For example, CSCM did not find sufficient evidence to recommend any adjuvant therapy except electrical stimulation, whereas RNAO and WOCN state that growth factors, negative pressure therapy, as well as heat therapy can be helpful for chronic non-healing wounds. In contrast to both CSCM and WOCN, RNAO also notes that physiotherapy, ultraviolet light C, skin equivalents, and hyperbaric oxygen may also be used to treat chronic pressure ulcers.

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