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*Nursing Best Practice Guideline*  
*Shaping the future of Nursing*

# *Assessment and Management of Venous Leg 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 healthcare colleagues, nurse educators in academic and practice settings, and employers. After lodging these guidelines into their minds and hearts, knowledgeable and skillful nurses and nursing students need healthy and supportive work environments to help bring these guidelines to life.

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

RNAO will continue to work hard at developing 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/environment, as well as the needs and wishes of the client. Guidelines should not be applied in a “cookbook” fashion but used as a tool to assist in decision making for individualized client care, as well as ensuring that appropriate structures and supports are in place to provide the best possible care.

Nurses, other healthcare professionals and administrators who are leading and facilitating practice changes will find this document valuable for the development of policies, procedures, protocols, educational programs, assessment and documentation tools. It is recommended that the nursing best practice guidelines be used as a resource tool. It is not necessary, nor practical that every nurse have a copy of the entire guideline. Nurses providing direct client care will benefit from reviewing the recommendations, the evidence in support of the recommendations and the process that was used to develop the guidelines. However, it is highly recommended that practice settings/environments adapt these guidelines in formats that would be user-friendly for daily use. This guideline has some suggested formats for such local adaptation and tailoring.



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

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

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

## Guideline Development Panel Members

Kathryn Kozell, RN, BA, BScN, MScN,  
ACNP/CNS, ET

(Co-Team Leader)

GI Surgery Ostomy/Wound  
St. Joseph's Healthcare London  
St. Joseph's Site  
London, Ontario

Susan Mills-Zorzes, RN, BScN, CWOCN

(Co-Team Leader)

Enterostomal Therapy Nurse  
St. Joseph's Care Group  
Thunder Bay, Ontario

Patti Barton, RN, PHN, ET

Ostomy, Wound and Skin Consultant  
Specialty ET Services  
Toronto, Ontario

Marion Chipman, RN

ONA Representative  
Staff Nurse  
Shaver Rehabilitation Hospital  
St. Catharines, Ontario

Patricia Coutts, RN

Wound Care & Clinical Trials Coordinator  
The Mississauga Dermatology Centre  
Office of Dr. R. Gary Sibbald  
Mississauga, Ontario

Diane Gregoire, RN, ET, MScN

Spina Bifida Service Coordinator  
Coordinatrice des Services de Spina Bifida  
Ottawa, Ontario

Margaret Harrison, RN, PhD

Associate Professor  
School of Nursing  
Queen's University  
Kingston, Ontario  
Nurse Scientist  
Clinical Epidemiology Program  
Ottawa Health Research Institute  
Ottawa, Ontario

Terri Labate, RN, CRRN, GNC(C), BScN (candidate)

Staff Nurse  
St. Joseph's Healthcare London  
Parkwood Site  
London, Ontario

Karen Lorimer, RN, MScN (candidate)

Clinical Leader  
Ottawa-Carleton Regional Leg Ulcer Project  
Ottawa, Ontario

Sheri Oliver, RPN

Project Coordinator  
Nursing Education Initiative  
Registered Practical Nurses Association  
of Ontario  
Mississauga, Ontario

Nancy Parslow, RN, ET

Enterostomal/Wound Care Consultant  
Calea  
Toronto, Ontario

Josephine Santos, RN, MN

Facilitator, Project Coordinator  
Nursing Best Practice Guidelines Project  
Registered Nurses Association of Ontario  
Toronto, Ontario

## *Assessment & Management of Venous Leg Ulcers*

*Project team:*

***Tazim Virani***, RN, MScN  
Project Director

***Josephine Santos***, RN, MN  
Project Coordinator

***Heather McConnell***, RN, BScN, MA(Ed)  
Project Manager

***Jane Schouten***, RN, BScN, MBA  
Project Coordinator

***Stephanie Lappan-Gracon***, RN, MN  
Coordinator – Best Practice Champions Network

***Carrie Scott***  
Project Assistant

***Elaine Gergolas***, BA  
Project Coordinator – Advanced Clinical/Practice  
Fellowships

***Melissa Kennedy***, BA  
Project Assistant

***Keith Powell***, BA, AIT  
Web Editor

Registered Nurses Association of Ontario  
Nursing Best Practice Guidelines Project  
111 Richmond Street West, Suite 1100  
Toronto, Ontario M5H 2G4  
[www.rnao.org/bestpractices](http://www.rnao.org/bestpractices)



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### Marlene Allen

Physiotherapist  
*Oshawa, Ontario*

### Lucy Cabico

Nurse Practitioner/Clinical Nurse Specialist  
Baycrest Centre for Geriatric Care  
*Toronto, Ontario*

### Karen Campbell

Nurse Practitioner/Clinical Nurse Specialist  
Parkwood Hospital  
*London, Ontario*

### Dawn-Marie Clarke

Chiropodist  
Shaver Rehabilitation Hospital  
*St. Catharines, Ontario*

### Debra Clutterbuck

Registered Practical Nurse  
*Cambridge, Ontario*

### Nicole Denis

Enterostomal Therapy Nurse  
The Ottawa Hospital  
*Ottawa, Ontario*

### Elaine Diebold

Enterostomal Therapy Nurse  
*Durham, Ontario*

### Geneviève Grégoire

Dietetic Intern  
*Moncton, New Brunswick*

### Connie Harris

Enterostomal Therapist/Consultant  
*Kitchener, Ontario*

### Cheri Hernandez

Associate Professor  
Faculty of Nursing  
University of Windsor  
*Windsor, Ontario*

### Dr. Pamela Houghton

Associate Professor  
School of Physiotherapy  
University of Western Ontario  
*London, Ontario*

### Madge Legrace

Registered Nurse  
*Unionville, Ontario*

### Dr. Ronald Mahler

Dermatologist  
Thunder Bay Medical Centre  
*Thunder Bay, Ontario*

### Stephanie McIntosh

Consumer

### Marie-Andre Meloche

Victorian Order of Nurses – Peel  
*Mississauga, Ontario*

### Beverly Monette

Clinical Nurse Consultant  
Dell Pharmacy, Home Health Care Centre  
*Hamilton, Ontario*

**Sue Morrell-DeVries**

Nurse Coordinator, Vascular Surgery  
Toronto General Hospital  
*Toronto, Ontario*

**Dr. Gary Sibbald**

Director of Dermatology Day Care and  
Wound Healing Clinic  
Sunnybrook & Women's College Health  
Sciences Centre  
Associate Professor & Director  
Continuing Education  
Department of Medicine  
University of Toronto  
*Toronto, Ontario*  
The Mississauga Dermatology Centre  
*Mississauga, Ontario*

**Jennifer Skelly**

Associate Professor  
McMaster University  
*Hamilton, Ontario*

**Louise Spence**

Hamilton-Wentworth Community Care  
Access Centre  
*Hamilton, Ontario*

**Dr. Terry Trusdale**

Varicose & Spider Vein Treatment  
*Kakabeka Falls, Ontario*

**Hélène Villeneuve**

Dietitian  
*Sarsfield, Ontario*

**Claire Westendorp**

Enterostomal Therapist  
Kingston General Hospital  
*Kingston, Ontario*

**Meta Wilson**

Consumer

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**Principal Investigators:**

Nancy Edwards, RN, PhD  
Barbara Davies, RN, PhD  
University of Ottawa

**Evaluation Team:**

Maureen Dobbins, RN, PhD  
Jenny Ploeg, RN, PhD  
Jennifer Skelly, RN, PhD  
McMaster University

Patricia Griffin, RN, PhD  
University of Ottawa

**Project Staff:**

University of Ottawa  
Barbara Helliwell, BA(Hons); Marilyn Kuhn, MHA; Diana Ehlers, MA(SW), MA(Dem);  
Lian Kitts, RN; Elana Ptack, BA; Isabelle St-Pierre, BScN, MScN(cand.)

## Contact Information

**Registered Nurses Association  
of Ontario**

Nursing Best Practice Guidelines Project  
111 Richmond Street West, Suite 1100  
Toronto, Ontario  
M5H 2G4

**Registered Nurses Association  
of Ontario**

Head Office  
438 University Avenue, Suite 1600  
Toronto, Ontario  
M5G 2K8

# *Assessment and Management of Venous Leg Ulcers*

## **Disclaimer**

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

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## Summary of Recommendations

	RECOMMENDATION	*LEVEL OF EVIDENCE
Practice Recommendations	<b>A. ASSESSMENT</b>	
	1. Assessment and clinical investigations should be undertaken by healthcare professional(s) trained and experienced in leg ulcer management.	C
	2. A comprehensive clinical history and physical examination including blood pressure measurement, weight, urinalysis, blood glucose level and Doppler measurement of Ankle Brachial Pressure Index (ABPI) should be recorded for a client presenting with either their first or recurrent leg ulcer and should be ongoing thereafter.	C
	3. Information relating to ulcer history should be documented in a structured format.	C
	4. Examine both legs and record the presence/absence of the following to aid in the assessment of underlying etiology.  <b>Venous Disease:</b> <ul style="list-style-type: none"> <li>■ usually shallow moist ulcers</li> <li>■ situated on the gaiter area of the leg</li> <li>■ edema</li> <li>■ eczema</li> <li>■ ankle flare</li> <li>■ lipodermatosclerosis</li> <li>■ varicose veins</li> <li>■ hyperpigmentation</li> <li>■ atrophie blanche</li> </ul> <b>Arterial Disease:</b> <ul style="list-style-type: none"> <li>■ ulcers with a “punched out” appearance</li> <li>■ base of wound poorly perfused, pale, dry</li> <li>■ cold legs/feet (in a warm environment)</li> <li>■ shiny, taut skin</li> <li>■ dependent rubor</li> <li>■ pale or blue feet</li> <li>■ gangrenous toes</li> </ul>	C

\* See page 18 for details regarding Interpretation of Evidence

	RECOMMENDATION	*LEVEL OF EVIDENCE	
Practice Recommendations	5. Measure the surface areas of ulcers, at regular intervals, to monitor progress. Maximum length and width, or tracings onto a transparency are useful methods.	B	
	6. The client's estimate of the quality of life should be included in the initial discussion of the treatment plan, throughout the course of treatment, and when the ulcer has healed.	C	
	7. Assess the functional, cognitive and emotional status of the client and family to manage self-care.	C	
	8. Regular ulcer assessment is essential to monitor treatment effectiveness and healing goals.	C	
	<b>B. DIAGNOSTIC EVALUATION</b>		
	9. Venous disease of the leg is most commonly detected by a combination of clinical examination and measurement of a reliably taken Ankle Brachial Pressure Index (ABPI).	A	
	10. Doppler ultrasound measurement of Ankle Brachial Pressure Index (ABPI) should be done by practitioners trained to undertake this measure.	B	
	11. If there are no signs of chronic venous insufficiency and the Ankle Brachial Pressure Index (ABPI) is abnormal (greater than 1.2 or less than 0.8), arterial etiology should be assumed and a vascular opinion sought.	C	
	12. Vascular assessment, such as Ankle Brachial Pressure Index (ABPI) is recommended for ulcers in lower extremities, prior to debridement, to rule out vascular compromise.	C	
	<b>C. PAIN</b>		
	13. Assess Pain.	C	
	14. Pain may be a feature of both venous and arterial disease, and should be addressed.	B	

	RECOMMENDATION	*LEVEL OF EVIDENCE
Practice Recommendations	15. Prevent or manage pain associated with debridement. Consult with a physician and pharmacist as needed.	C
	<b>D. VENOUS ULCER CARE</b>	
	16. Choose the technique of debridement, considering the type, quantity and location of non-viable tissue, the depth of the wound, the amount of wound fluid and the general condition and goals of the client.	C
	17. Cleansing of the ulcer should be kept simple; warm tap water or saline is usually sufficient.	C
	18. Dressings must be simple, low adherent, acceptable to the client and should be low cost.	A
	19. Avoid products that commonly cause skin sensitivity, such as those containing lanolin, phenol alcohol, or topical antibiotics.	C
	20. Choose a type of dressing depending on the amount of exudate and the phase of healing.	C
	21. No specific dressing has been demonstrated to encourage ulcer healing.	A
	22. In contrast to drying out, moist wound conditions allow optimal cell migration, proliferation, differentiation and neovascularization.	A
	23. Refer clients with suspected sensitivity reactions to a dermatologist for patch testing. Following patch testing, identified allergens must be avoided, and medical advice on treatment should be sought.	B
	24. Venous surgery followed by graduated compression hosiery is an option for consideration in clients with superficial venous insufficiency.	C
	25. Biological wound coverings and growth factor treatments should not be applied in cases of wound infection.	C

	RECOMMENDATION	*LEVEL OF EVIDENCE
Practice Recommendations	26. Optimal nutrition facilitates wound healing, maintains immune competence, and decreases the risk of infection.	B
	<b>E. INFECTION</b>	
	27. Assess for infection.	A
	28. An infection is indicated when $> 10^5$ bacteria/gram tissue is present.	B
	29. The treatment of infection is managed by debridement, wound cleansing and systemic antibiotics.	A
	30. Antibiotics should only be considered if the ulcer is clinically cellulitic (presence of some of the following signs and symptoms: pyrexia; increasing pain; increasing erythema of surrounding skin; purulent exudate; rapid increase in ulcer size).	C
	31. Do not use topical antiseptics to reduce bacteria in wound tissue, e.g., povidone iodine, iodophor, sodium hypochlorite, hydrogen peroxide, or acetic acid.	B
	32. Topical antibiotics and antibacterial agents are frequent sensitizers and should be avoided.	B
	<b>F. COMPRESSION</b>	
	33. The treatment of choice for clinical venous ulceration uncomplicated by other factors, is graduated compression bandaging, properly applied, and combined with exercise. Graduated compression is the main treatment for venous eczema.	A
	34. High compression increases venous ulcer healing and is more effective than low compression, but should only be used where ABPI $\geq 0.8$ and ulcer is clinically venous.	A
	35. Compression bandages should only be applied by a suitably trained and experienced practitioner.	B

	RECOMMENDATION	*LEVEL OF EVIDENCE
Practice Recommendations	36. Venous ulceration should be treated with high compression bandaging to achieve a pressure between 35-40 mm Hg. at the ankle, graduating to half at calf in the normally shaped limb, as per La Place's Law.	C
	37. Use protective padding over bony prominences when applying high compression.	C
	38. Arterial insufficiency is a contraindication to the use of high compression. A modified form of compression may be used under specialist supervision.	C
	39. Use compression with caution in clients with diabetes, those with connective tissue disease and the elderly.	C
	40. Compression therapy should be modified until clinical infection is treated.	C
	41. Bandages should be applied according to manufacturer's recommendations.	C
	42. When using elastic systems such as "high compression" bandages, the ankle circumference must be more than or padded to equal 18 cms.	C
	43. Ankle circumference should be measured at a distance of 2.5 cm (one inch) above the medial malleolus.	C
	44. The concepts, practice, and hazards of graduated compression should be fully understood by those prescribing and fitting compression stockings.	A
	45. Graduated compression hosiery should be measured and fitted by a certified fitter.	C
	46. To maintain a therapeutic level of compression, stockings should be cared for as per manufacturer's instructions, and replaced every six months.	C
	47. Graduated compression hosiery should be prescribed for life.	B
	48. External compression applied using various forms of pneumatic compression pumps is indicated for individuals with chronic venous insufficiency.	A

	RECOMMENDATION	*LEVEL OF EVIDENCE
Practice Recommendations	49. The client should be prescribed regular vascular exercise by means of intensive controlled walking and exercises to improve the function of the upper ankle joint and calf muscle pump.	A
	<b>G. COMPLEMENTARY THERAPIES</b>	
	50. Consider electrical stimulation in the treatment of venous leg ulcers.	B
	51. Hyperbaric oxygen may reduce ulcer size in non-diabetic, non-atherosclerotic leg ulcers.	A
	52. Therapeutic ultrasound may be used to reduce the size of chronic venous ulcers.	A
	<b>H. REASSESSMENT</b>	
	53. With no evidence of healing, a comprehensive assessment should be carried out at three-month intervals, or sooner if clinical condition deteriorates.	C
	54. For resolving and healing venous leg ulcers, routine assessment at six-month intervals should include: physical assessment; Ankle Brachial Pressure Index (ABPI); replacement of compression stockings; and reinforcement of teaching.	C
	<b>I. SECONDARY PREVENTION</b>	
	55. Measures to prevent recurrence of a venous leg ulcer include: wearing compression stockings, regular follow-up to monitor Ankle Brachial Pressure Index (ABPI), discouragement of self-treatment with over-the-counter preparations, and avoidance of accidents or trauma to legs.	C
	56. Inform the client after the ulcer has healed regarding: wearing and maintenance of compression stockings; elevation of affected limb above level of heart when at rest; early referral at first sign of skin breakdown or trauma to limb; need for exercise and ankle-joint mobility; appropriate skin care; avoidance of products likely to be sensitizers; and life-long use of compression.	C

	RECOMMENDATION	*LEVEL OF EVIDENCE
Education Recommendations	57. Guidelines are more likely to be effective if they take into account local circumstances and are disseminated by an ongoing education and training program.	C
	58. Develop educational programs that target appropriate healthcare providers, clients, family members, and caregivers. Develop programs that maximize retention, ensure carryover into practice, and support lifestyle changes. Present information at an appropriate level for the target audience using principles of adult learning.	C
	59. 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.	C
	60. All healthcare professionals should be trained in leg ulcer assessment and management.	C
	61. Education programs for healthcare professionals should include: <ul style="list-style-type: none"> <li>■ pathophysiology of leg ulceration</li> <li>■ leg ulcer assessment</li> <li>■ need for Doppler ultrasound to measure Ankle Brachial Pressure Index (ABPI)</li> <li>■ normal and abnormal wound healing</li> <li>■ compression therapy theory, management, and application</li> <li>■ dressing selection</li> <li>■ principles of debridement</li> <li>■ principles of cleansing and infection control</li> <li>■ skin care of the lower leg</li> <li>■ peri-wound skin care and management</li> <li>■ psychological impact of venous stasis disease</li> <li>■ quality of life</li> <li>■ pain management</li> <li>■ teaching and support for care provider</li> <li>■ health education</li> <li>■ preventing recurrence</li> <li>■ principles of nutritional support with regard to tissue integrity</li> <li>■ mechanisms for accurate documentation and monitoring of pertinent data, including treatment interventions and healing progress</li> <li>■ criteria for referral for specialized assesment</li> </ul>	C

	RECOMMENDATION	*LEVEL OF EVIDENCE
Education Recommendations	62. Healthcare professionals with recognized training in leg ulcer care should cascade their knowledge and skills to local healthcare teams.	C
	63. The knowledge and understanding of the healthcare professional is a major factor in adherence to treatment regimens.	C
Organization & Policy Recommendations	64. Successful implementation of a venous ulcer treatment policy/strategy requires: <ul style="list-style-type: none"> <li>■ dedicated funding</li> <li>■ integration of healthcare services</li> <li>■ support from all levels of government</li> <li>■ management support</li> <li>■ human resources</li> <li>■ financial resources</li> <li>■ functional space</li> <li>■ commitment</li> <li>■ collection of baseline information about vulnerable populations</li> <li>■ resources and existing knowledge</li> <li>■ interpretation of above data and identification of organizational problems</li> </ul>	C
	65. Nursing best practice guidelines can be successfully implemented only where there are adequate planning, resources, organizational and administrative support, as well as appropriate facilitation. Organizations may wish to develop a plan for implementation that includes: <ul style="list-style-type: none"> <li>■ An assessment of organizational readiness and barriers to education.</li> <li>■ Involvement of all members (whether in a direct or indirect supportive function) who will contribute to the implementation process.</li> <li>■ Dedication of a qualified individual to provide the support needed for the education and implementation process.</li> <li>■ Ongoing opportunities for discussion and education to reinforce the importance of best practices.</li> <li>■ Opportunities for reflection on personal and organizational experience in implementing guidelines.</li> </ul> <p>In this regard, RNAO (through a panel of nurses, researchers and administrators) has developed the <i>Toolkit: Implementation of Clinical Practice Guidelines</i>, based on available evidence, theoretical perspectives and consensus. The RNAO strongly recommends the use of this <i>Toolkit</i> for guiding the implementation of the best practice guideline on <i>Assessment and Management of Venous Leg Ulcers</i>.</p>	C

## Interpretation of Evidence

**This RNAO guideline** is a synthesis of a number of source guidelines. In order to fully inform the reader, every effort has been made to maintain the original level of evidence cited in the source document. No alterations have been made to the wording of the source documents involving recommendations based on randomized controlled trials or research studies. Where a source document has demonstrated an “expert opinion” level of evidence, wording may have been altered and the notation of [RNAO Consensus Panel 2004](#) has been added.

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In the guidelines reviewed, the panel assigned each recommendation a rating of A, B, or C level of evidence (LOE), to indicate the strength of the evidence supporting the recommendation. It is important to clarify that these ratings represent the strength of the supporting research evidence to date.

**LEVEL OF EVIDENCE A:** Evidence obtained from at least one randomized controlled trial or meta-analysis of randomized controlled trials.

**LEVEL OF EVIDENCE B:** Evidence from well designed clinical studies but no randomized controlled trials.

**LEVEL OF EVIDENCE C:** Evidence from expert committee reports or opinion and/or clinical experience or respected authorities. Indicates absence of directly applicable studies of good quality.



## *Responsibility for Development*

The Registered Nurses Association of Ontario, 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. Assessment and management of venous leg ulcers is one of six nursing best practice guidelines developed in the third cycle of the project. The RNAO convened a panel to develop this guideline, conducting its work independent of any bias or influence from the Ministry of Health and Long-Term Care.

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## *Purpose and Scope*

The purpose of this guideline is to:

- improve outcomes for venous leg ulcer clients;
- assist practitioners to apply the best available research evidence to clinical decisions;  
and
- promote the responsible use of healthcare resources.

Best practice guidelines are systematically developed statements to assist practitioners and clients' decisions about appropriate healthcare (Field & Lohr, 1990; McKibbon, Eady & Marks, 1999). This best practice guideline is intended to provide direction to practicing nurses in all care settings, both institutional and community, in the assessment and management of venous leg ulcers, including prevention of recurrence wherever possible.

The guideline focuses on:

1. Practice Recommendations: directed at the nurse to guide practice regarding assessment, planning and interventions.
2. Education Recommendations: directed at educational institutions and organizations in which nurses work to support its implementation.
3. Organization and Policy Recommendations: directed at practice settings and environment to facilitate nurses' practice.
4. Evaluation and monitoring indicators.

This nursing best practice guideline contains recommendations for Registered Nurses (RNs) and Registered Practical Nurses (RPNs). Although these guidelines are written for the nurse, venous leg ulcer care is an interdisciplinary endeavour. Many settings have formalized interdisciplinary teams and the 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 client/family wishes and local circumstances.

It is the intention of this guideline to identify best nursing practices in the treatment of venous leg ulcers. It is acknowledged that the individual competency of nurses varies between nurses and across categories of nursing professionals (RNs and RPNs) and is based on the knowledge, skills, attitudes and judgment enhanced over time by experience and education.

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It is expected that individual nurses will perform only those aspects of venous leg ulcer assessment and management for which they have appropriate education and experience. Further, it is expected that nurses, both RNs and RPNs, will seek consultation in instances where the client's care needs surpass the individual nurse's ability to act independently. It is acknowledged that effective client care depends on a coordinated interdisciplinary approach incorporating ongoing communication between health professionals and clients, ever mindful of the personal preferences and unique needs of each individual client.

## *Guideline Development Process*

**In February of 2001**, a panel of nurses with expertise in the practice and research related to venous leg ulcers, from community and academic settings, was convened under the auspices of the RNAO. At the onset the panel discussed and came to consensus on the scope of the best practice guideline.

A search of the literature for systematic reviews, clinical practice guidelines, relevant articles and websites was conducted. See Appendix A for a detailed outline of the search strategy employed.

The panel identified a total of eleven clinical practice guidelines related to venous leg ulcers. An initial screening was conducted with the following criteria:

- Guideline was in English.
- Guideline was dated no earlier than 1998 as significant changes in venous leg ulcer management occurred in that year.
- Guideline was strictly about the topic area.
- Guideline was evidence-based (e.g., contained references, description of evidence, sources of evidence).
- Complete guideline was available and accessible for retrieval.

Eight guidelines were short-listed for critical appraisal using the “Appraisal Instrument for Clinical Practice Guidelines” (Cluzeau et al., 1997). This appraisal tool allowed for evaluation in three key dimensions: rigour, content and context, and application.

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The panel, following the appraisal process, identified the following guidelines, and related updates, to adapt and modify recommendations:

Clement, D. L. (1999). Venous ulcer reappraisal: Insights from an international task force. *Journal of Vascular Research*, 36(Suppl.1), 42-47.

Clinical Resource Efficiency Support Team (CREST) (1998a). Guidelines for the assessment and management of leg ulceration. CREST, Belfast, Northern Ireland [On-line]. Available: <http://www.ni-nhs.uk/crest/index.htm>

Compliance Network Physicians/Health Force Initiative, Inc. (1999). Guideline for the out-patient treatment – venous and venous-arterial mixed leg ulcer. Compliance Network Physicians/Health Force Initiative, Inc., Berlin, Germany [On-line]. Available: <http://www.cnhfi.de/index-engl.html>

Kunimoto, B., Cooling, M., Gulliver, W., Houghton, P., Orsted, H., & Sibbald, R. G. (2001). Best practices for the prevention and treatment of venous leg ulcers. *Ostomy/Wound Management*, 47(2), 34-50.

New Zealand Guidelines Group (NZGG) (1999). Care of people with chronic leg ulcers: An evidence based guideline. New Zealand Guidelines Group [On-line]. Available: <http://www.nzgg.org.nz/library.cfm>

Ottawa-Carleton Community Care Access Centre Leg Ulcer Care Protocol Task Force (2000). *Ottawa-Carleton Community Care Access Centre (CCAC) venous leg ulcer care protocol: Development, methods, and clinical recommendations*. Ottawa, Ontario: Ottawa-Carleton CCAC Leg Ulcer Protocol Task Force.

Royal College of Nursing (RCN) (1998). Clinical practice guideline: The management of patients with venous leg ulcers. RCN Institute, Centre for Evidence-Based Nursing, University of York and the School of Nursing, Midwifery and Health Visiting, University of Manchester [On-line]. Available: <http://www.rcn.org.uk>

Scottish Intercollegiate Guidelines Network (SIGN) (1998). The care of patients with chronic leg ulcers: A national clinical guideline. Scottish Intercollegiate Guidelines Network [On-line]. Available: <http://www.show.scot.nhs.uk/sign/home.htm>

The Ottawa-Carleton Community Care Access Centre Venous Leg Ulcer Care Protocol (2000) is a synthesis guideline that was based on all of the above noted guidelines with the exception of the Care of People with Chronic Leg Ulcers: An Evidence Based Guideline which was developed by the New Zealand Guidelines Group (1999).

A critique of systematic review articles and pertinent literature was conducted to update the existing guidelines. Through a process of evidence gathering, synthesis and consensus, a draft set of recommendations was established. This draft document was submitted to a set of external stakeholders for review and feedback – an acknowledgement of these reviewers is provided at the front of this document. Stakeholders represented various healthcare professional groups, clients and families, as well as professional associations. External stakeholders were provided with specific questions for comment, as well as the opportunity to give overall feedback and general impressions. The results were compiled and reviewed by the development panel – discussions and consensus resulted in revisions to the draft document prior to pilot testing.

A pilot implementation practice setting was identified through a “Request for Proposal” (RFP) process. Practice settings in Ontario were asked to submit a proposal if they were interested in pilot testing the recommendations of the guideline. These proposals were then subjected to a review process, from which a successful practice setting was identified. A nine-month pilot implementation was undertaken to test and evaluate the recommendations. The evaluation took place in a chronic care hospital and community care organization in Southern Ontario. An acknowledgement of these organizations is included at the front of this document. The development panel reconvened after the pilot implementation in order to review the experiences of the pilot site, consider the evaluation results, and review any new literature published since the initial development phase. All these sources of information were used to update/revise the document prior to publication.



## Definition of Terms

An additional Glossary of Terms related to clinical aspects of the document is located in Appendix B.

**Clinical Practice Guidelines or Best Practice Guidelines:** Systematically developed statements (based on best available evidence) to assist practitioner and client decisions about appropriate healthcare for specific clinical (practice) circumstances (Field & Lohr, 1990).

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

**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).

**Meta-analysis:** The use of statistical methods to summarize the results of independent studies, thus providing more precise estimates of the effects of healthcare than those derived from the individual studies included in a review (Clarke & Oxman, 1999).



**Organization & Policy Recommendations:** Statements of conditions required for a practice setting that enable 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 healthcare professionals that are ideally evidence-based.

**Randomized Controlled Trial:** For the purposes of this guideline, a study in which subjects are assigned to conditions on the basis of chance, and where at least one of the conditions is a control or comparison condition.

**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 Council, 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).

## *Background Context*

Leg ulcer disease is typically cyclical and chronic, with periods of healing followed by recurrence. It is not uncommon for leg ulcers to persist for years, with recurrence rates as high as 76 percent within one year (Nelzen, Bergquist & Lindhagen, 1995). Leg ulcers are a major cause of morbidity, suffering and high health service costs. The negative impact on the sufferer's quality of life is significant, as individuals may experience mobility loss, chronic pain, fear, anger, depression, and social isolation (Phillips, Stanton, Provan & Lew, 1994; Pieper, Szczepaniak & Templin, 2000; Price & Harding, 1996).

International studies on leg ulcer prevalence from all etiologies have demonstrated rates of between 1 and 6 per 1,000 population in Western countries (Baker, Stacy, Jopp-McKay & Thompson, 1991; Callam, Ruckley, Harper & Dale, 1985; Cornwall, Dore & Lewis, 1986; Nelzen et al., 1995). A one-month prevalence study in one large Canadian region found a prevalence rate of 1.8 per 1,000 for the population over the age of 25 (Harrison, Graham, Friedberg, Lorimer & Vandervelde-Coke, 2001). The care of this population is compounded by the fact that the condition is highly associated with age, with the prevalence rate reported in the 2 percent range for those over age 65 (Callam et al., 1985; Cornwall et al., 1986). Reports on the percentage of lower limb ulcerations that result predominantly from a venous etiology range from 37 to 62 percent (Baker et al., 1991; Callam et al., 1985; Cornwall et al., 1986; Nelzen, Bergquist, Lindhagen & Halbrook, 1991; Nelzen et al., 1995). Some studies found venous leg ulcers had a longer duration and a higher recurrence rate than those of a non-venous etiology (Baker et al., 1991; Nelzen et al., 1995).

Surveys have shown wide variation in the clinical management of leg ulcers. Numerous types of wound dressings, bandages and stocking are used in the treatment and prevention of recurrence (Lees & Lambert, 1992; Stevens, Franks & Harrington, 1997). In leg ulcer care, using treatments with known efficacy leads to improvements in both healing rates and quality of life for the leg ulcer sufferer (Cullum, Nelson, Fletcher & Sheldon, 2000; Franks et al., 1995a). Despite the evidence supporting effective leg ulcer management, many clients are not receiving this care (Harrison et al., 2001; Hickie, Ross & Bond, 1998).

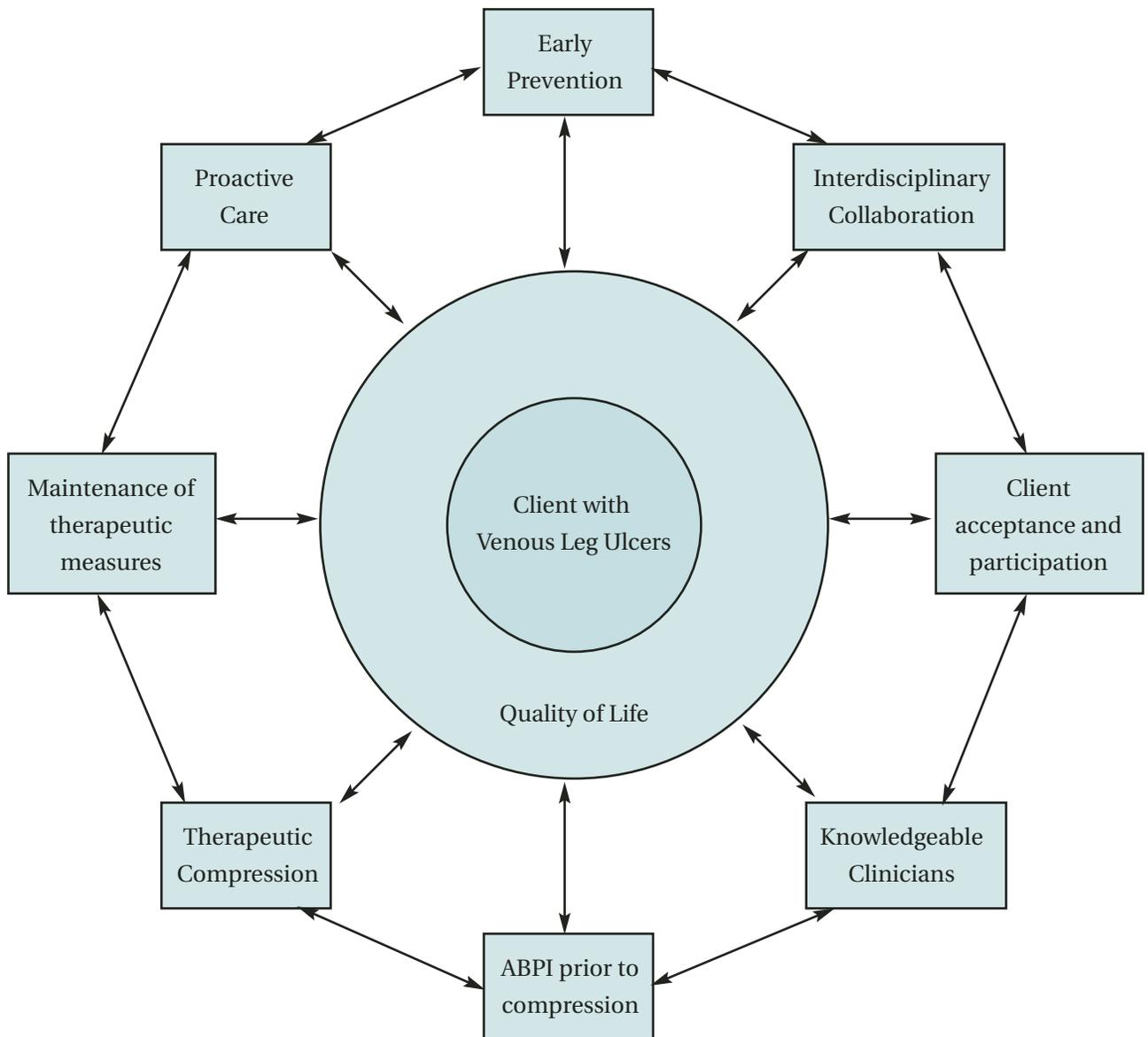
The cost of caring for individuals with leg ulcers is significant. Reports from the United Kingdom and France indicate that the cost of venous diseases of the leg accounts for 2 percent of their total national health budgets (Laing, 1992). One study in the UK estimated that district nurses spend as much as 30 to 50 percent of their time with clients in leg ulcer care (Lees & Lambert, 1992). Over 80 percent of the ongoing management of chronic wounds such as leg ulcers occurs mainly in the community (Callam et al., 1985; Lees & Lambert, 1992; Lindholm, Bjellerup, Christensen & Zederfeldt, 1992). As the prevalence of leg ulcers increases with age, the swell in the elderly population with the advance of the "boomer" generation, and an anticipated increment in longevity will result in higher resource demand for community leg ulcer care.

## *Guiding Principles/Assumptions in Venous Leg Ulcers Care*

1. Venous leg ulcers can significantly compromise quality of life.
2. Interdisciplinary, collaborative assessment, and treatment planning with the client is essential.
3. Early prevention strategies decrease the potential for ulcer development.
4. Therapy involves client acceptance and participation.
5. Clinicians must be knowledgeable of the features and management of venous disease.
6. Venous leg ulcers are managed with effective compression and wound management therapy.
7. An Ankle Brachial Pressure Index (ABPI) measurement must be done prior to commencement of compression therapy.
8. Clinicians must have sound practical knowledge and experience in the use of Ankle Brachial Pressure Index (ABPI).
9. Clinicians must have sound practical knowledge and expertise in the use of therapeutic compression.
10. Maintaining therapeutic measures reduces the risk of re-occurrence.
11. Proactive care supports rehabilitation and return of client independence.

## Interactive Guiding Principles of Venous Leg Ulcers Care

A graphic depiction of the previously listed guiding principle statements can be visualized in the following diagram:



# Practice Recommendations

## A. ASSESSMENT OF VENOUS LEG ULCERS

### Recommendation • 1

**Assessment and clinical investigations should be undertaken by healthcare professional(s) trained and experienced in leg ulcer management.**

*(Level of Evidence = C – RNAO Consensus Panel, 2004)*

A complete client assessment precedes evaluation of the limb and ulcer characteristics. A comprehensive assessment is essential to determine the underlying ulcer etiology and appropriate treatment approaches.

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### Discussion of Evidence:

Although little guidance is given, the literature strongly supports the importance of assessment and clinical investigations for venous leg ulcers. Recognizing significant arterial insufficiency is important, as no healing will occur in the presence of severe occlusive arterial disease of the affected limb. Kunimoto et al. (2001) caution that the high levels of compression necessary to correct venous hypertension will be potentially dangerous in this situation. Keast & Orsted (1998) add that a chronic wound should prompt a search for underlying causes.

According to Zink, Rousseau & Holloway (2000), twenty-one percent of individuals with venous ulcers experience concomitant arterial disease, with the risk of co-existing arterial dysfunction increasing with age, which again supports the importance of a thorough assessment.

Research repeatedly confirms the necessity of trained healthcare professionals in leg ulcer management. Surveys of reported practice by nurses demonstrate that knowledge of nurses in wound care often falls short of what is ideal (RCN, 1998). Providers of healthcare recognize that the mismanagement of wounds is both costly and unnecessary. Kerstein, van Rijswijk & Betiz (1998), among others, maintain that providing optimal cost-effective wound care requires extensive skills, as well as knowledge, and that classroom teaching alone will not meet the needs of our aging population.

While findings as to what constitutes adequate training levels for nurses involved in leg ulcer care are inconclusive, the essential point is that the person conducting the assessment must

be trained and experienced. The RNAO guideline development panel found no trials assessing and comparing reliability and accuracy based on levels of training.

## Recommendation • 2

**A comprehensive clinical history and physical examination including blood pressure measurement, weight, urinalysis, blood glucose level and Doppler measurement of Ankle Brachial Pressure Index (ABPI) should be recorded for a client presenting with either their first or recurrent leg ulcer and should be ongoing thereafter.**

*(Level of Evidence = C – RNAO Consensus Panel, 2004)*

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*An assessment for a history of venous insufficiency also includes:*

- Family history of venous disease.
- Client history of deep vein thrombosis (DVT).
- Lower leg fracture or other major leg injury, previous vein surgery, varicose veins, or prior history of ulceration with/without use of compression stockings.
- History of episodes of chest pain, hemoptysis, or history of a pulmonary embolus.
- Lifestyle factors (e.g., sedentary lifestyle, chair-bound), obesity, poor nutrition.

*An assessment for signs indicative of Non-Venous Disease also includes:*

- Family history of non-venous etiology.
- Heart disease, stroke, transient ischemic attack.
- Diabetes mellitus.
- Peripheral vascular disease (PVD)/intermittent claudication.
- Smoking.
- Rheumatoid arthritis.
- Ischemic rest pain.

A combination of the features described above may be indicative of mixed arterial/venous disease (RCN, 1998).

### Discussion of Evidence:

Several clinical studies show strong support for the need for thorough history taking for assessment of venous insufficiency (NZGG, 1999; RCN, 1998). The New Zealand Guidelines Group (1999) further suggests assessing the history of the ulcer, the mechanism of injury, and previous methods of treatment.

Zink et al. (2000) recommend a guided interview to obtain the history most pertinent to the cause of the ulcer, explaining that while the client may be able to relate important symptoms, living with a chronic disease often blunts the ability to be discriminatory. Zink et al. (2000) further adds that the initial encounter with the client is critical to establishing a positive, therapeutic relationship. Establishing trust is instrumental for successful client outcomes, particularly as venous leg ulcers often involve a lengthy healing time.

Misdiagnosis of ulcers can cause harm or lead to long periods of inappropriate treatment. It is therefore important to have an accurate diagnosis of ulcer etiology (NZGG, 1999). Despite this, there is only one population study that has systematically investigated and published data on the etiology of identified ulcers.

### **Recommendation • 3**

**Information relating to ulcer history should be documented in a structured format.**

*(Level of Evidence = C – RNAO Consensus Panel, 2004)*

*An ulcer history should include:*

- The year first ulcer occurred.
- Site of ulcer and of any previous ulcers.
- Number of previous episodes of ulceration.
- Length of time taken to heal in previous episodes.
- Length of time with no recurrence of ulcers.
- Past treatment methods (both successful and unsuccessful).
- Previous operations on venous system.
- Previous and current use of compression hosiery.

### **Discussion of Evidence:**

Although no specific evidence was cited, the Royal College of Nursing (1998) supports the theory that collection of data in a structured format will enable consideration of clinical factors that may have an impact on treatment and healing progress, as well as provide baseline information on ulcer history. They cautioned, however, that a diagnosis of ulcer type should not be made solely on this information.

The literature also stresses the importance of clear and comprehensive documentation of information during history taking, and suggests several examples of leg ulcer assessment forms. The RNAO guideline development panel does not consider one assessment form to be superior to another. *(For examples of leg ulcer assessment forms, see Appendices D and E).*

### Recommendation • 4

**Examine both legs and record the presence/absence of the following to aid in the assessment of underlying etiology.**

Venous Disease	Arterial Disease
<ul style="list-style-type: none"> <li>■ usually shallow moist ulcers</li> <li>■ situated on the gaiter area of the leg</li> <li>■ edema</li> <li>■ eczema</li> <li>■ ankle flare</li> <li>■ lipodermatosclerosis</li> <li>■ varicose veins</li> <li>■ hyperpigmentation</li> <li>■ atrophie blanche</li> </ul>	<ul style="list-style-type: none"> <li>■ ulcers with a “punched out” appearance</li> <li>■ base of wound poorly perfused, pale, dry</li> <li>■ cold legs/feet (in a warm environment)</li> <li>■ shiny, taut skin</li> <li>■ dependent rubor</li> <li>■ pale or blue feet</li> <li>■ gangrenous toes</li> </ul>

*(Level of Evidence = C – RNAO Consensus Panel, 2004)*

### Discussion of Evidence:

Research strongly recommends that the person conducting the assessment should be aware that ulcers may result from many different causes, such as arterial insufficiencies, diabetes, rheumatoid arthritis, or malignancy. Where there is mixed venous/arterial etiology, this condition will have the features of venous ulcer in combination with signs of arterial impairment (RCN, 1998).

Several studies confirm that malignancy can cause and may be a sequel of leg ulceration (NZGG, 1999). The RNAO guideline development panel supports the practice of checking for a

history of skin cancers, although little guidance is offered in the literature. Signs suggestive of malignancy include:

- irregular nodular appearance of the surface ulcer
- raised or rolled edge
- rapid increase in ulcer size
- failure to respond to treatment.

Any unusual appearance or signs of malignancy should be documented, and if present, refer to a physician or to a dermatologist for a biopsy.

For characteristics specific to ulcer types, see:

- Different Types of Leg Ulcers and Their Causes (Appendix C)

## Recommendation • 5

**Measure the surface areas of ulcers, at regular intervals, to monitor progress. Maximum length and width, or tracings onto a transparency are useful methods.**

*(Level of Evidence = B)*

### Discussion of Evidence:

The New Zealand Guidelines Group (1999) confirms that surface area and volume measurement are indicators of ulcer healing. Common reproducible techniques, such as those described in this recommendation, closely correlate to wound area determined by computerized planimetry of photographs (a reliable and valid objective measure, but not widely available).

*During an assessment, the following characteristics should be observed and recorded:*

- location
- depth
- size (mm, cm)
- odour
- sinus tracts
- undermining
- tunneling
- exudate
- pain
- infection
- appearance of the wound bed (eschar, slough, fibrin, granulation tissue, epithelial tissue)
- condition of the surrounding skin (peri-wound) and wound edges

## Recommendation • 6

**The client's estimate of the quality of life should be included in the initial discussion of the treatment plan, throughout the course of treatment, and when the ulcer has healed.**

*(Level of Evidence = C – RNAO Consensus Panel, 2004)*

### Discussion of Evidence:

Issues relating to quality of life for leg ulcer clients have been well documented in the literature, with several studies confirming that the negative impact of venous ulcers on quality of life is significant (Phillips et al., 1994; Pieper et al., 2000; Price & Harding, 1996). Healing the ulcer and normalizing the clients' lives can and should form the basis of care (Husband, 2001a).

Increased sensitivity to, and understanding of the impact of painful venous ulcers on quality of life may lead to more effective intervention strategies and improved outcomes for these clients (Krasner, Sibbald & Coutts, 2001). Although it is widely accepted among healthcare professionals that the individual needs of the client should be considered, and that a positive management outcome will likely be influenced by client insight into the severity of the venous disorder, there has been little conclusive research done in this area. One qualitative study cited by Krasner (1998), focused on understanding and interpreting the meaning of living with a painful venous leg ulcer, and the resulting quality of life.

From the point of view of the client, quality of life is crucial in assessing the effectiveness of medical treatments (Phillips et al., 1994). Compliance Network Physicians (1999) add that compliance in clients may be enhanced as a result of regular communication in the physician-client and nurse-client interaction.

In one study conducted in Sweden, where standard questionnaires were distributed to clients, results showed that chronic leg ulcers had a marked impact on the client's subjectively perceived health. Males exhibited elevated scores, while for women the impact of leg ulcer disease, although obvious, seemed much less marked (Lindholm et al., 1992). Lindholm et al. (1992) further added that the impact of chronic disease on health is closely related to personal, social, and environmental factors.

Research also indicates that quality of life is impacted if clients attend a leg ulcer clinic. Liew, Law & Sinha (2000) found an improvement in three quality of life indicators – pain, sleep and

mobility, over an average of one to three visits to the clinic, and home visits by primary care nurses. There is also some evidence demonstrating an improvement in the quality of life resulting from healing of leg ulcers, but again, results are inconclusive.

*See Appendix F for a Quality of Life Assessment Tool.*

### **Recommendation • 7**

**Assess the functional, cognitive and emotional status of the client and family to manage self-care.** (*Level of Evidence = C – RNAO Consensus Panel, 2004*)

Communicate with the client, family and caregivers to establish realistic expectations for the healability of the venous leg ulcers. The basis for a treatment plan begins with the client when the individual aims of the overall treatment are defined and agreed upon.

The RNAO guideline development panel believes that the presence or absence of a social support system is important for the treatment and prevention of venous leg ulcers.

#### **Discussion of Evidence:**

Pieper, Rossi & Templin (1998) describe how persons with leg ulcers describe interferences in their functional status and psychological well-being. They experience more pain, less vitality, more restrictions in physical and social functioning, and poorer general health and limitations in their physical and emotional roles compared with age-matched cohorts.

Pain and increased sensitivity can serve as a constant reminder of the presence of an ulcer, and contribute to sleep disturbances and decreased mobility (Liew et al., 2000). In a study where 62 individuals with chronic leg ulcers were interviewed, Phillips et al.

(1994) found the leg ulcer was associated with altered mobility (81 percent of cases), burdensome care (58 percent), negative emotional impact on life such as fear, isolation, anger, depression, and negative depression (60 percent). Pieper et al. (2000) documented similar findings.



### Recommendation • 8

**Regular ulcer assessment is essential to monitor treatment effectiveness and healing goals.** (*Level of Evidence = C – RNAO Consensus Panel, 2004*)

Common features of venous ulcers include:

- Irregular borders that are flat and slope into a shallow crater.
- Loss of epidermis with a dermal base.
- Base may be covered with yellow fibrin, or ruddy granulation.
- Ulcer located often over medial malleolus where long saphenous vein is most superficial and has the greatest curvature. In severe cases, ulcers may extend over the circumference of the ankle.
- Exudate evident and may be minimal to copious.
- Periwound skin that may be dry, scaly, irritated (stasis dermatitis) or macerated.
- Edema that may be pitting or firm.

## B. DIAGNOSTIC EVALUATION

### Recommendation • 9

**Venous disease of the leg is most commonly detected by a combination of clinical examination and measurement of a reliably taken Ankle Brachial Pressure Index (ABPI).**

(*Level of Evidence = A*)

### Recommendation • 10

**Doppler ultrasound measurement of Ankle Brachial Pressure Index (ABPI) should be done by practitioners trained to undertake this measure.** (*Level of Evidence = B*)

### Recommendation • 11

**If there are no signs of chronic venous insufficiency and the Ankle Brachial Pressure Index (ABPI) is abnormal (greater than 1.2 or less than 0.8), arterial etiology should be assumed and a vascular opinion sought.**

(*Level of Evidence = C – RNAO Consensus Panel, 2004*)

### Recommendation • 12

**Vascular assessment, such as Ankle Brachial Pressure Index (ABPI) is recommended for ulcers in lower extremities, prior to debridement, to rule out vascular compromise.**

(*Level of Evidence = C – RNAO Consensus Panel, 2004*)

## **Discussion of Evidence:**

The importance of making an objective etiological diagnosis by measuring the Ankle Brachial Pressure Index (ABPI), in addition to visual inspection of the ulcer, pedal pulse palpation and a thorough clinical and physical assessment, is highlighted in a number of studies (CREST, 1998a; Moffatt, Oldroyd, Greenhalgh & Franks, 1994).

Expert opinion recommends that the ABPI is used to rule out arterial disease and to determine the safe use of therapeutic compression therapy (RNAO Consensus Panel, 2004). The Royal College of Nursing (1998) also notes that all clients should be given the benefit of Doppler ultrasound management to ensure detection of arterial insufficiency, which could result in commencement of inappropriate or even dangerous therapy.

According to Zink et al. (2000), the Trendelenburg test also assists in the physical evaluation of venous valve competence in the perforators and saphenous system.

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 instruction and training to undertake this measure (Cornwall et al., 1986).

Based on available research from the New Zealand Guidelines Group (1999), Doppler ultrasound measurement of ABPI should be repeated when:

- a leg ulcer deteriorates
- an ulcer is not fully healed within three months
- clients present with recurrence (of whichever leg)
- there is a sudden increase in pain
- colour and/or temperature of foot changes (RCN, 1998).

In addition, the New Zealand Guidelines Group (1999) recommended that:

- The presence of palpable foot pulses alone are insufficient to rule out arterial disease.
- All ulcers should be screened for arterial disease using Doppler ultrasound to determine the Ankle Brachial Pressure Index (ABPI). A single measure of ABPI < 0.8 makes the presence of peripheral arterial occlusive disease (PAOD) highly likely.
- Further tests should be considered prior to initiating compression bandaging if a client has an ABPI > 0.8 in the presence of signs and symptoms of PAOD, rheumatoid arthritis, diabetes mellitus or systemic vasculitis.
- Clients with ABPI < 0.6 should be considered for referral to a vascular surgeon.

*A Specialist medical referral may be appropriate for:*

- treatment of underlying medical problems
- ulcers of non-venous etiology (rheumatoid; diabetic; arterial; mixed etiology)
- suspected malignancy
- diagnostic uncertainty
- reduced ABPI (e.g., <0.8 – routine vascular referral; 0.5 – urgent vascular referral)
- increased ABPI (> 1.2 as in calcification of vessels)
- rapid deterioration of ulcers
- newly diagnosed diabetes mellitus
- signs of contact dermatitis (spreading eczema; increased itch)
- cellulitis
- consideration for venous surgery
- ulcers which have received adequate treatment, and have not improved for three months
- recurring ulceration
- ischemic foot
- infected foot
- pain management (LOE = C – RCN, 1998; RNAO Consensus Panel, 2004)
- clients with suspected sensitivity reactions (should be referred to a dermatologist for patch testing). Following patch testing, identified allergens must be avoided and medical advice on treatment should be sought (RCN, 1998)
- a non-healing or atypical leg ulcer which should be considered for biopsy (CREST, 1998a)

In the case of clients with diabetes, some studies note that there may be a higher risk of peripheral vascular disease, and as a result ABPI readings may be unreliable (greater than 1.2) due to arterial calcification. As results are inconclusive, further investigation is required.



## C. PAIN

### Recommendation • 13

**Assess Pain** (*Level of Evidence = C – RNAO Consensus Panel, 2004*)

### Recommendation • 14

**Pain may be a feature of both venous and arterial disease, and should be addressed.**  
(*Level of Evidence = B*)

### Recommendation • 15

**Prevent or manage pain associated with debridement. Consult with a physician and pharmacist as needed.** (*Level of Evidence = C – RNAO Consensus Panel, 2004*)

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### Discussion of Evidence:

Research results consistently indicate that clients with venous leg ulcers can experience considerable pain (RCN, 1998), and that a significant proportion of clients with venous leg ulcers report moderate to severe pain. Sibbald (1998a) reports that 76 percent of severe venous ulcers are painful. In a study cited by Kunimoto et al. (2001), pain in three distinct locations was reported by clients – within ulcers, around ulcers, and elsewhere in the leg. Pain often increases when the limb is in a dependent position.

Assessment of pain is complex, but a structured discussion and frequent re-assessment are important (CREST, 1998a; SIGN, 1998). The importance of pain management in venous leg ulcer clients is often cited in the literature, yet in one particular study, 55 percent of district nurses did not assess the clients' pain.

Pieper et al. (1998) identified a need for better control of venous leg ulcer pain so people felt more confident and positive about treatment and could reduce activity restrictions, complementing the observation by Liew et al. (2000), that pain can significantly reduce clients' quality of life (*see Recommendation 6*).

Although utilization of a pain assessment tool is strongly recommended in the literature, no research evidence could be identified that examined the use of a pain assessment method specifically designed for clients with venous leg ulcers, or compared different methods of

relief. There are several samples of pain assessment tools currently available being used; the RNAO guideline development panel does not consider one tool superior to others. (See Appendix G for examples of Pain Assessment Tools).

Although other pain relief strategies may be considered, there is little conclusive research on interventions such as exercise or leg elevation (RCN, 1998). However, Johnson (1995) observed that increased pain on mobility may be associated with poorer healing rates.

The presence of severe pain does not necessarily indicate arterial disease or infection, and Krasner (1998) observes that pain is often inadequately controlled in these clients. According to Scottish Intercollegiate Guidelines Network (1998), “the pain associated with a dressing change can be reduced by adequate soakage before the dressing is removed. In two trials, one of a hydrocolloid and the other of a foam dressing, the ulcer pain was less when compared with a non-adherent dressing” (p.8).

The RNAO guideline development panel has found that there is very limited guidance in the literature on how best to manage pain associated with debridement.

## D. VENOUS ULCER CARE

### Recommendation • 16

**Choose the technique of debridement, considering the type, quantity and location of non-viable tissue, the depth of the wound, the amount of wound fluid and the general condition and goals of the client.** (Level of Evidence = C – RNAO Consensus Panel, 2004)

### Recommendation • 17

**Cleansing of the ulcer should be kept simple; warm tap water or saline is usually sufficient.** (Level of Evidence = C – RNAO Consensus Panel, 2004)

### Recommendation • 18

**Dressings must be simple, low adherent, acceptable to the client and should be low cost.** (Level of Evidence = A)

### Recommendation • 19

Avoid products that commonly cause skin sensitivity, such as those containing lanolin, phenol alcohol, or topical antibiotics. *(Level of Evidence = C – RNAO Consensus Panel, 2004)*

### Recommendation • 20

Choose a type of dressing depending on the amount of exudate and the phase of healing. *(Level of Evidence = C – RNAO Consensus Panel, 2004)*

### Recommendation • 21

No specific dressing has been demonstrated to encourage ulcer healing. *(Level of Evidence = A)*

### Recommendation • 22

In contrast to drying out, moist wound conditions allow optimal cell migration, proliferation, differentiation and neovascularization. *(Level of Evidence = A)*

### Recommendation • 23

Refer clients with suspected sensitivity reactions to a dermatologist for patch testing. Following patch testing, identified allergens must be avoided, and medical advice on treatment should be sought. *(Level of Evidence = B)*

### Recommendation • 24

Venous surgery followed by graduated compression hosiery is an option for consideration in clients with superficial venous insufficiency. *(Level of Evidence = C – RNAO Consensus Panel, 2004)*

### Recommendation • 25

Biological wound coverings and growth factor treatments should not be applied in cases of wound infection. *(Level of Evidence = C – RNAO Consensus Panel, 2004)*

### Recommendation • 26

Optimal nutrition facilitates wound healing, maintains immune competence and decreases the risk of infection. *(Level of Evidence = B)*

Debridement is necessary to remove devitalized tissue and exudate, reduce the risk of infection, prepare the wound bed and promote healing. Debridement can be:

- Autolytic, the natural self-clearance of debris in the wound bed by phagocytosis and proteolytic enzymes
- Mechanical, the use of wet-to-dry dressings, hydrotherapy or irrigation with saline solution
- Enzymatic
- Sharp, using a scalpel or scissors (Fowler, 1992)

Select the method of debridement most appropriate to the client's condition and goals.

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*Sharp debridement is a high-risk procedure.* Debridement with a scalpel should be undertaken with caution and performed by specially trained and experienced healthcare professionals. Subcutaneous debridement with a scalpel is a controlled act that must be carried out by a physician or the delegate.

### Discussion of Evidence:

There is no evidence to favour any one method of debridement, whether mechanical, autolytic, enzymatic/chemical or sharp (NZGG, 1999). Fowler (1992) states that debridement of non-viable tissue in open wounds is clearly an overlapping function of medicine and nursing, and nurses who are trained to perform this function are practicing within the scope of nursing.

There is a body of research showing a wide variation in the clinical management of venous leg ulcers through the use of dressings, however it is unlikely that a single type of dressing will be appropriate for all types of wounds (Bryant, 2001). Bryant (2001) also explains that if the dressing material transmits less moisture than the wound loses, then the wound will remain moist. Several articles confirm that there are numerous types of wound dressings, bandages, and stockings used in the treatment and prevention of recurrence (Lees & Lambert, 1992; Stevens, Franks & Harrington, 1997). The RNAO guideline development panel, however, found insufficient evidence to determine whether any particular dressing increases healing or reduces the pain of venous leg ulcers. The most important factor, according to the Royal College of Nursing (1998), is that the dressings be simple, low adherent, acceptable to the client, and low in cost.

The New Zealand Guidelines Group (1999) cautions that a number of cleansing agents currently on the market may commonly cause skin sensitivity, and that some antiseptic and

chemical agents have been shown to damage cells. (*See Appendix H for a list of Cleansing Agents and Their Associated Toxicities*). Health professionals should also be aware that clients can become sensitized to elements of their treatment at any time (RCN, 1998). (*See Appendix I for a list of Potential Allergens*).

Wound cleansing can be accomplished by showering and ensuring peri-wound skin is dried carefully.

The nutritional status of clients appears to be a key factor in the management of venous leg ulcers. Several studies show a strong link between deteriorating nutritional status and the development and healing of chronic, non-healing wounds (Himes, 1999; Whitney & Heirkemper, 1999; Wissing, Unosson, Lennernas & Ek, 1997).

Himes (1999) observed that clients with chronic wounds require higher intake of protein and calories, suggesting that aggressive intervention may be required to prevent malnutrition. While the importance of specific nutrients to wound healing, including ascorbic acid, Vitamin A and zinc is well documented, the actual understanding of the precise nutritional requirements needed for tissue repair is still developing (Whitney & Heirkemper, 1999).

Kunimoto et al. (2001) state that a nutritionist or dietitian should be consulted if nutritional deficiency is thought to be significant enough to possibly impair wound healing. Wipke-Tevis & Stotts (1998) note that there are many factors that can contribute to inadequate dietary intake:

- financial constraints
- mobility limitations
- social isolation
- coexistent medical problems
- inadequate cooking facilities
- poor eating habits
- lack of nutritional knowledge.

In clinical practice, Wipke-Tevis & Stotts (1998) recommend that a multidisciplinary approach is desirable, as the factors listed above are quite different in nature.

## E. INFECTION

### Recommendation • 27

**Assess for infection.** (*Level of Evidence = A*)

### Recommendation • 28

**An infection is indicated when  $> 10^5$  bacteria/gram tissue is present.**

(*Level of Evidence = B*)

### Recommendation • 29

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

### Recommendation • 30

**Antibiotics should only be considered if the ulcer is clinically cellulitic (presence of some of the following signs and symptoms: pyrexia; increasing pain; increasing erythema of surrounding skin; purulent exudate; rapid increase in ulcer size).**

(*Level of Evidence = C – RNAO Consensus Panel, 2004*)

### Recommendation • 31

**Do not use topical antiseptics to reduce bacteria in wound tissue, e.g., povidone iodine, iodophor, sodium hypochlorite, hydrogen peroxide, or acetic acid.** (*Level of Evidence = B*)

### Recommendation • 32

**Topical antibiotics and antibacterial agents are frequent sensitizers and should be avoided.**

(*Level of Evidence = B*)

### Discussion of Evidence:

Avoidance of wound infection is a primary concern in the healing of acute injuries and wounds (Whitney & Heirkemper, 1999), and wound care regimens should be aimed at preventing infection, which delays healing (Mureebe & Kerstein, 1998). All wounds are colonized by a colony of bacteria, but most do not become infected. In chronic wounds, an infection should be suspected if the wound does not begin to show signs of healing.

There are numerous strategies cited in the literature regarding assessment of infection, but the Royal College of Nursing (1998) recommends that routine bacteriological swabbing is unnecessary unless there is evidence of clinical infection such as:

- inflammation/redness/cellulitis
- increased pain
- purulent exudate
- rapid deterioration of the ulcer
- pyrexia

When a client with an ulcer develops sudden pain, a bacterial infection may be present (Kunimoto et al., 2001). An infection may be indicated based on the presence of bacteria/gram tissue (Compliance Network Physicians, 1999). The presence of bacteria in a leg ulcer, however, does not mean that it is infected as all chronic ulcers can be colonized by microorganisms which are not producing any inflammatory reaction. A diagnosis of infection should therefore be made on clinical evidence, e.g., cellulitis. Odour or increased exudate also does not necessarily indicate infection and can be managed with selective dressings. Again, a clinical assessment is recommended if infection is suspected.

There is strong support in the literature, citing clinical studies, stressing the avoidance of topical antibiotics and antiseptics to treat infections, as they are frequent sensitizers or cytotoxics (CREST, 1998a; Compliance Network Physicians, 1999; NZGG, 1999). (*See Appendix H for Cleansing Agents and Their Associated Toxicities; and Appendix J for a list of Topical Antimicrobial Agents*).

## F. COMPRESSION

### Recommendation • 33

**The treatment of choice for clinical venous ulceration uncomplicated by other factors, is graduated compression bandaging, properly applied, and combined with exercise. Graduated compression is the main treatment for venous eczema.**

*(Level of Evidence = A)*

**Recommendation • 34**

**High compression increases venous ulcer healing and is more effective than low compression, but should only be used where ABPI  $\geq$  0.8 and ulcer is clinically venous.**

*(Level of Evidence = A)*

**Recommendation • 35**

**Compression bandages should only be applied by a suitably trained and experienced practitioner.** *(Level of Evidence = B)*

**Recommendation • 36**

**Venous ulceration should be treated with high compression bandaging to achieve a pressure between 35-40 mm Hg. at the ankle, graduating to half at calf in the normally shaped limb, as per La Place's Law.** *(Level of Evidence = C – RNAO Consensus Panel, 2004)*

**Recommendation • 37**

**Use protective padding over bony prominences when applying high compression.**

*(Level of Evidence = C – RNAO Consensus Panel, 2004)*

**Recommendation • 38**

**Arterial insufficiency is a contraindication to the use of high compression. A modified form of compression may be used under specialist supervision.**

*(Level of Evidence = C- RNAO Consensus Panel, 2004)*

**Recommendation • 39**

**Use compression with caution in clients with diabetes, those with connective tissue disease and the elderly.** *(Level of Evidence = C – RNAO Consensus Panel, 2004)*

**Recommendation • 40**

**Compression therapy should be modified until clinical infection is treated.**

*(Level of Evidence = C – RNAO Consensus Panel, 2004)*

**Recommendation • 41**

**Bandages should be applied according to manufacturer's recommendations.**

*(Level of Evidence = C – RNAO Consensus Panel, 2004)*

**Recommendation • 42**

**When using elastic systems such as “high compression” bandages, the ankle circumference must be more than or padded to equal 18 cms.**

*(Level of Evidence = C – RNAO Consensus Panel, 2004)*

**Recommendation • 43**

**Ankle circumference should be measured at a distance of 2.5 cm (one inch) above the medial malleolus.** *(Level of Evidence = C – RNAO Consensus Panel, 2004)*

**Recommendation • 44**

**The concepts, practice, and hazards of graduated compression should be fully understood by those prescribing and fitting compression stockings.** *(Level of Evidence = A)*

**Recommendation • 45**

**Graduated compression hosiery should be measured and fitted by a certified fitter.**

*(Level of Evidence = C – RNAO Consensus Panel, 2004)*

**Recommendation • 46**

**To maintain a therapeutic level of compression, stockings should be cared for as per manufacturer's instructions, and replaced every six months.**

*(Level of Evidence = C – RNAO Consensus Panel, 2004)*

**Recommendation • 47**

**Graduated compression hosiery should be prescribed for life.** *(Level of Evidence = B)*

**Recommendation • 48**

**External compression applied using various forms of pneumatic compression pumps is indicated for individuals with chronic venous insufficiency.** *(Level of Evidence = A)*

**Recommendation • 49**

**The client should be prescribed regular vascular exercise by means of intensive controlled walking and exercises to improve the function of the upper ankle joint and calf muscle pump.** *(Level of Evidence = A)*

### Discussion of Evidence:

Results of at least one randomized controlled trial recommends the use of graduated compression bandaging as the treatment of choice for clinical venous ulceration, uncomplicated by other factors (CREST, 1998a). Cotton (1996) notes that compression therapy increases skin perfusion pressure and decreases interstitial fluid volume, thereby increasing tissue oxygenation, thus promoting tissue healing.

Graduated compression may be achieved by prescribed bandages or by compression stockings.

**Tensor bandages and post-operative anti-embolic stockings, e.g., TEDS™, do not provide therapeutic compression for treatment and management of venous stasis disease.** Thomas (1999) explains that these materials have limited elasticity and tend to “lock out” at relatively low levels of extension, further adding that they are not suitable for significant levels of pressure.

Compression systems must be applied correctly so that sufficient (but not excessive) pressure is applied. Incorrectly applied systems may be harmful or ineffective. CREST (1998a) in recommending the use of graduated compression bandaging, cautions that compression bandages should only be applied by a suitably trained and experienced practitioner. Practitioners without training in compression bandages apply bandages at inappropriate and wide varying pressures (NZGG, 1999; RCN, 1998). More research is needed to see what training strategies improve compression techniques, and if the effects of training are maintained over time (RCN, 1998).

It is important to note, however, that no controlled studies have compared recurrence rates of venous ulceration achieved with or without compression hosiery, nor are there conclusive studies to indicate which high compression system (3 layer, 4 layer, or short stretch) is most effective (NZGG, 1999). The systematic review by Nelson, Bell-Syer and Cullum (2003) has found that there is no evidence to indicate that high compression hosiery is more effective than moderate compression in the prevention of ulcer recurrence. Compliance is lower in people wearing high compression stockings. From the same systematic review, it was suggested that clients should be prescribed the highest grade stocking they are able to wear.

Kunimoto et al. (2001) note that recognition of significant arterial insufficiency is important, and that no healing will occur in the presence of severe occlusive arterial disease of the affected limb. Kunimoto et al. (2001) also add that the high levels of compression necessary to correct venous hypertension will be potentially dangerous in this situation.

External compression using various forms of pneumatic compression pumps (PCPs) are indicated for individuals with chronic venous insufficiency. However, there is no strong evidence about the effects of intermittent pneumatic compression (IPC) on venous leg ulcer. In the review by Mani, Vowden and Nelson (2003), they found that there is conflicting evidence whether or not IPC can help heal venous leg ulcers.

*Note: At time of publishing, this recommendation is not inclusive of elastic and non-elastic bandages* (RNAO Consensus Panel, 2004).

Findings from several studies indicate that high compression bandaging should be used for venous leg ulceration, as per La Place's Law (NZGG, 1999):

#### La Place's Law:

The theoretical pressure produced beneath a bandage can be calculated as follows:

$$P = \frac{4630 \times N \times T}{C \times W}$$

**Where**

- P = sub-bandage pressure (mmHg)
- N = number of layers
- T = tension within bandage (Kgforce)
- C = limb circumference (cm)
- W = width of bandage (cm)

It can be seen that sub-bandage pressure is directly proportional to the tension in the bandage during application and the number of layers applied, but inversely proportional to the radius of curvature of the limb (Logan, Thomas, Harding & Collyer, 1992).

The treatment of venous stasis disease demands the life-long use of therapeutic compression. The concepts, practice, and hazards of graduated compression should be fully understood by those prescribing and fitting (SIGN, 1998). Graduated compression hosiery should be prescribed for life (CREST, 1998a).

Provided the client has been measured by a certified stocking fitter for the correct size, elasticized stockings are a safe alternative to bandages. They can be full-length, but generally

below-knee stockings are the most frequently used, and are more acceptable to the client. There are three classes of compression stockings. The stockings are unsuitable in clients with a high level of exudate, and are prescribed for use after compression therapy with bandages has reduced the edema. When edema and exudate are controlled, the use of therapeutic compression stockings may be considered. (See Appendix K for Classes of Compression Bandages).

The client should be prescribed regular vascular exercise by means of intensive controlled walking and exercises to improve the function of the upper ankle joint and calf muscle pump (Compliance Network Physicians, 1999; Kan & Delis, 2001).

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Loss of ankle joint movement can accompany venous ulceration. Good calf muscle pump function is an important aspect of ulcer healing. Walking and passive ankle exercises should be encouraged. The immobility of the ankle joint is thought to influence ambulatory venous hypertension and may be a factor in causing venous ulceration. Exercise is necessary to enhance compression therapy. These can be modified to accommodate the needs of non-ambulatory and obese individuals. A physical and/or occupational therapist should be consulted. When resting, elevation of the limb above chest level is beneficial.

## G. COMPLEMENTARY THERAPIES

### Recommendation • 50

**Consider electrical stimulation in the treatment of venous leg ulcers.** (Level of Evidence = B)

### Recommendation • 51

**Hyperbaric oxygen may reduce ulcer size in non-diabetic, non-atherosclerotic leg ulcers.** (Level of Evidence = A)

### Recommendation • 52

**Therapeutic ultrasound may be used to reduce the size of chronic venous ulcers.** (Level of Evidence = A)

### Discussion of Evidence:

The clinical research evidence for complementary therapies to treat chronic venous leg ulcers is the subject of an article by Kunimoto et al. (2001).

The New Zealand Guidelines Group (1999) reports that there is sufficient evidence to conclude that hyperbaric oxygen may reduce ulcer size in non-diabetic, non-atherosclerotic leg ulcers, and should be considered as a complementary therapy for venous leg ulcer clients.

There have been several randomized controlled trials examining the effect of ultrasound on chronic venous leg ulcers. In addition, a meta-analysis published by Johannsen, Gam & Karlsmark (1998) found a significant effect of ultrasound on wound size of chronic venous leg ulcers.

In a search of the literature, the RNAO guideline development panel also found that there is insufficient evidence to give clear direction on the use of laser therapy, maggot therapy, sugar, honey, vitamins, hormones, Vacuum Assisted Closure (VAC) Therapy™, growth factors, mineral elements, and normalthermic therapies in the treatment of venous ulcers.

## H. REASSESSMENT

### Recommendation • 53

**With no evidence of healing, a comprehensive assessment should be carried out at three-month intervals, or sooner if clinical condition deteriorates.**

*(Level of Evidence = C – RNAO Consensus Panel, 2004)*

### Recommendation • 54

**For resolving and healing venous leg ulcers, routine assessment at six-month intervals should include:**

- physical assessment
- Ankle Brachial Pressure Index (ABPI)
- replacement of compression stockings
- reinforcement of teaching

*(Level of Evidence = C – RNAO Consensus Panel, 2004)*

### Discussion of Evidence:

Refer to a specialist (Dermatologist or Vascular physician) if there is a deterioration of the ulcer status, client status or if non-venous etiology is identified or suspected (e.g., rheumatoid disease; suspected malignancy; acute congestive heart failure (CHF); renal failure; diagnostic uncertainty; rapid deterioration of ulcers; new diagnosis of diabetes; lack of healing; recurrent ulceration; ischemic limb or foot infection; pain management; or for potential surgery).

The active management of leg ulcers may be required over many months or years and may be carried out by several different healthcare professionals. It is important to reassess progress 12 weeks after the institution of treatment. This should involve a comprehensive review, similar to the initial assessment. Likewise, when an ulcer recurs, a full assessment should be carried out even though the client may be well known to the nurse or doctor.

## I. SECONDARY PREVENTION

### Recommendation • 55

Measures to prevent recurrence of a venous leg ulcer include:

- wearing compression stockings
- regular follow-up to monitor Ankle Brachial Pressure Index (ABPI)
- discouragement of self-treatment with over-the-counter preparations
- avoidance of accidents or trauma to legs.

*(Level of Evidence = C – RNAO Consensus Panel, 2004)*

### Recommendation • 56

Inform the client after the ulcer has healed regarding:

- wearing and maintenance of compression stockings
- elevation of affected limb above level of heart when at rest
- early referral at first sign of skin breakdown or trauma to limb
- need for exercise and ankle-joint mobility
- appropriate skin care
- avoidance of products likely to be sensitizers
- life-long use of compression.

*(Level of Evidence = C – RNAO Consensus Panel, 2004)*

### Discussion of Evidence:

The majority of venous leg ulcers recur. The rates of recurrence vary, but several large population studies found 59 to 76 percent of all identified ulcers were recurrent (NZGG, 1999).

Secondary prevention must be put into place and maintained in order to prevent this recurrence. Secondary prevention presently takes the form of graduated compression, surgery, or drugs.

With graduated compression, it is important to take note that not all stockings produce an adequate pressure. Stockings are more effective when client adherence is taken into account. The hazards of incorrectly fitting stockings are the same as those of improperly applied compression bandages.

In order to maintain a proper level of compression, stockings should be replaced every 3 to 6 months as per manufacturer's instructions. If a stocking is uncomfortable a change of the brand of stocking within the same class of stocking may be beneficial to the comfort and compliance of the client.

## Education Recommendations

### Recommendation • 57

**Guidelines are more likely to be effective if they take into account local circumstances and are disseminated by an ongoing education and training program.**

*(Level of Evidence = C – RNAO Consensus Panel, 2004)*

### Recommendation • 58

**Develop educational programs that target appropriate healthcare providers, clients, family members, and caregivers. Develop programs that maximize retention, ensure carryover into practice, and support lifestyle changes. Present information at an appropriate level for the target audience using principles of adult learning.**

*(Level of Evidence = C – RNAO Consensus Panel, 2004)*

### Recommendation • 59

**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.** *(Level of Evidence = C – RNAO Consensus Panel, 2004)*

### Recommendation • 60

**All healthcare professionals should be trained in leg ulcer assessment and management.**

*(Level of Evidence = C – RNAO Consensus Panel, 2004)*

### Recommendation • 61

Education programs for healthcare professionals should include:

- pathophysiology of leg ulceration
- leg ulcer assessment
- need for Doppler ultrasound to measure Ankle Brachial Pressure Index (ABPI)
- normal and abnormal wound healing
- compression therapy theory, management, and application
- dressing selection
- principles of debridement
- principles of cleansing and infection control
- skin care of the lower leg
- peri-wound skin care and management
- psychological impact of venous stasis disease
- quality of life
- pain management
- teaching and support for care provider
- health education
- preventing recurrence
- principles of nutritional support with regard to tissue integrity
- mechanisms for accurate documentation and monitoring of pertinent data, including treatment interventions and healing progress
- criteria for referral for specialized assessment.

*(Level of Evidence = C – RNAO Consensus Panel, 2004)*

### Recommendation • 62

Healthcare professionals with recognized training in leg ulcer care should cascade their knowledge and skills to local healthcare teams.

*(Level of Evidence = C – RNAO Consensus Panel, 2004)*

### Recommendation • 63

The knowledge and understanding of the healthcare professional is a major factor in adherence to treatment regimens.

*(Level of Evidence = C – RNAO Consensus Panel, 2004)*

### **Discussion of Evidence:**

Research using non-randomized comparison groups on pre- and post-test designs have shown that community nurses' knowledge of leg ulcer management is often inadequate, but that knowledge can be improved by provision of training (RCN, 1998).

In an article by Ruane-Morris (1995), programs of continuing support and education offer an alternative to discharge and loss of contact for clients in the United Kingdom. All clients with a healed ulcer and an ABPI of 0.8 or greater, are invited to participate in Healed Ulcer Groups (HUGS). The program focuses on daily life activities, exercise and movement, skin care, and the reasons for developing ulcers, with a goal to shifting clients from nurse-led to self-directed care.

## *Organization & Policy Recommendations*

### **Recommendation • 64**

**Successful implementation of a venous ulcer treatment policy/strategy requires:**

- **dedicated funding**
- **integration of healthcare services**
- **support from all levels of government**
- **management support**
- **human resources**
- **financial resources**
- **functional space**
- **commitment**
- **collection of baseline information about vulnerable populations**
- **resources and existing knowledge**
- **interpretation of above data and identification of organizational problems.**

*(Level of Evidence = C – RNAO Consensus Panel, 2004)*

### Recommendation • 65

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

- An assessment of organizational readiness and barriers to education.
- Involvement of all members (whether in a direct or indirect supportive function) who will contribute to the implementation process.
- Dedication of a qualified individual to provide the support needed for the education and implementation process.
- Ongoing opportunities for discussion and education to reinforce the importance of best practices.
- Opportunities for reflection on personal and organizational experience in implementing guidelines.

In this regard, RNAO (through a panel of nurses, researchers and administrators) has developed the *Toolkit: Implementation of Clinical Practice Guidelines*, based on available evidence, theoretical perspectives and consensus. The RNAO strongly recommends the use of this *Toolkit* for guiding the implementation of the best practice guideline on *Assessment and Management of Venous Leg Ulcers*.

*(Level of Evidence = C – RNAO Consensus Panel, 2004)*

## 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.

Indicator	Structure	Process	Outcome
Objectives	<ul style="list-style-type: none"> <li>To evaluate the supports available in the organization that allow for nurses to integrate into their practice the assessment and management of venous leg ulcers.</li> </ul>	<ul style="list-style-type: none"> <li>To evaluate the changes in practice that lead towards assessment and management of venous leg ulcers.</li> </ul>	<ul style="list-style-type: none"> <li>To evaluate the impact of implementing the recommendations.</li> </ul>
Organization/Unit	<ul style="list-style-type: none"> <li>Review of best practice recommendations by organizational committee(s) responsible for policies and procedures.</li> <li>Availability of client education resources that are consistent with best practice recommendations.</li> <li>Provision of accessible resource people for nurses to consult for ongoing support during and after initial implementation period.</li> </ul>	<ul style="list-style-type: none"> <li>Development of forms or documentation systems that encourage documentation of assessment and management of venous leg ulcers.</li> <li>Concrete procedures for making referrals to internal and external resources and services.</li> </ul>	<ul style="list-style-type: none"> <li>Incorporation of assessment and management of venous leg ulcers in staff orientation program.</li> <li>Referrals internally and externally.</li> </ul>
Provider	<ul style="list-style-type: none"> <li>Percentage of nurses attending the best practice guideline education sessions on assessment and management of venous leg ulcers.</li> </ul>	<ul style="list-style-type: none"> <li>Nurses' self-assessed knowledge of assessment and management of venous leg ulcers.</li> <li>Nurses' average self-reported awareness levels of community referral sources for clients with venous leg ulcers.</li> </ul>	<ul style="list-style-type: none"> <li>Evidence of documentation in the client's record consistent with the guideline recommendations:                             <ol style="list-style-type: none"> <li>Referral to the following services or resources within the community or within the organization as necessary – Wound Care Clinic, Wound Care Specialist or Enterostomal Nurse, Dermatologist, Infectious Disease Specialist, Vascular Surgeon, Plastic Surgeon, Family Physician, Dietitian, Occupational Therapist, Physiotherapist, Chiropodist/Podiatrist, Certified Compression Stocking Fitter.</li> <li>Provision of education and support to client and family members.</li> <li>Client/family satisfaction.</li> </ol> </li> </ul>
<b>Client Eligibility criteria:</b> <ul style="list-style-type: none"> <li>new ulcer or</li> <li>recurrent venous leg ulcer</li> </ul> <b>Exclusion:</b> <ul style="list-style-type: none"> <li>arterial</li> <li>diabetic</li> <li>mixed</li> <li>primary lymphadema</li> <li>vasculitis</li> </ul>	<ul style="list-style-type: none"> <li>Percentage of clients admitted to unit/facility or seen at the clinic with venous leg ulcers.</li> </ul>	<ul style="list-style-type: none"> <li>Percentage of clients with venous leg ulcers who have a Doppler assessment completed and recorded by a trained professional.</li> <li>Percentage of clients with venous leg ulcers where compression is appropriately used.</li> </ul>	<ul style="list-style-type: none"> <li>Percentage of clients adhering to treatment plan at three months post discharge.</li> <li>Percentage of clients reporting reduced leg ulcer pain at three months post discharge.</li> <li>Percentage of clients with ulcers partially or fully healed at three months post discharge.</li> <li>Percentage of clients accessing referral sources in community.</li> <li>Percentage of clients seen or to be seen for referral.</li> </ul>
Financial Costs	<ul style="list-style-type: none"> <li>Cost related to equipment and products (e.g., Doppler, bandages).</li> </ul>	<ul style="list-style-type: none"> <li>Cost related to implementing guideline:                             <ul style="list-style-type: none"> <li>Education and access to on the job supports.</li> <li>New documentation systems.</li> <li>Support systems.</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>Cost for treatments.</li> </ul>

## Implementation Tips

This best practice guideline was pilot tested in a chronic care hospital and community care setting. There were many strategies that the pilot sites found helpful during the implementation, and those who are interested in implementing this guideline may consider these strategies or implementation tips. A summary of these strategies follows:

- Have a dedicated person such as a clinical resource nurse who will provide support, clinical expertise and leadership. The individual should also have good interpersonal, facilitation and project management skills.
- Establishment of a steering committee comprised of key stakeholders and members committed to leading the initiative. A work plan can assist as a means of keeping track of activities, responsibilities and timelines.
- Provide educational sessions and ongoing support for implementation. At the pilot sites, training was set up for maximum flexibility to respond to the various levels of experience of the nurses and accommodate their work schedule. The key resource for training nurses was a manual produced by the pilot sites, which is based on this RNAO best practice guideline. It contained two modules available in both print and electronic format: (1) basic wound care; and (2) care of venous leg ulcers. The training consisted of four phases. In the first phase, nurses were given the training manual, both in hard copy and on a CD, as a self-directed learning package. The nurses were given four to six weeks to review the material. The second phase was a two-hour, face-to-face session where participants had a short quiz on the training manual, an opportunity to ask questions, and a demonstration and practice session on bandaging. The third phase involved training a group of consultants who were available to support the further learning of staff. The final phase was support through a series of monthly newsletters. Each newsletter included an update of the project and focused on a specific group of recommendations from the guideline, such as product assessment, exercise, or nutrition.

Samples of these implementation tools developed by the pilot sites can be found at the RNAO website, [www.rnao.org/bespractices](http://www.rnao.org/bespractices).

- Organizational support, such as having the structures in place to facilitate the implementation. For examples, hiring of replacement staff so participants would not be distracted by concerns about work, and having an organizational philosophy that reflects the values of best practices through policies and procedures and documentation tools.

- Organizations implementing this guideline should look at a range of self-learning, group learning, mentorship and reinforcement strategies that will, over time, build the knowledge and confidence of nurses in implementing this guideline.
- Beyond skilled nurses, the infrastructure required to implement this guideline includes access to specialized equipment and treatment materials. A vigilant monitoring of the most effective pressure bandage products in the market needs to be established. A formal allocation of this monitoring activity to an appropriate staff or team is required.
- Timely access to Doppler ultrasound measurements is essential to proper assessment. Staff using the Doppler must have appropriate training and make frequent use of their skills in order to maintain a high standard of quality.
- Orientation of the staff to the use of specific products must be provided and regular refresher training planned.
- Teamwork, collaborative assessment and treatment planning with the client and family and through interdisciplinary work are beneficial in implementing guidelines successfully. Referral should be made as necessary to the following services or resources in the community or within the organization: Wound Care Clinic, Wound Care Specialist or Enterostomal Nurse, Dermatologist, Infectious Disease Specialist, Vascular Surgeon, Plastic Surgeon, Other healthcare professionals who provide care to clients with venous leg ulcers such as family physician, dietitian, occupational therapist, physiotherapist, chiropodist/podiatrist, and Certified Compression Stocking fitter.
- The RNAO's Advanced/Clinical Practice Fellowships (ACPF) Project is another way that registered nurses in Ontario may apply for a fellowship and have an opportunity to work with a mentor who has expertise in venous leg ulcer management. With the ACPF, the nurse fellow will have the opportunity to hone their skills in assessing and managing venous leg ulcers.

In addition to the tips mentioned above, the RNAO has developed resources that are available on the website. A toolkit for implementing guidelines can be helpful if used appropriately. A brief description of this *Toolkit* can be found in Appendix L. A full version of the document, in pdf file, is also available at the RNAO website, [www.rnao.org/bestpractices](http://www.rnao.org/bestpractices).

## Process For Update/ Review of Guideline

**The Registered Nurses Association of Ontario** proposes to update the 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 systematic reviews, meta-analysis and randomized controlled trials (RCT) in the field.
3. Based on the results of the monitor, project staff may recommend an earlier revision period. Appropriate consultation with a team of members, comprised of original panel members and other specialists in the field, will help inform the decision to review and revise the best practice guideline earlier than the three year milestone.
4. Three months prior to the three year milestone, the 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) Compilation of feedback received, questions encountered during the dissemination phase, as well as other comments and experiences of implementation sites.
  - c) Compilation of new clinical practice guidelines in the field, systematic reviews, meta-analysis papers, technical reviews and randomized controlled trial research.
  - d) Detailed work plan with target dates for deliverables will be established.

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

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## Appendix A: Search Strategy for Existing Evidence

### STEP 1 – Database Search

An initial database search for existing guidelines was conducted in early 2001 by a company that specializes in searches of the literature for health related organizations, researchers and consultants. A subsequent search of the MEDLINE, CINAHL and Embase databases, for articles published from January 1, 1998 to February 28, 2001, was conducted using the following search terms and keywords: “leg ulcer”, “leg ulcers”, “venous leg ulcer(s)”, “practice guidelines”, “practice guideline”, “clinical practice guideline”, “clinical practice guidelines”, “standards”, “consensus statement(s)”, “consensus”, “evidence based guidelines” and “best practice guidelines”. In addition, a search of the Cochrane Library database for systematic reviews was conducted using the above search terms.

### STEP 2 – Internet Search

A metacrawler search engine (metacrawler.com), plus other available information provided by the project team, was used to create a list of 42 websites known for publishing or storing clinical practice guidelines. The following sites were searched in early 2001.

- Agency for Healthcare Research and Quality: [www.ahrq.gov](http://www.ahrq.gov)
- Alberta Clinical Practice Guidelines Program:  
[www.amda.ab.ca/general/clinical-practice-guidelines/index.html](http://www.amda.ab.ca/general/clinical-practice-guidelines/index.html)
- American Medical Association: <http://www.ama-assn.org/>
- Best Practice Network: [www.best4health.org](http://www.best4health.org)
- British Columbia Council on Clinical Practice Guidelines:  
[www.hlth.gov.bc.ca/msp/protoguide/index.html](http://www.hlth.gov.bc.ca/msp/protoguide/index.html)
- Canadian Centre for Health Evidence: [www.cche.net](http://www.cche.net)
- Canadian Institute for Health Information (CIHI): [www.cihi.ca/index.html](http://www.cihi.ca/index.html)
- Canadian Medical Association Guideline Infobase: [www.cma.ca/eng-index.htm](http://www.cma.ca/eng-index.htm)
- Canadian Task Force on Preventative Health Care: [www.ctfphc.org/](http://www.ctfphc.org/)
- Cancer Care Ontario: [www.cancercare.on.ca](http://www.cancercare.on.ca)
- Centre for Clinical Effectiveness – Monash University, Australia:  
<http://www.med.monash.edu.au/publichealth/cce/evidence/>

- Centre for Disease Control and Prevention: [www.cdc.gov](http://www.cdc.gov)
- Centre for Evidence-Based Child Health: <http://www.ich.bpmf.ac.uk/ebm/ebm.htm>
- Centre for Evidence-Based Medicine: <http://cebmr2.ox.ac.uk/>
- Centre for Evidence-Based Mental Health: <http://www.psychiatry.ox.ac.uk/cebmh/>
- Centre for Evidence-Based Nursing: [www.york.ac.uk/depts/hstd/centres/evidence/ev-intro.htm](http://www.york.ac.uk/depts/hstd/centres/evidence/ev-intro.htm)
- Centre for Health Services Research: [www.nci.ac.uk/chsr/publicn/tools/](http://www.nci.ac.uk/chsr/publicn/tools/)
- Core Library for Evidenced-Based Practice: <http://www.shef.ac.uk/~scharr/ir/core.html>
- Clinical Resource Efficiency Support Team (CREST): <http://www.n-i.nhs.uk/crest/index.htm>
- Evidence-Based Nursing: <http://www.bmjpub.com/data/ebn.htm>
- Health Canada: [www.hc-sc.gc.ca](http://www.hc-sc.gc.ca)
- Healthcare Evaluation Unit: Health Evidence Application and Linkage Network (HEALNet): <http://healnet.mcmaster.ca/nce>
- Institute for Clinical Evaluative Sciences (ICES): [www.ices.on.ca/](http://www.ices.on.ca/)
- Institute for Clinical Systems Improvement (ICSI): [www.icsi.org](http://www.icsi.org)
- Journal of Evidence-Based Medicine: <http://www.bmjpub.com/data/ebm.htm>
- McMaster University EBM site: <http://hiru.hirunet.mcmaster.ca/ebm>
- McMaster Evidence-Based Practice Centre: <http://hiru.mcmaster.ca/epc/>
- Medical Journal of Australia: <http://mja.com.au/public/guides/guides.html>
- Medscape Multispecialty: Practice Guidelines: [www.medscape.com/Home/Topics/multispecialty/directories/dir-MULT.PracticeGuide.html](http://www.medscape.com/Home/Topics/multispecialty/directories/dir-MULT.PracticeGuide.html)
- Medscape Women's Health: [www.medscape.com/Home/Topics/WomensHealth/directories/dir-WH.PracticeGuide.html](http://www.medscape.com/Home/Topics/WomensHealth/directories/dir-WH.PracticeGuide.html)
- National Guideline Clearinghouse: [www.guideline.gov/index.asp](http://www.guideline.gov/index.asp)
- National Library of Medicine: <http://text.nlm.nih.gov/ftrs/gateway>
- Netting the Evidence: A SchARR Introduction to Evidence-Based Practice on the Internet: [www.shef.ac.uk/uni/academic/](http://www.shef.ac.uk/uni/academic/)
- New Zealand Guideline Group (NZGG): <http://www.nzgg.org.nz/library.cfm>
- Primary Care Clinical Practice Guideline: <http://medicine.ucsf.edu/resources/guidelines/>
- Royal College of Nursing (RCN): [www.rcn.org.uk](http://www.rcn.org.uk)
- The Royal College of General Practitioners: <http://www.rcgp.org.uk/Sitelis3.asp>
- Scottish Intercollegiate Guidelines Network (SIGN): [www.show.scot.nhs.uk/sign/home.htm](http://www.show.scot.nhs.uk/sign/home.htm)
- TRIP Database: [www.tripdatabase.com/publications.cfm](http://www.tripdatabase.com/publications.cfm)
- Turning Research into Practice: <http://www.gwent.nhs.gov.uk/trip/>
- University of California: [www.library.ucla.edu/libraries/biomed/cdd/clinprac.htm](http://www.library.ucla.edu/libraries/biomed/cdd/clinprac.htm)
- [www.ish.ox.au/guidelines/index.html](http://www.ish.ox.au/guidelines/index.html)

One individual searched each of these sites. The presence or absence of guidelines was noted for each site searched – at times it was indicated that the website did not house a guideline, but re-directed to another website or source for guideline retrieval. A full version of the document was retrieved for all guidelines.

### STEP 3 – Hand Search/Panel Contributions

Panel members were asked to review personal archives to identify guidelines not previously found through the above search strategy. In a rare instance, a guideline was identified by panel members and not found through the database or internet search. These were guidelines that were developed by local groups and had not been published to date.

### STEP 4 – Core Screening Criteria

The search method described above revealed eleven guidelines, several systematic reviews and numerous articles related to venous leg ulcer assessment and management. The final step in determining whether the clinical practice guideline would be critically appraised was to apply the following criteria:

- Guideline was in English.
- Guideline was dated no earlier than 1998 as significant changes in venous leg ulcer management occurred in that year.
- Guideline was strictly about the topic area.
- Guideline was evidence-based (e.g., contained references, description of evidence, sources of evidence).
- Guideline was available and accessible for retrieval.

Eight guidelines were deemed suitable for critical review using the Cluzeau et al., (1997) Appraisal Instrument for Clinical Guidelines.



## RESULTS OF THE SEARCH STRATEGY

The results from the search strategy and initial screening process resulted in the critical appraisal outcome as itemized below.

### TITLE OF THE PRACTICE GUIDELINES CRITICALLY APPRAISED

Clement, D. L. (1999). Venous ulcer reappraisal: Insights from an international task force. *Journal of Vascular Research*, 36(Suppl.1), 42-47.

Clinical Resource Efficiency Support Team (CREST) (1998a). Guidelines for the assessment and management of leg ulceration. CREST, Belfast, Northern Ireland [On-line]. Available: <http://www.ni-nhs.uk/crest/index.htm>

Compliance Network Physicians/Health Force Initiative, Inc. (1999). Guideline for the outpatient treatment – venous and venous-arterial mixed leg ulcer. Compliance Network Physicians/Health Force Initiative, Inc., Berlin, Germany [On-line]. Available: <http://www.cnhfi.de/index-engl.html>

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New Zealand Guidelines Group (NZGG) (1999). Care of people with chronic leg ulcers: An evidence based guideline. New Zealand Guidelines Group [On-line]. Available: <http://www.nzgg.org.nz/library.cfm>

Ottawa-Carleton Community Care Access Centre Leg Ulcer Care Protocol Task Force (2000). *Ottawa-Carleton Community Care Access Centre (CCAC) venous leg ulcer care protocol: Development, methods, and clinical recommendations*. Ottawa, Ontario: Ottawa-Carleton CCAC Leg Ulcer Protocol Task Force.

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## Appendix B: Glossary of Terms

**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.

**Adherent Materials:** Matter attached to the wound bed such as eschar, dirt particles, or bacteria.

**Allergic Sensitization:** The development of antibodies to a foreign substance (e.g., medication) that results in an allergic reaction.

**Anaerobic Organisms:** A microorganism that grows and lives in the complete or almost complete absence of oxygen.

**Analgesia:** Relief of pain without loss of consciousness.

**Ankle Brachial Pressure Index (ABPI):** A comparison between the brachial systolic pressure and the ankle systolic pressure. It gives an indication of arterial perfusion. The normal resting pressure is 1.0.

**Ankle Flare:** The characteristic clinical sign evident in the region of the ankle associated with venous hypertension/varicose veins visible as a result of a number of engorged veins in the area.

**Ankylosing Spondylitis:** A chronic disorder that is characterized by inflammation and ankylosis of the sacroiliac joints and spinal articulations.

**Antibiotic:** An agent that is synthesized from a living organism (e.g. mold from penicillin) and can kill or halt the growth of microbes or bacteria.

**Antimicrobial:** An agent that is used to kill bacteria or microbes, that is not synthesized from a living organism (e.g., iodine or silver).

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

**Antiseptic (Topical):** A diluted form of a disinfectant (a strong chemical agent not derived from living tissue), designed to kill all cell membranes it contacts.

**Atherosclerotic:** A thickening, hardening, and loss of elasticity of the blood vessel walls.

**Atrophe Blanche:** White atrophic lesions often associated with venous disease. Tiny visible blood vessels, called telangiectasia, are often seen in the centre.

**Bacteremia:** The presence of viable bacteria in the circulating blood.

**Basal Cell Carcinoma:** A malignant carcinoma which affects epithelial cells.

**Beurger's Disease:** An inflammatory occlusive condition, usually affecting vascular circulation of the leg, foot or upper extremities. Also known as thromboangitis obliterans.

**Biopsy:** The tissue removed (usually under local or general anaesthesia) for examination to determine the underlying etiology. The procedure to remove the tissue is also referred to as a biopsy.

**Body Mass Index:** Body weight in kilograms (kg) divided by height in meters squared (m<sup>2</sup>). It is used as a crude indicator of obesity.

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

**Calcification:** The accumulation of calcium salts in tissues. Normally 99 percent of calcium is deposited in bones and teeth with the remaining 1 percent dissolved in body fluids.

**Callus:** A thickening of the epidermis at a location of external pressure or friction. It is usually painless.

**Cell Migration:** Movement of cells in the repair process.

**Cellulitis:** An infection of the skin characterized most commonly by local heat, redness (erythema), pain and swelling.

**Cellulitis Advancing:** Cellulitis that is visibly spreading in the area of the wound. Advancement can be monitored by marking the outer edge of the cellulitis and assessing the area for advancement or spread 24 hours later.

**Charcot:** The chronic, progressive degenerative joint disease characterized by swelling, joint instability, hemorrhage, heat and bony deformities.

**Clean:** Containing no foreign material or debris.

**Clean Dressing:** Dressing that is not sterile but free of environmental contaminant such as water damage, dust, pest and rodent containments, and gross soiling.

**Clean Wound:** Wound free of purulent drainage, devitalized tissue, or dirt.

**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.

**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  $10^5$  organisms per gram of tissue or less are generally considered contaminated; those with higher counts are generally considered infected.

**Compression Bandaging:** The deliberate application of pressure using elastic bandages.

**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.

**Culture (Quantitative Bacterial):** Performing a bacterial culture in a manner that allows the number of bacteria present in a known quantity of tissue biopsy, wound aspirate, or sampled surface to be quantified.

**Culture and Sensitivity:** Removal of bacteria from a 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.

**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.

**Cytotoxic Cleansers:** Agents that can be used to cleanse wounds (to remove undesirable materials) but that have a specific destructive action on certain cells.

**Dead Space:** A cavity remaining in a wound.

**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-digest by the action of enzymes present in wound fluids, therefore facilitated through the maintenance of a moist wound environment.

**Enzymatic (Chemical) Debridement.** The topical application of proteolytic substances (enzymes) to breakdown devitalized tissue.

**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.

**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.

**Dehiscence:** Separation of the layers of a surgical wound.

**Dependent:** A dependent position is the fallen, limp or relaxed position of a limb or extremity.

**Desquamation:** Shedding of cells from the skin or mucous membranes.

**Dessication:** Damage to wound surface from drying, external products, dressings or solutions.

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

**Differentiation:** To develop differences, to become different; to make a difference between; to calculate the derivative.

**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.

**Doppler Ultrasound (in leg ulcer assessment):** The use of very high frequency sound in the detection and measurement of blood flow.

**Dorsum:** The back or posterior aspect of a relevant anatomical part.

**Duplex Ultrasound:** The combination of B mode grey scale ultrasound scanning and colour Doppler flow which gives an image of the vessel and velocity of the blood within. This is currently considered the gold standard in venous and arterial assessment.

**Edema:** The presence of excessive amounts of fluid in the intercellular tissue spaces of the body.

**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.

**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 color of “ground glass” to pink.

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

**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.

**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.

**Eschar:** Thick, hard, black, leathery, necrotic, devitalized tissue.

**Exfoliation:** Separation or shedding of skin in scales.

**Exudate:** Fluid, cells or other substances that have slowly been exuded or discharged from other cells and blood vessels through small pores or breaks in the cell membranes.

**Fibrin:** an insoluble protein that is essential to clotting of blood, formed from fibrinogen by action of thrombin.

**Fluid Irrigation:** Cleansing by means of a stream of fluid, preferably saline.

**Full Thickness Tissue Loss:** The absence of epidermis and dermis.

**Gaiter Area:** 2.5 cms. below the malleolus to the lower one third of the calf.

**Graduated High Compression Bandaging:** Pressure between 35-40 mm Hg at the ankle graduating to half at calf in the normally shaped limb, as per La Place's Law.

**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.

**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.

**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 clients. Healing is supported by a moist wound environment.

**Primary Intention Healing.** Closure and healing of a sutured wound.

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

**Hemosiderin:** Grayish brown hyperpigmentation caused by extravasation of red blood cells into the tissues; colour from the breakdown of red blood cells.

**Hydrotherapy:** Use of whirlpool or submersion in water for wound cleansing.

**Hyperbaric Oxygen:** Oxygen at greater than atmospheric pressure that can be applied either to the whole client inside a pressurized chamber or to a localized area (such as an arm or leg) inside a smaller chamber.

**Hyperkeratosis:** Overgrowth of the cornified epithelial layer of the skin.

**Hypoalbuminemia:** An abnormally low amount of albumin in the blood. A value less than 3.5 mg/dL is clinically significant. Albumin is the major serum protein that maintains plasma colloidal osmotic pressure (pressure within blood vessels) and transports fatty acids, bilirubin, and many drugs as well as certain hormones, such as cortisol and thyroxine, through the blood. Low serum albumin may be due to inadequate protein intake, active inflammation, or serious hepatic and renal disease and is associated with pressure ulcer development.

**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  $10^5$  or greater microorganisms per gram of tissue. Clinical signs of infection may not be present, especially in the immuno-compromised client or the client with a chronic wound.

**Local Clinical Infection.** A clinical infection that is confined to the wound and within a few millimeters of its margins – e.g., purulent exudate, odour, erythema, warmth, tenderness, edema, pain, fever, and elevated white cell count.

**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. *See Sepsis.*

**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 clients.

**Interdisciplinary:** A process where healthcare professionals representing expertise from various healthcare disciplines participate in a prevention or treatment based program standardizing and practising pressure ulcer management.

**Intermittent Claudication:** Pain that occurs only with moderate to heavy activity and is relieved by 2 to 5 minutes of rest.

**Irrigation:** Cleansing by a stream of fluid, preferably saline, with sufficient surface pressure to mechanically debride wound surface debris.

**Ischemia:** Deficiency of blood supply to a tissue, often leading to tissue necrosis.

**La Place's Law:** The theoretical pressure produced beneath a bandage can be calculated as follows:

$$P = \frac{4630 \times N \times T}{C \times W}$$

Where

- P = sub-bandage pressure (mmHg)
- N = number of layers
- T = tension within bandage (Kgforce)
- C = limb circumference (cm)
- W = width of bandage (cm)

A bandage applied with constant tension to a limb of normal proportions will automatically produce graduated compression with the highest pressure at the ankle. This pressure will gradually reduce up the leg as the circumference increases.

**Leucocytoclastic Vasculitis:** A vasculitis that results from leucocytoclasia, which is the disintegration of leucocytes.

**Lipodermatosclerosis:** Deposit of fibrin in the deep dermis and fat, resulting in a woody induration (woody fibrosis) of the gaiter area of the calf. May attribute to the inverted champagne bottle appearance of the lower leg.

**Low Resting Pressure:** When the muscle is relaxed, superficial veins are able to fill.

**Lymphoedema:** Edema and secondary skin changes resulting from lymphatic failure.

**Maceration:** The breakdown of the epidermis (skin) as a result of prolonged exposure to moisture.

**Malleolus:** Ankle bone.

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

### **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 maceration and impair healing of existing ulcers. Primary sources of skin moisture include perspiration, urine, feces, drainage from wounds, or fistulas.

**MRSA:** Methicillin-resistant staphylococcus aureus (MRSA) is a strain of the staphylococcus bacterium which is resistant to the main groups of antibiotics.

**Necrosis/Necrotic Tissue:** Describes devitalized (dead) tissue as a result of a reduced or inadequate blood/nutritional supply (e.g., eschar, slough and fibrin).

**Needle Aspiration:** Removal of fluid from a cavity by suction, often to obtain a sample (aspirate) for culturing.

**Osteomyelitis:** A bone infection which can be both localized and generalized.

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

**Phagocytosis:** The process of ingestion and digestion of bacteria, cells, necrotic tissue, or white blood cells in an injured area.

**Photoplethysmography:** Photoplethysmography uses infra-red light to assess changes in the blood volume in the micro-circulation. This provides information about the presence of deep or superficial venous disease and the effectiveness of the calf muscle pump.

**Pinch Graft:** A small, circular, deep graft of skin only a few millimetres in diameter.

**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.

**Proliferation:** To produce new growth or offspring rapidly, to multiply.

**Purpura:** Any of several bleeding disorders characterized by hemorrhaging into tissue particularly beneath the skin or with atrophie blanche.

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

**Qualitative Data:** Information that describes the nature or qualities of a subject.

**Quantitative Data:** Information that describes the characteristics of a subject in numerical or quantitative terms.

**Reactive Hyperemia:** Reddening of the skin caused by blood rushing back into ischemic tissue.

**Recalcitrant:** Disobedient, resisting authority or discipline.

**Resting Pressure:** Pressure exerted by the contracting bandage onto the tissue and the relaxed muscle.

**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.

**Seroma:** A collection of serum/plasma within a wound.

**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.

**Slough:** The accumulation of dead cellular debris on the wound surface. It tends to be yellow in colour due to large amounts of leukocytes present. NOTE: Yellow tissue is not always indicative of slough but may be subcutaneous tissue tendon or bone instead.

**Split Skin Graft:** A surgical procedure involving the replacement of dead tissue from one anatomical region by healthy tissue from another anatomical region of the same client (host).

**Squamous Cell Carcinoma:** A malignant tumour arising from the keratinocytes of the epidermis.

**Stasis Dermatitis:** Eczema of the legs with edema, pigmentation, and sometimes chronic inflammation. It is usually due to impaired return of blood from the legs. Compression stockings help the rash to resolve.

**Surfactants:** A surface-active agent that reduces the surface tension of fluids to allow greater penetration.

**Thromboangitis Obliterans:** An inflammatory occlusive condition, usually affecting vascular circulation of the leg, foot or upper extremities. Also known as Beurger's disease.

**Tissue Biopsy:** Use of a sharp instrument to obtain a sample of skin, muscle, or bone.

**Toe Pressure:** See photoplethysmography.

**Topical Antibiotic:** A drug known to inhibit or kill microorganisms that can be applied locally to a tissue surface.

**Topical Antiseptic:** Product with antimicrobial activity designed for use on skin or other superficial tissues; may damage some cells.

**Trendelenburg Test:** The Trendelenburg test also assists in the physical evaluation of venous valvular competence in the perforators and saphenous system. To perform this maneuver, the client is placed in a supine position with the leg elevated for 5 to 10 minutes allowing venous blood to empty. A tourniquet is then placed above the knee to occlude venous circulation and prevent retrograde flow. The client then stands, and the manner in which the veins refill is noted, with normal veins filling from below in approximately 30 seconds. If the superficial veins fill rapidly and the tourniquet in place, the perforator valves are incompetent. The tourniquet is then released, and if sudden additional filling occurs, the valves of the saphenous vein are incompetent.

**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.

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

**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.

**Unna Boot:** A dressing for varicose ulcers formed by applying a layer of gelatin-glycerine zinc oxide paste to the leg then a spiral bandage which is covered with successive coats of paste to produce a rigid boot.

**Vacuum Assisted Wound Closure:** A closed wound management system which facilitates a negative pressure across the complete wound interface through suction, thereby stimulating improved circulation and a reduction in exudate production.

**Valgus:** An abnormal position of a part of a limb twisted outwards – away from the midline.

**Varicose Veins:** A distended, engorged vein, usually as a result of incompetent valves or local trauma. The long saphenous vein is most commonly affected.

**Varus :** An abnormal position of a part of a limb turned inwards – towards the midline.

**Vasculitic Lesion:** A lesion associated with an inflammatory condition of the blood vessels that is characteristic of certain systemic diseases or that is caused by an allergic reaction.

**Venous Eczema:** Eczema associated with the development of venous ulcers. Also known as venous or stasis dermatitis.

**Venous Hypertension:** Back pressure on the venous system exerted either from central or pulmonary sources, or from extrinsic compression syndrome. Example, a mass, tumour or tight girdle.

**Venous Insufficiency:** An obstruction which blocks outflow, valvular incompetence, which permits retrograde flow, or muscle pump failure, resulting in incomplete emptying of the venous system in the lower leg.

**Venous Leg Ulcers:** Wounds that usually occur on the lower leg in people with venous insufficiency disease. Venous Leg Ulcers are also known by such terms as venous stasis ulcer and venous insufficiency. Ulcers result from chronic venous hypertension caused by the failure of the calf muscle pump (Blair, Wright, Backhouse, Riddle & McCollum, 1988).

**Venous Ulcer:** Partial to full thickness ulceration of the lower leg precipitated by venous hypertension and venous insufficiency.

**Vesicles:** Elevated, circumscribed, superficial fluid filled blister less than 1 cm in diameter.



## *Appendix C: Different Types of Leg Ulcers and Their Causes*

Arterial leg ulcers are caused by insufficient arterial blood supply to the lower limb, resulting in ischemia and necrosis. A vascular assessment is required to establish the location and extent of the occlusion and presence of small vessel disease. The client may require angioplasty or major vascular surgery.

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Rheumatoid ulcers are described as deep, well demarcated and punched-out in appearance. Persons with rheumatoid arthritis may develop vasculitis, which causes occlusion of small vessels leading to tissue ischemia. Ulcers resulting from vasculitis tend to have a purplish hue around the edges.

Diabetic ulcers are usually found on the foot, often over bony prominences such as the bunion area or under the metatarsal heads and usually have a sloughy or necrotic appearance. An ulcer in a diabetic client may have neuropathic, arterial and/or venous components. It is essential to identify underlying etiology. The Doppler measurement of the ABPI may be unreliable in the diabetic client if calcification prevents compression of the artery. Therefore, specialist assessment is required.

Malignancy is a rare cause of ulceration, and more rarely, a consequence of chronic ulceration. Ulcers with atypical site and appearance such as rolled edges, or non-healing ulcers with a raised ulcer bed should be referred for biopsy.

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## Appendix D: Leg Ulcer Assessment Form

Person Completing Assessment: \_\_\_\_\_ Date: \_\_\_\_\_

Client Name:	_____ Caf # _____ CM# _____	
VON ID #:	_____ District _____ CCAC ID # _____	
Address	_____	
Telephone	Home: _____ Work: _____	
Date of Birth	Y/M/D: _____	
Gender	<input type="checkbox"/> Male <input type="checkbox"/> Female	
Language	<input type="checkbox"/> English <input type="checkbox"/> French <input type="checkbox"/> Bilingual <input type="checkbox"/> Other Specify _____	
Family Physician	Name: _____ Telephone: _____	
Referral By	Name: _____ Telephone: _____	
Contact Person	Name: _____	
Relationship	<input type="checkbox"/> Spouse <input type="checkbox"/> Parent <input type="checkbox"/> Daughter <input type="checkbox"/> Son <input type="checkbox"/> Friend <input type="checkbox"/> Neighbour <input type="checkbox"/> Other Specify _____	
Telephone of Contact	Home: _____ Work: _____	
Specialist/Consultants	Name      Telephone 1. _____ 2. _____ 3. _____	office use only 01 04 02 05 03 06
Social History Lives	<input type="checkbox"/> Alone <input type="checkbox"/> With Spouse <input type="checkbox"/> With Family <input type="checkbox"/> Other Specify _____	
Accommodations	<input type="checkbox"/> House <input type="checkbox"/> Apartment <input type="checkbox"/> Senior Citizen Residence <input type="checkbox"/> Long Term Care Facility	
Mobility	Independently Mobile <input type="checkbox"/> Yes <input type="checkbox"/> No <b>If No:</b> <input type="checkbox"/> Bed bound <input type="checkbox"/> Chair bound <input type="checkbox"/> Physical aid(s) <input type="checkbox"/> Assistance from another person	
Sleeps	<input type="checkbox"/> In bed <input type="checkbox"/> Mostly in a chair	

Attendance at Leg Ulcer Clinic	Able to attend a leg ulcer clinic <input type="checkbox"/> Yes <input type="checkbox"/> No			
	Willing to attend a leg ulcer clinic <input type="checkbox"/> Yes <input type="checkbox"/> No			
<b>If Yes to both able and willing to attend the leg ulcer clinic:</b> Travel By: <input type="checkbox"/> Automobile <input type="checkbox"/> Drives self <input type="checkbox"/> Family/friend drives <input type="checkbox"/> City bus <input type="checkbox"/> Close to bus line <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Para Transpo <input type="checkbox"/> Taxi <input type="checkbox"/> Walks				
Height/Weight	Height M _____ or Ft/In _____	Weight Kg. _____ or lbs _____		
Allergies	Medications or Topical 1. _____ 2. _____ 3. _____ 4. _____ 5. _____ 6. _____			
Baseline Vital Signs	BP _____	T _____ P _____ R _____		
Blood work done Results Received	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> taken in clinic <input type="checkbox"/> arranged by VON		
HEALTH HISTORY	History Associated with Venous Disease		History Associated with Non Venous Disease	
		Family history of leg ulcers	Peripheral Vascular Disease	Rheumatoid Arthritis
		Varicose Veins	Intermittent Claudication	Renal Disease
		DVT • Affected Leg ----- • Unaffected Leg	Vascular Surgery lower limbs	Vasculitis
		Venous surgery	Rest Pain/ night pain	Ulcerative Colitis
		Injection Sclerotherapy	Hypertension	Current Smoker
		Trauma/Fracture of leg(s)	CHF	Past Smoker
		Pulmonary embolism	MI	
		Pregnancies # _____	Angina	
		Osteoarthritis	CVA/TIAS	
		Phlebitis	Diabetes	
	Medications for Pain Control	<input type="checkbox"/> Non Narcotic <input type="checkbox"/> NSAIDS <input type="checkbox"/> Opioids <input type="checkbox"/> Psychotropic <input type="checkbox"/> Anticonvulsants		

History of Leg Ulcers

Previous leg ulcers  Yes  No

Number of previous episodes \_\_\_\_\_

Age of first occurrence \_\_\_\_\_ **OR** Year of first occurrence \_\_\_\_\_

How long did it take the last ulcer to heal? \_\_\_\_\_

Have you been prescribed compression stockings?  Yes  No

**If Yes, Class of stocking:**  Class 1 (20-30 mm Hg)  Class 2 (30-40 mm Hg)  
 Class 3 (40-50 mm Hg)  Unknown

How frequently do you wear stockings?

All of the time  Daytime only  Occasionally  Never

How old are your current stockings?  < 6 months  ≥ 6 months

Do you have problems with stockings?  Yes  No

**If yes, the problem is:**  Applying  Discomfort  Skin Reactions

Were you treated with compression bandaging before

Yes  No

**If yes, specify:**  Unna Boot  Long stretch (e.g., surepress)  
 Four layer (e.g., Profore)  Other specify \_\_\_\_\_

Did you experience any problems with the compression bandage?

Yes  No

**If yes,**  Skin reactions  Discomfort  Skin breakdown

**Have you had a Doppler ultrasound of your leg before?**  Yes  No

**If yes,** when was the last time? \_\_\_\_\_



## Assessment of Legs

		Leg			Leg			Leg	
		RT	LT		RT	LT		RT	LT
Temperature	Warm			Cool in a warm environment			Warm		
Colour	Hyperpigmentation (brown staining)			Reddish blue on dependency			Normal Skin Tones		
				Leg blanches on elevation					
Pain	Aching, heavy legs			Nocturnal pain			Numbness		
				Pain at rest			Tingling		
				• Forefoot • Toes • Calf • Thigh • Buttock	-----	-----	Burning		
				Calf pain caused by walking					
Skin /Nail Changes	Hyperkeratosis			Shiny, taut skin			Cracked, inelastic		
	Lipodermatosclerosis			Hairless			Absence of sweating in feet		
	Atrophe Blanche			Trophic nail bed changes					
	Ankle Flare								
	Venous eczema			Gangrene			Infection suspected		
	• Wet	-----	-----	• Wet	-----	-----			
	• Dry	-----	-----	• Dry	-----	-----			
	• Infected	-----	-----						
Capillary Refill	Less than 3 seconds			Greater than 3 seconds			Depends on degree of ischemia		
Peripheral Pulses	Palpable pulses			Diminished or absent pulses			Bounding pulses		
	• Dorsalis Pedis (DP)			• DP			• DP		
	• Posterior tibial (PT)			• PT			• PT		

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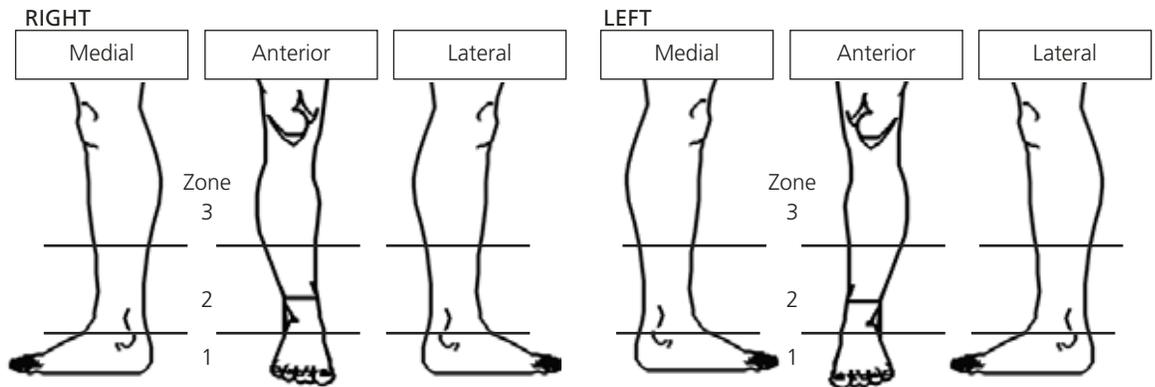


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<b>Location of Ulcers</b>	Gaiter Region	Leg RT   LT	Dorsum of Foot Digits	Leg RT   LT	Beneath Calluses	Leg RT   LT
<b>Edema</b>	<ul style="list-style-type: none"> <li>• Pitting Mild (1+)</li> <li>Moderate (2+)</li> <li>Severe (3+)</li> <li>Very Severe (4+)</li> <li>• Non pitting</li> <li>• Edema of toes</li> </ul>	-----	Dependency edema			
<b>Other Characteristics</b>	Varicose veins  Fixed ankle joint	-----			Foot deformity <ul style="list-style-type: none"> <li>• Hammer toes</li> <li>• Prominent metatarsal heads</li> <li>• Charcot joint</li> </ul>	-----
<b>Probable Etiology</b>	Venous	Arterial		Diabetic Neuropathy		
Circumference (Right Leg)			Circumference (Left Leg)			
Ankle ____ Cm Calf ____ Cm			Ankle ____ Cm Calf ____ Cm			
<b>Sensation (Right)</b> (Clients with suspected neuropathy)			<b>Sensation (Left)</b> (Clients with suspected neuropathy)			
<b>Perception of Pain</b> <input type="checkbox"/> Normal <input type="checkbox"/> Increased <input type="checkbox"/> Decreased <input type="checkbox"/> Absent			<b>Perception of Pain</b> <input type="checkbox"/> Normal <input type="checkbox"/> Increased <input type="checkbox"/> Decreased <input type="checkbox"/> Absent			
<b>Perception of Temperature</b> Hot <input type="checkbox"/> Yes <input type="checkbox"/> No Cold <input type="checkbox"/> Yes <input type="checkbox"/> No			<b>Perception of Temperature</b> Hot <input type="checkbox"/> Yes <input type="checkbox"/> No Cold <input type="checkbox"/> Yes <input type="checkbox"/> No			
<b>Perception of Touch</b> <input type="checkbox"/> Normal <input type="checkbox"/> Increased <input type="checkbox"/> Decreased <input type="checkbox"/> Absent			<b>Perception of Touch</b> <input type="checkbox"/> Normal <input type="checkbox"/> Increased <input type="checkbox"/> Decreased <input type="checkbox"/> Absent			
<b>Ankle Brachial Pressure Index (Right)</b>			<b>Ankle Brachial Pressure Index (Left)</b>			
Brachial Systolic _____			Brachial Systolic _____			
Dorsalis Pedis _____ Anterior Tibial _____			Dorsalis Pedis _____ Anterior Tibial _____			
Posterior Tibial _____ Peroneal _____			Posterior Tibial _____ Peroneal _____			
ABPI _____			ABPI _____			

## Current Ulcer(s)

(Locate ulcer site by an X and number each leg ulcer on the diagram below)



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Right	Zone 1	Zone 2	Zone 3	Left	Zone 1	Zone 2	Zone 3
Medial				Medial			
Lateral				Lateral			
Posterior				Posterior			
Anterior				Anterior			
Plantar				Plantar			

Leg Ulcer Assessment

Client: _____		Ulcer #	Ulcer #	Ulcer #	Ulcer #
<b>Date of Onset: Year/Month/Day</b> Please indicate when each ulcer first started. This may be an estimate if client is uncertain.					
<b>Ulcer margins</b>	1. Well defined, punched out 2. Diffuse irregular 3. Cliff – like edges 4. Rolled edges				
<b>Odour</b>	0. None 1. Slight 2. Offensive				

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## Appendix E: Leg Ulcer Measurement Tool

Item/Domain	Response Categories	Score					
		Date (mm/dd/yyyy)					
		_/_/_	_/_/_	_/_/_	_/_/_	_/_/_	_/_/_
<b>(A) CLINICIAN RATED DOMAINS</b>							
A1. Exudate type	<b>0</b> None <b>1</b> Serosanguinous <b>2</b> Serous <b>3</b> Seropurulent <b>4</b> Purulent						
A2. Exudate amount	<b>0</b> None <b>1</b> Scant <b>2</b> Small <b>3</b> Moderate <b>4</b> Copious						
A3. Size (from edge of advancing border of epithelium)	<b>(Length x Width)</b> <b>0</b> Healed <b>1</b> <2.5 cm <sup>2</sup> <b>2</b> 2.5-5.0 cm <sup>2</sup> <b>3</b> 5.1-10.0 cm <sup>2</sup> <b>4</b> 10.1 cm <sup>2</sup> or more						
A4. Depth	<b>Tissue Layers</b> <b>0</b> Healed <b>1</b> Partial thickness skin loss <b>2</b> Full thickness <b>3</b> Tendon/joint capsule visible <b>4</b> Probes to bone						
A5. Undermining	<b>Greatest at ___ o'clock</b> <b>0</b> 0 cm <b>1</b> >0 – 0.4 cm <b>2</b> >0.4 – 0.9 cm <b>3</b> >0.9 – 1.4 cm <b>4</b> >1.5 cm						
A6. Necrotic tissue type	<b>0</b> None <b>1</b> Loose white to yellow slough <b>2</b> Attached white to yellow slough or fibrin <b>3</b> Soft grey to black eschar <b>4</b> Hard dry black eschar						

<p>A7. Necrotic tissue amount</p>	<p><b>0</b> None visible  <b>1</b> 1 to 25% of wound bed covered  <b>2</b> 26 to 50% of wound bed covered  <b>3</b> 51 to 75% of wound bed covered  <b>4</b> 76 to 100% of wound bed covered</p>						
<p>A8. Granulation tissue type</p>	<p><b>0</b> Healed  <b>1</b> Bright beefy red  <b>2</b> Dusky pink  <b>3</b> Pale  <b>4</b> Absent</p>						
<p>A9. Granulation tissue amount</p>	<p><b>0</b> Healed  <b>1</b> 76 to 100% of wound bed covered  <b>2</b> 51 to 75% of wound bed covered  <b>3</b> 26 to 50% of wound bed covered  <b>4</b> 1 to 25% of wound bed covered</p>						
<p>A10. Edges</p>	<p><b>0</b> Healed  <b>1</b> ≥50% advancing border of epithelium or indistinct borders  <b>2</b> &lt; 50% advancing border of epithelium  <b>3</b> Attached, no advancing border of epithelium  <b>4</b> Unattached or undermined</p>						
<p>A11. Perilucer skin viability</p> <ul style="list-style-type: none"> <li>- callus</li> <li>- dermatitis (pale)</li> <li>- maceration</li> <li>- induration</li> <li>- erythema (bright red)</li> <li>- purple blanchable</li> <li>- purple non-blanchable</li> <li>- skin dehydration</li> </ul>	<p><b>Number of factors affected</b>  <b>0</b> None  <b>1</b> One only  <b>2</b> Two or three  <b>3</b> Four or five  <b>4</b> Six or more factors</p>						
<p>A12. Leg edema type</p>	<p><b>0</b> None  <b>1</b> Non-pitting or firmness  <b>2</b> Pitting  <b>3</b> Fibrosis or lipodermatosclerosis  <b>4</b> Indurated</p>						

A13. Leg edema location	<ul style="list-style-type: none"> <li>0 None</li> <li>1 Localized periulcer</li> <li>2 Foot, including ankle</li> <li>3 To mid calf</li> <li>4 To knee</li> </ul>						
A14. Assessment of bioburden	<ul style="list-style-type: none"> <li>0 Healed</li> <li>1 Lightly colonized</li> <li>2 Heavily colonized</li> <li>3 Localized infection</li> <li>4 Systemic infection</li> </ul>						
<b>Total – (A) CLINICIAN RATED DOMAINS:</b>							
<b>(B) PATIENT (PROXY) RATED DOMAINS</b>							
<p>B1. Pain amount (as it relates to the leg ulcer)</p> <p><i>Rate your pain, experienced in the last 24 hours, on a scale from 0 to 10, where 0 is "no pain" and 10 is the "worst pain".</i></p>	<p><b>Numerical rating scale (0 – 10)</b></p> <ul style="list-style-type: none"> <li>0 None</li> <li>1 &gt;0 – 2</li> <li>2 &gt;2 – 4</li> <li>3 &gt;4 – 7</li> <li>4 &gt;7</li> </ul>						
<p>B2. Pain frequency (as it relates to the leg ulcer)</p> <p><i>"Which of the following terms best describes how often you have had pain in the last 24 hours?"</i></p>	<ul style="list-style-type: none"> <li>0 None</li> <li>1 Occasional</li> <li>2 Position dependent</li> <li>3 Constant</li> <li>4 Disturbs sleep</li> </ul>						
<p>B3. Quality of life (as it relates to the leg ulcer)</p> <p><i>"How do you feel about the quality of your life at the present time?"</i></p>	<ul style="list-style-type: none"> <li>0 Delighted</li> <li>1 Satisfied</li> <li>2 Mixed</li> <li>3 Dissatisfied</li> <li>4 Terrible</li> </ul>						
<b>Total – (B) PATIENT (PROXY) RATED DOMAINS:</b>							
<b>Proxy Completed by:</b>							
<b>Total LUMT Score:</b>							

## LUMT 2000 General Instructions

**Section A CLINICIAN RATED DOMAINS Assessments are to be done pre-debridement but after cleansing the wound. Evaluators should note the exudate type and amount on removal of dressings. Whenever possible, the time since the last dressing change should be consistent from one assessment to next.**

**A1. Exudate type – Reminder: Some wound care products may change the appearance of the exudate, e.g., silver sulfadiazine or hydrocolloids.**

Definitions:

- 1 Serosanguinous – thin watery pale red to pink
- 2 Serous – thin watery clear pale yellowish
- 3 Seropurulent – thin opaque
- 4 Purulent – thick opaque yellow to green with foul odour (as distinct from body or foot odour)

**A2. Exudate amount – Reminder: Consider time since last dressing change.**

- 0 None – ulcer healed or wound tissue dry (if wound dressings changes are not regular)
- 1 Scant – wound bed moist with dressing dry
- 2 Small – wound bed moist with some drainage on dressing
- 3 Moderate – obvious fluid in wound bed and >50% of dressing soaked
- 4 Copious – overwhelming the dressing system

**A3. Size – Measure length as the longest diameter; width is perpendicular to length. Avoid diagonals. Calculate wound area as length by width. Write this in space provided and select appropriate response category.**



**A4. Depth – layers. Pick the most appropriate descriptor.**

**A5. Undermining – Place moistened rayon-tipped sterile applicator or wound probe under the edge of the wound. Advance it gently as far as it will go. Place gloved thumb on the applicator against the wound edge to mark the extent of undermining on the applicator. Holding the thumb in place, remove the applicator and measure the distance along the applicator in centimetres. Indicate the area of greatest undermining according to the face of a clock with 12 o'clock at the top of the patient.**

- A6. Necrotic tissue type** – *Reminder: The wound should be thoroughly cleansed before evaluating.* Pick the predominant type of necrotic tissue, e.g., if most of the wound bed is attached fibrin with small amount of black eschar, choose attached fibrin as tissue type.
- A7. Necrotic tissue amount** of predominant type selected in A6. The sum of the percentages in A7 and A9 may be less than but should not exceed 100%.
- A8. Granulation tissue type** – Choose predominant type of granulation tissue.
- A9. Granulation tissue amount** – (The sum of the percentages in A7 and A9 may be less than but should not exceed 100%.) The percentage of granulation tissue refers only to the non-epithelialized (open) portion of the wound. The advancing border of epithelium is not considered part of the wound surface.

- A10. Edges** – Definition: Indistinct borders - where you would not be able to trace the wound edge.
- 1 More than half of advancing borders may be indistinct because most of wound is epithelializing.

Advancing wound edge is 

- 2 Less than half of the wound edge is advancing (the process of epidermal resurfacing appears smooth and shiny).

- 3 Attached, no advancing border – unable to probe. Looks like 

- 4 Unattached wound edge is  undermined wound edge is 

- A11. Periwound skin viability** – Select the following items that are present; count the number selected; then use this total to determine appropriate response category.

Definitions: Callus – thick dry epidermis

Scaling dermatitis – scaling red skin which may be weeping

Maceration – wet white opaque skin

Induration – feels firmer than surrounding skin when pressed

Erythema – skin redness (bright red)

**A12. Leg edema type** – Indicate the *worst* edema type located anywhere on leg.

Definition: lipodermatosclerosis – waxy white firm tissue.

**A13. Leg edema location** – Indicate the most proximal location of *any* type of edema. Clinical example: pitting edema ankles with non-pitting edema to mid calf: For A10, leg edema type = 2 ‘pitting’ , A11, leg edema location = 3 to ‘mid calf’.

**A14 Assessment of bioburden**

- 1 Lightly colonized: small amount of serous- type exudate.
- 2 Heavily colonized: large amount of seropurulent drainage with foul odour and no other cardinal signs of inflammation.
- 3 Localized infection: large amount of seropurulent drainage with foul odour and either induration, erythema, warmth, or pain.
- 4 Systemic infection: advancing cellulitis or osteomyelitis.

**Section B PATIENT (PROXY) RATED DOMAINS** *Read the questions “as they are” to the patient. It is important to qualify that the questions refer to the last 24 hours. If the patient is unable to understand the questions due to cognition or language deficits, section B should not be completed or it may be completed by a proxy only if the proxy knows the patient well and has been with the patient for most of the last 24 hours. The same person should provide proxy information for each assessment; otherwise do not complete section B.*

**B1. Pain amount** as it relates to the leg ulcer in the last 24 hours. Determine the rating based on a numerical rating scale ranging from 0 - 10, then place response in appropriate category.

**B2. Pain frequency** as it relates to the leg ulcer in the last 24 hours. How often patient experienced pain in the last 24 hours.

**B3. Quality of life** as it relates to the leg ulcer in the last 24 hours.

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## *Appendix F: Quality of Life Assessment Tool*

### **Prognostic indication:**

The prognostic indication considers the benefits and risks, requirements, and outcomes of the selected therapy. It takes into account the patient compliance, the physical, cognitive and emotional state, the social integration in the family, the circle of acquaintances and the living conditions together with the everyday and occupational capabilities of the patient.

A treatment plan is produced with therapeutic aims broken down into separate aims. The necessary cooperation of the patient is allocated to the various parts of the break-down. Alternative aims of the treatment plan are:

- Maintenance/re-establishment of the ability to work,
- Avoidance of the necessity for lifelong professional nursing care,
- Improvement of the quality of life,
- Prolongation of the years of survival.

The patient's estimate of the quality of life should be included both initially in the discussion of the treatment plan with the patient, and once the ulcer has healed.

The outcome of the treatment as a result of the physician-patient and the nurse-patient interaction is influenced by:

- Perception of the severity of the disorder by the patient
- Assessment of the efficacy of the treatment by the patient
- Duration of treatment and disorder
- Complexity of the therapy.

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Compliance Network Physicians/Health Force Initiative, Inc. (1999). Guideline for the outpatient treatment – venous and venous-arterial mixed leg ulcer. Compliance Network Physicians/Health Force Initiative, Inc., Berlin, Germany [On-line]. Available: <http://www.cnhfi.de/index-engl.html>

### **Assess for Quality of Life**

Collect information on quality of life and impact of illness on a regular basis and assess for change over time. Use existing measure if your agency uses a quality of life assessment instrument (e.g., Medical Outcome Study – SF-36 or the SF-12 quality of life scale) or develop generic, simple questions to be incorporated into the nursing assessment.

Example:

How would you describe your current health status?

Very good    Good    Fair    Bad    Very Bad

How does the leg ulcer impact your day-to-day living?

Very little    Moderately    A lot

Periodic reassessment is recommended.

Set treatment goals with the client consistent with the values of the individual, family, and caregiver.

Arrange interventions to meet identified psychosocial needs and goals. Follow-up should be planned in cooperation with the individual, caregiver, and consultations with appropriate interdisciplinary team members.

## Appendix G: Pain Assessment Tools

### SAMPLE 1 – Visual Analogue Scale (VAS)



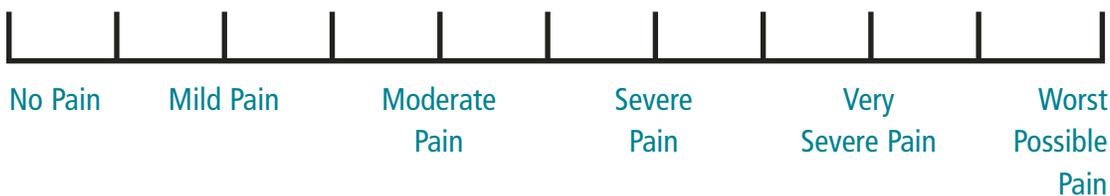
The patient indicates intensity of pain on a 10cm. line marked from no pain at one end to pain as bad as it could possibly be at the other end.

### 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”.

### Facial Grimace & Behaviour Checklist Flow Charts

Name: \_\_\_\_\_ Active  Resting  Time: \_\_\_\_\_



Regular pain Medication: \_\_\_\_\_ Rescue/PRN medication \_\_\_\_\_

Month: \_\_\_\_\_

Date or Time															
FACIAL SCORE															
10															
8															
6															
4															
2															
0															
PRN medication															

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 - occasionally    2 – rarely    0 - never

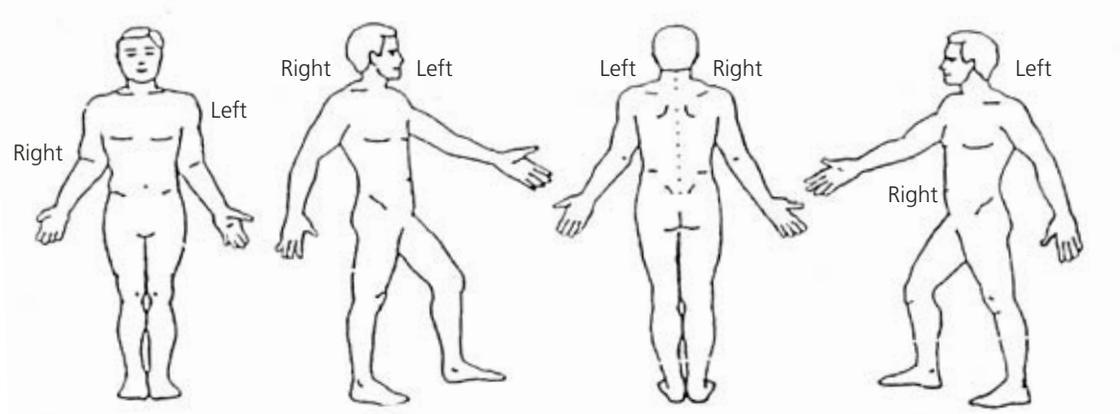
Date or Time															
BEHAVIOUR															
eats poorly															
tense															
quiet															
indicates pain															
calls out															
paces															
noisy breathing															
sleeps poorly															
picks															
PRN medication															

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.**

## Pain Assessment Tool

Assessment Date: \_\_\_\_\_ Name: \_\_\_\_\_

Location of Pain: Use letters to identify different pains.



Intensity: Use appropriate pain tool to rate pain subjectively/objectively on a scale of 0-10.

Location	Pain A	Pain B	Pain C	Other
What is your/their present level of pain?				
What makes the pain better?				
What is the rate when the pain is at it's least?				
What makes the pain worse?				
What is the rate when the pain is at it's worst?				
Is the pain continuous or intermittent (comes & goes)?				
When did this pain start?				
What do you think is the cause of this pain?				
What level of pain are you satisfied with?				

Quality: Indicate the words that describe the pain using the letter of the pain (A,B,C) being described.

- aching  throbbing  shooting  stabbing  gnawing  sharp   
 burning  tender  exhausting  tiring  penetrating  numb   
 nagging  hammering  miserable  unbearable  tingling  stretching   
 pulling  other: \_\_\_\_\_



0  
no pain



2  
mild



4  
discomforting



6  
distressing



8  
horrible



10  
excruciating

Originally adapted with permission from Grey Bruce Palliative Care/Hospice Association Manual. 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: Cleansing Agents and Their Associated Toxicities

Relative toxicity indices of nonantimicrobial and antimicrobial wound cleansers		
Product (nonantimicrobial)	Manufacturer	Toxicity Index
Dermagran®	Derma Sciences, Inc.	10
Shur-Cleans®	Conva Tec®	10
Biolex™	Bard Medical Division, C.R. Bard Inc.	100
Cara-Klenz™ Wound & Skin Cleanser	Carrington Laboratories Inc.	100
Saf-Cleans® Chronic Wound Cleanser	Conva Tec®	100
Clinswound™	Sage Laboratories, Inc.	1,000
Constant-Cleans™ Dermal Wound Cleanser	Sherwood Medical-Davis & Geck	1,000
Curaklense™ Wound Cleanser	Kendall Healthcare Products Co.	1,000
Curasol™	Healthpoint Medical	1,000
Gentell Wound Cleanser™	Gentell	1,000
Sea-Cleans® Wound Cleanser	Coloplast Sween Corp.	1,000
Ultra-Klenz™ Wound Cleanser	Carrington Laboratories, Inc.	1,000
Product (antimicrobial)	Manufacturer	Toxicity Index
Clinical Care® Dermal Wound Cleanser	Care-Tech® Laboratories, Inc.	1,000
Dermal Wound Cleanser	Smith & Nephew United, Inc.	10,000
MicroKlenz™ Antimicrobial Wound Cleanser	Carrington Laboratories, Inc.	10,000
Puri-Cleans™ Wound Deodorizer & Cleanser	Coloplast Sween Corp.	10,000
Restore™	Hollister Inc.	10,000
Royl-Derm™	Acme United Corp.	10,000
SeptiCare™ Antimicrobial Wound Cleanser	Sage Laboratories, Inc.	10,000

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Rodeheaver, G. T. (2001). Wound cleansing, wound irrigation, wound disinfection. In D. L. Krasner, G. T. Rodeheaver & R. G. Sibbald (Eds.), *Chronic wound care: A clinical source book for healthcare professionals, Third Edition*. (pp.369-383). Wayne, PA: HMP Communications.

## Appendix I: Potential Allergens

Commonly Reported Allergens In Patients With Chronic Ulcers	
Allergen	Source
Topical antibiotics e.g., framycetin, neomycin, gentamicin	Medicaments e.g., some tulleles, powders, creams and ointments
Lanolin (wood alcohols, amerchol L 101)	Many creams, ointments and emollients
Cetyl stearyl alcohol	Present in many creams preparations e.g., in aqueous cream and some corticosteroid cream. Also in some ointments e.g., emulsifying ointment, and in some paste bandages.
Colophony (Rosin, Esters of Rosin)	Sticking plaster, adhesive in some bandages and some hydrocolloid dressings.
Rubber Chemicals e.g., Thiuram mix, including latex	Bandages, tubular elastic bandages, elastic stockings containing natural rubber and latex gloves worn by carer
Preservatives e.g., parabens and chloroxylenol	In many medicaments and some paste bandages
Antibacterials and antiseptics e.g., quinoline mix, chlorhexidine	Solutions, creams, tulleles
a. Balsam of Peru/fragrance mix b. Benzocaine	Home care preparations: a. with perfume b. with local anaesthetic action
Tixocortol pivalate	Marker of corticosteroid hypersensitivity particular to hydrocortisone

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## Appendix J: Topical Antimicrobial Agents

TOPICAL ANTIMICROBIAL AGENTS									
	Agent	Spectrum							Comments
		SA	MRSA	Strep	PS	F	An-aerobic	VRE	
Safe & Effective	Cadexomer Iodine	✓	✓	✓	✓	✓	✓		Broad spectrum. Effective for fungi & virus. Widely available. Sheet requires wound contact. Caution if on thyroid medication.
	Ionized Silver	✓	✓	✓	✓	✓	✓	✓	Broad spectrum. Effective for fungi & virus. Sheet requires wound contact.
	Silver Sulphadiazine	✓	✓	✓	✓		✓		Limited potential for resistance. Available in paste or ointment. Do not use if sulfa sensitive.
	Polymyxin B Sulphate – Bacitracin Zinc	✓	✓	✓	✓		✓		Sheet requires wound contact.
Selective Use	Metronidazole gel/cream						✓		Reserve for anaerobes & odour control.
	Benzyl/Peroxide	✓		✓	✓		✓		Reserve for MRSA & other resistant gram positive.
	Acetic Acid				✓				Used in 0.25% (e.g., 1/4 of 1.0% maximum concentration).

TOPICAL ANTIMICROBIAL AGENTS									
	Agent	Spectrum							Comments
		SA	MRSA	Strep	PS	F	An-aerobic	VRE	
	Mupuricin Bactrobaic		✓						Good for MRSA Excellent topical penetration
Caution	Gentamycin	✓		✓	✓				Reserve for oral/IV use
	Fucidic Acid	✓		✓					Sensitize
	Polymixin B Sulphate Bacitracin Zinc Neomycin	✓	✓	✓	✓		✓		Potezot Sensitizer
Not Recommended	Alcohol Betadine Boric Acid Daikens Iodine								Cytotoxic Cytotoxic Cytotoxic Cytotoxic Cytotoxic
<p>Legend: (SA = Staphylococcus Aureus), (MRSA = Methicillin Resistant Staph Aureus), (Strep = Streptococci), (PS = Pseudomona), (F = Fungi – Mucor, Aspergillus, Candida Albicans, Candida Tropicalis, Candida Glabrata, &amp; Saccharomyces), (VRE = Vancomycin-Resistant Enterococci)</p>									

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# Appendix K: Classes of Compression Bandages

Below are examples of compression bandages commonly used in the management of venous leg ulcers:

Type of Compression	Examples	Performance Characteristics
<b>HIGH (40 mmHg pressure and higher)</b>		
High elastic compression (Long stretch)	Surepress* (Convatec) Surepress and flexible cohesive bandage.	Sustained compression; can be worn continuously for up to 1 week; can be washed and re-used, but may slip. Can use flexible cohesive for slippage.
Multilayer high compression	Profore* (Smith & Nephew) 4 layer bandage comprising of orthopedic padding; crepe; Eiset; Coban.	Designed to apply 40 mmHg pressure at the ankle, graduating to 17 mmHg at the knee; sustainable for 1 week.
Inelastic Compression	Short-stretch bandage, e.g., Compriln (Beiersdorf)	Reusable with slight stretch giving low resting pressure but high pressure during activity.
Unna's Boot		Non compliant, plaster-type dressing. Need ankle mobility if slippage problem.
<b>MEDIUM (20-40 mmHg pressure)</b>		
Multilayer bandages	Profore light	Bandages can be made by combining Kling and a Tensor (spiral or figure 8) and a flexible cohesive bandage on top. Components can be re-used.
Cohesive bandages	Coban (3M), Roflex	Self-adherent to prevent slippage; useful over non-adhesive bandages such as elastocrepe and paste bandages; compression well sustained. Provides approximately 23 mmHg or higher at the ankle graduating to approximately one-half this pressure at the knee.
<b>LOW (15-20 mmHg pressure)</b>		
Light compression single layer elastic	Kling/orthopedic wool Tensor/Elastocrepe	Low pressure obtained; used alone it gives only light support; a single wash reduces pressure by about 20 percent.
Light support only (inelastic)		For holding dressings in place, as a layer within the multilayer bandage, for light support of minor strains and sprains; pressures alone are too low to be effective in management of venous ulcers; 40 to 60 percent of pressure lost in first 20 minutes after application.

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**Notes:** **1.** Applying in a figure 8 increases compression by 10 to 15 mmHg over spiral, for any bandage. **2.** Latex-free products – Unna's paste boot and other specially marked latex-free products. **3.** Support- inelastic bandages usually require more frequent changing with reduced edema. **4.** Inform clients to notify healthcare professional if there is pain in foot, or if it turns blue or black.

## *Appendix L: Description of the Toolkit*

### **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. RNAO, through a panel of nurses, researchers and administrators has developed a *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 healthcare 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 from the RNAO website. For more information, an order form or to download the *Toolkit*, please visit the RNAO website at [www.rnao.org/bestpractices](http://www.rnao.org/bestpractices).





March 2007

## Nursing Best Practice Guideline

Shaping the future of Nursing

## Assessment and Management of Venous Leg Ulcers

Guideline supplement

### Revision Panel Members

**Patricia Coutts, RN, IIWCC**

**Team Leader**

Wound Care and Clinical Trials Coordinator  
Debary Dermatological  
Mississauga, Ontario

**Patti Barton, RN, PHN, ET**

ET Wound Consultant  
Specialty ET Services  
Toronto, Ontario

**Cathy Burrows, RN, BScN**

Staff Nurse  
Vascular Surgery Leg Ulcer Clinic  
QE II Health Sciences Centre  
Halifax, Nova Scotia

**Karen E. Campbell, RN, MScN, PhD(c), ACNP**

Nurse Practitioner/Clinical Nurse Specialist  
London Health Sciences Center, University Hospital  
London, Ontario

**Moir Coates, RN, BScN, ET**

Enterostomal Therapy Nurse  
St. Joseph's Care Group  
Thunder Bay, Ontario

**Theresa Hurd, RN, MScN, MSN, ACNP**

Advanced Practice Nurse  
Hamilton Niagara Haldimand Brant CCAC  
St. Catharines, Ontario

**Karen Lorimer, RN, MScN, CCHN**

Advanced Practice Nurse  
Carefor Health & Community Services  
Ottawa, Ontario

**Nancy Parslow, RN, ET**

Wound Care Nurse Specialist  
Southlake Regional Health Centre  
Newmarket, Ontario

**Christine Pearson, RN, IIWCC**

Community Wound Clinician  
North Vancouver, British Columbia

**Laura Teague, RN, MN, ACNP**

Nurse Practitioner  
St. Michael's Hospital  
Toronto, Ontario

**Samantha Mayo, RN, BScN, MN**

Program Coordinator  
Nursing Best Practice Guidelines Program  
Registered Nurses' Association of Ontario  
Toronto, Ontario

**Meagan Cleary, BA**

Project Coordinator  
Nursing Best Practice Guidelines Program  
Registered Nurses' Association of Ontario  
Toronto, Ontario

### Supplement Integration

This supplement to the nursing best practice guideline *Assessment and Management of Venous Leg Ulcers* is the result of a three year scheduled revision of the guideline. Additional material has been provided in an attempt to provide the reader with current evidence to support practice. Similar to the original guideline publication, this document needs to be reviewed and applied, based on the specific needs of the organization or practice setting/environment, as well as the needs and wishes of the client. This supplement should be used in conjunction with the guideline as a tool to assist in decision making for individualized

client care, as well as ensuring that appropriate structures and supports are in place to provide the best possible care.

Since the original publication of this guideline, venous leg ulcers have continued to be a significant and chronic problem for large numbers of Canadians, with major implications to quality of life and overall healthcare costs (Harrison et al., 2005). A review of the most recent literature and relevant guidelines published since 2004 does not suggest dramatic changes to our assessment and management approach to venous leg ulcers, but rather suggest some refinements and stronger evidence for our approach.



## Revision Process

The Registered Nurses' Association of Ontario (RNAO) has made a commitment to ensure that this practice guideline is based on the best available evidence. In order to meet this commitment, a monitoring and revision process has been established for each guideline every 3 years. The revision panel members (experts from a variety of practice settings) are given a mandate to review the guideline focusing on the recommendations and the original scope of the guideline.

Members of the panel critically appraised three international guidelines, published since 2004, using the *Appraisal of Guidelines For Research and Evaluation* (AGREE Collaboration, 2001) instrument. This review resulted in the following guideline and accompanying document being used as a supportive resource during the revision process of this RNAO guideline:

Royal College of Nursing (RCN). (2006). *Clinical practice guideline: The nursing management of patients with venous leg ulcers*. [Online].

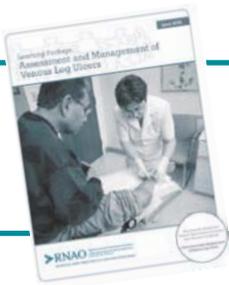
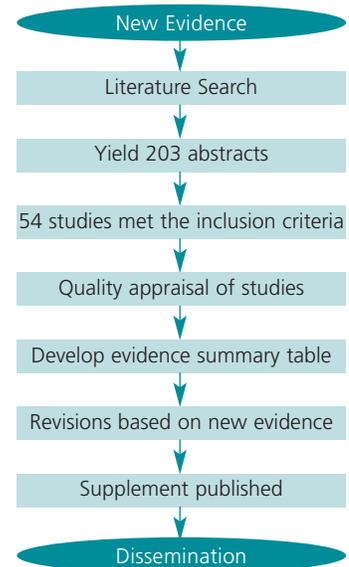
Available: [http://www.rcn.org.uk/publications/pdf/guidelines/venous\\_leg\\_ulcers.pdf](http://www.rcn.org.uk/publications/pdf/guidelines/venous_leg_ulcers.pdf).

Accompanying document:

Prodigy. (2004). Leg ulcer – venous.

[Online]. Available: [http://www.cks.library.nhs.uk/leg\\_ulcer\\_venous](http://www.cks.library.nhs.uk/leg_ulcer_venous)

## Review/Revision Process Flow Chart



Look for the following resources to support the implementation of this guideline (available for free download at [www.rnao.org/bestpractices](http://www.rnao.org/bestpractices)):

- *Learning Package: Assessment and Management of Venous Leg Ulcers*
- *Health Education Fact Sheet: Taking Care of Your Legs*

## Summary of Evidence

The following content reflects the evidence reviewed that either supports the original guideline recommendations or provides evidence for revision. Through the review process, many recommendations were re-worded, removed or combined to reflect current knowledge and to enhance the clarity of the document. Two new recommendations have also been added. As a result of these changes, the numbering of the recommendations has been revised. The following are the recommendations supported by the revision process. Details regarding the omitted recommendations can be found on page 14.

-  unchanged
-  changed
-  additional information
-  new recommendation

Practice Recommendations: Comprehensive Assessment	
<p>The section heading was modified to emphasize that a <i>comprehensive</i> assessment, where a complete client assessment precedes evaluation of limb and ulcer characteristics, is essential to determine the underlying ulcer etiology and appropriate treatment approaches</p>	+
<p><b>Recommendation 1</b></p> <p><i>Assessment and clinical investigations should be undertaken by healthcare professional(s) trained and experienced in leg ulcer management.</i></p> <p style="text-align: right;"><i>(Level C)</i></p>	✓
<p>Additional Literature Supports</p> <p>RCN, 2006</p>	
<p><b>Recommendation 2</b></p> <p><i>A comprehensive clinical history and physical examination includes:</i></p> <ul style="list-style-type: none"> <li>■ <i>blood pressure measurement;</i></li> <li>■ <i>weight;</i></li> <li>■ <i>blood glucose level;</i></li> <li>■ <i>doppler measurement of Ankle Brachial Pressure Index (ABPI);</i></li> <li>■ <i>any other tests relevant to presenting patient's condition;</i></li> <li>■ <i>ulcer history;</i></li> <li>■ <i>ulcer treatment history;</i></li> <li>■ <i>medical history;</i></li> <li>■ <i>medication;</i></li> <li>■ <i>bilateral limb assessment;</i></li> <li>■ <i>pain;</i></li> <li>■ <i>nutrition;</i></li> <li>■ <i>allergies;</i></li> <li>■ <i>psychosocial status (including quality of life); and</i></li> <li>■ <i>functional, cognitive, emotional status and ability for self-care.</i></li> </ul> <p><i>The above should be documented in a structured format for a client presenting with either their first or recurrent leg ulcer and should be ongoing thereafter.</i></p> <p style="text-align: right;"><i>(Level C)</i></p>	
<p>This recommendation has been modified to incorporate original Recommendations 2, 3, 4, 6, 7, 13 and 26, in order to emphasize the essential components of a comprehensive clinical assessment. <b><i>Any other tests relevant to presenting patient's condition, ulcer treatment history, medical history and medications</i></b> have also been added to reflect components of an assessment that may provide valuable information towards the development of an appropriate treatment plan.</p> <p>A comprehensive clinical history and physical examination will provide important information regarding the underlying etiology of the ulcer. There are several types of leg ulcers whose treatment is beyond the scope of the guideline. The recommendations presented here were developed specifically for the management of leg ulcers related to venous disease. Appendix M (page 16 of this supplement) provides a description of physical findings that would indicate venous disease versus arterial disease.</p>	+

<p><b>Recommendation 3</b></p> <p><i>A comprehensive assessment of an ulcer should include:</i></p> <ul style="list-style-type: none"> <li>■ measurement of the wound and undermining;</li> <li>■ amount and quality of exudate;</li> <li>■ wound bed appearance;</li> <li>■ condition of the wound edge;</li> <li>■ infection;</li> <li>■ presence or absence of patient suffering; and</li> <li>■ re-evaluation.</li> </ul> <p style="text-align: right;"><i>(Level C)</i></p> <p><i>Measure the surface areas of ulcers, at regular intervals, to monitor progress. Maximum length and width, or tracings onto a transparency are useful methods.</i></p> <p style="text-align: right;"><i>(Level B)</i></p>	
<p>Key elements of ulcer assessment have been added to this recommendation to reflect that ulcer condition is best evaluated using a comprehensive approach. The panel cautions, however, that the presence of undermining is rare with venous ulceration and therefore warrants further assessment to rule out other etiologies (i.e. arterial disease).</p> <p><a href="#">Additional Literature Supports</a> Sibbald et al., 2006</p>	<p>+</p>
<p><b>Recommendation 4</b></p> <p><i>Regular ulcer assessment is essential to monitor treatment effectiveness and healing goals.</i></p> <p style="text-align: right;"><i>(Level C)</i></p>	<p>✓</p>
<p><b>Practice Recommendations: Diagnostic Evaluation</b></p>	
<p><b>Recommendation 5</b></p> <p><i>An Ankle Brachial Pressure Index (ABPI) measurement should be performed by a trained practitioner to rule out the presence of peripheral arterial disease, particularly prior to the application of compression therapy.</i></p> <p style="text-align: right;"><i>(Level B)</i></p>	
<p>This recommendation has been modified to emphasize the role of Ankle Brachial Pressure Index (ABPI) measurement within the scope of nursing practice and represents a combination of original Recommendations 9 and 10. In the management of venous leg ulcers, ABPI measurement offers valuable information as a screening tool for lower extremity peripheral arterial disease (Hirsch et al., 2006). Where peripheral arterial disease is suspected, compression therapy treatments designed for venous leg ulcers may be contraindicated. ABPI may also offer prognostic data that are useful to predict limb survival, wound healing and patient survival. The use of ABPI measurement for diagnosis is generally outside of the scope of nursing practice. Furthermore, only those practitioners with the appropriate knowledge, skill and judgement to perform this measurement should do so.</p> <p><a href="#">Additional Literature Supports</a> Hirsch et al., 2006; RCN, 2006; Smith et al., 2003</p>	<p>+</p>
<p><b>Recommendation 6</b></p> <p><i>An Ankle Brachial Pressure Index (ABPI) &gt;1.2 and &lt;0.8 warrants referral for further medical assessment.</i></p> <p style="text-align: right;"><i>(Level C)</i></p>	

<p>This recommendation has been modified to emphasize the importance of specialized assessment in cases of abnormal ABPI. People with abnormally low or abnormally high ABPI should be further investigated for peripheral arterial disease (Hirsch et al., 2006). For example, an ABPI &gt;1.3 is considered indicative of non-compressible vessels that are found in individuals with diabetes, chronic renal failure and who are older than 70 years of age. In these cases, compression therapy may not be recommended.</p> <p><i>Additional Literature Supports</i> Hirsch et al., 2006; Partsch &amp; Partsch, 2005; Schroder &amp; Diehm, 2006</p>	+
<p><b>Recommendation 7</b></p> <p><i>Prior to debridement, vascular assessment, such as Ankle Brachial Pressure Index (ABPI), is recommended for ulcers in lower extremities to rule out vascular compromise and ensure healability.</i></p> <p style="text-align: right;"><i>(Level C)</i></p>	
<p>The wording of this recommendation has been modified to indicate that vascular assessment (including ABPI) may also provide information regarding the <i>healability</i> of the wound. Adequate perfusion to these wounds indicates that healing is supported by the microvascular supply and that debridement, when appropriate, may be safely performed.</p>	+
<b>Practice Recommendations: Pain</b>	
<p><b>Recommendation 8</b></p> <p><i>Pain may be a feature of both venous and arterial disease, and should be addressed.</i></p> <p style="text-align: right;"><i>(Level B)</i></p>	✓
<p>A comprehensive approach to pain is beyond the scope of this guideline. Refer to the RNAO Best Practice Guideline <i>Assessment and Management of Pain (Revised)</i> (RNAO, 2007) for strategies by which to address pain.</p> <p><i>Additional Literature Supports</i> Charles, 2002; Nemeth et al., 2004</p>	+
<p><b>Recommendation 9</b></p> <p><i>Prevent or manage pain associated with debridement. Consult with a physician and pharmacist as needed.</i></p> <p style="text-align: right;"><i>(Level C)</i></p>	✓
<b>Practice Recommendations: Venous Ulcer Care</b>	
<p><b>Recommendation 10</b></p> <p><i>Develop treatment goals mutually agreed upon by the patient and healthcare professionals, based on clinical findings, current evidence, expert opinion and patient preference.</i></p> <p style="text-align: right;"><i>(Level C)</i></p>	NEW
<p>Prior to commencing wound care, a treatment plan must be developed based on the goals of care for the particular client. The healing potential of the wound is one factor that may impact on the goals of care. Potential for healing is affected by local, host, and environmental factors. For any issues identified in the assessment that may impair healing, a plan needs to be developed that addresses these as well. Appendix N (page 16 of this supplement) provides a list of factors that may impact healing potential.</p>	+
<p><b>Recommendation 11</b></p> <p><i>Local wound bed preparation includes debridement when appropriate, moisture balance and bacterial balance.</i></p> <p style="text-align: right;"><i>(Level C)</i></p>	NEW

<p>The panel strongly recommends a systematic approach to wound care. The aim of local wound bed preparation is the removal of barriers to healing. Appendix O (page 17 of this supplement) outlines important considerations when preparing the wound bed.</p> <p>Not all wounds require debridement. The need for debridement is based on the goals of the client. Other issues when considering the appropriateness of debridement include the practice setting, skill of the clinician and the ability of the patient to tolerate the procedure. When choosing between particular techniques, considerations should include <i>type, quantity and location of nonviable tissue, the depth of the wound, the amount of wound fluid</i> and the <i>general condition and goals of the client</i>. Appendix P (page 17 of this supplement) compares the methods of debridement based on several key considerations. Refer to the original guideline (RNAO, 2004) for a more detailed discussion of debridement.</p> <p><i>Moisture balance</i> refers to the management of exudate and maintenance of fluids in the wound bed. When healing is the goal, a balanced moist wound environment ensures that there is sufficient moisture to facilitate cellular growth but not in excess to cause further skin breakdown. The primary approach to achieving moisture balance is through the appropriate use of moisture-balancing dressings (Okan et al., 2007).</p> <p><i>Bacterial balance</i> describes the bacterial level present in a wound and their ability to cause damage or infection. All chronic wounds contain bacteria. However, the impact of these bacteria on healing is dependent on several factors, including the number of organisms, the virulence of these organisms and host resistance (Sibbald, Woo, &amp; Ayello, 2006). Promoting host resistance, through optimizing overall health of the client, is an important aspect of achieving bacterial balance. The management of existing infection is addressed in the following section of this supplement.</p> <p><a href="#">Additional Literature Supports</a> Sibbald et al., 2006; Sibbald, Woo, &amp; Ayello, 2006; Okan et al., 2007</p>	+
<p><b>Recommendation 12</b></p> <p><i>Cleansing of the ulcer should be kept simple; warm tap water or saline is usually sufficient.</i></p> <p style="text-align: right;"><i>(Level B)</i></p>	✓
<p><b>Recommendation 13</b></p> <p><i>First-line and uncomplicated dressings must be simple, low adherent, acceptable to the client and should be cost-effective.</i></p> <p style="text-align: right;"><i>(Level A)</i></p>	
<p>A recent systematic review by Palfreyman et al. (2007) found insufficient evidence to support the use of a particular <i>first-line and uncomplicated</i> dressing type (beneath compression therapy) for the treatment of venous leg ulcers. As such, the authors suggested that decisions regarding dressings should be based on local costs and practitioner or patient preferences (Palfreyman et al., 2007). Similarly, the RCN guideline (2006) states that for patients not requiring frequent compression bandaging, the cost-effectiveness of the dressing will be related to its ability to remain in place and manage the exudate. The wording of this recommendation was modified to reflect a consideration of cost-effectiveness when choosing a dressing.</p> <p>In a systematic review by O'Donnell and Lau (2006), despite the findings that certain complex wound dressings resulted in better outcomes in both the proportion of ulcers healed and time to healing, the authors maintained that the selection of the specific dressing will depend on the dressing characteristics for ease of application, patient comfort, wound drainage absorption and expense.</p> <p><a href="#">Additional Literature Supports</a> O'Donnell &amp; Lau, 2006; Palfreyman et al., 2007; RCN, 2006; Schulze et al., 2001; Smith et al., 2004; Vanscheidt, Sibbald, &amp; Eager, 2004; Vin, Teot, &amp; Meaume, 2002</p>	+
<p><b>Recommendation 14</b></p> <p><i>Avoid products that are known to cause skin sensitivity, such as those containing lanolin, phenol alcohol, or some topical antibiotic and antibacterial preparations.</i></p> <p style="text-align: right;"><i>(Level C)</i></p>	

<p>The wording of this recommendation has been modified to indicate that not all topical antibiotic and antibacterial preparations are known to cause skin sensitivity. The change in the wording is for clarification only, and there has been no change in the intent of the recommendation.</p>	+
<p><b>Recommendation 15</b></p> <p><i>Choose a dressing that optimizes the wound environment and patient tolerance.</i></p> <p style="text-align: right;"><i>(Level C)</i></p>	
<p>This recommendation was revised to indicate that there are many considerations when choosing an appropriate dressing. Dressings are usually applied beneath the compression to aid healing, comfort and to control exudate. Wounds heal quicker in a moist environment and dressings are used to absorb excess fluid or retain fluid in an otherwise dry wound (Palfreyman et al., 2007).</p> <p><a href="#">Additional Literature Supports</a> Palfreyman et al., 2007; Schulze et al., 2001</p>	+
<p><b>Recommendation 16</b></p> <p><i>No specific dressing has been demonstrated to encourage ulcer healing.</i></p> <p style="text-align: right;"><i>(Level A)</i></p>	✓
<p><a href="#">Additional Literature Supports</a> Nelson, Cullum, &amp; Jones, 2006; O'Donnell &amp; Lau, 2006; Palfreyman et al., 2007; Vin, Teot, &amp; Meaume, 2002; Wollina et al., 2005</p>	+
<p><b>Recommendation 17</b></p> <p><i>In contrast to drying out, moist wound conditions allow optimal cell migration, proliferation, differentiation and neovascularization.</i></p> <p style="text-align: right;"><i>(Level A)</i></p>	✓
<p><b>Recommendation 18</b></p> <p><i>Refer clients with suspected sensitivity reactions to a dermatologist for patch testing. Following patch testing, identified allergens must be avoided, and medical advice on treatment should be sought.</i></p> <p style="text-align: right;"><i>(Level B)</i></p>	✓
<p>The panel notes that for most nurses, referral is outside their scope of practice. However, nurses are encouraged to advocate for appropriate referrals as necessary.</p>	+
<p><b>Recommendation 19</b></p> <p><i>Venous surgery followed by graduated compression hosiery is an option for consideration in clients with superficial venous insufficiency.</i></p> <p style="text-align: right;"><i>(Level A)</i></p>	
<p>The level of evidence has been updated in the context of recent research that indicates a significant reduction in ulcer recurrence after venous surgery for clients with superficial venous insufficiency.</p> <p><a href="#">Additional Literature Supports</a> Barnwell et al., 2004; Obermayer et al., 2006; Roka, Binder, &amp; Bohler-Sommeregger, 2006; Ting et al., 2006; van Gent et al., 2006</p>	+

<h2>Practice Recommendations: Infection</h2>		
<p><b>Recommendation 20</b></p> <p><i>Assess for signs and symptoms of infection</i></p> <p style="text-align: right;"><i>(Level A)</i></p>		
<p>The wording of this recommendation was modified to appropriately reflect nurses' scope of practice. It is imperative that the assessment and treatment of infection be addressed as it can influence the plan of care, such as the use of local dressings, compression modalities and adjunctive therapies. Refer to Appendix Q (page 18 of this supplement) for a list of signs and symptoms of infection.</p>		+
<p><b>Recommendation 21</b></p> <p><i>Manage wound infection with cleansing and debridement, as appropriate. Where there is evidence of cellulitis, treatment of infection involves systemic antibiotics.</i></p> <p style="text-align: right;"><i>(Level B)</i></p>		
<p>This recommendation, which reflects a combination of original Recommendations 29 and 30, was modified based on infectious disease guidelines and current evidence. Cellulitis is characterised by the presence of some of the following signs or symptoms: pyrexia, increasing pain, increasing erythema of surrounding skin; purulent exudate; and rapid increase in ulcer size.</p> <p><i>Additional literature supports</i> Cutting and White, 2005; Gardner, Franz, &amp; Doebbeling, 2001; Grayson et al., 2002; Rosser et al., 2005;</p>		+
<p><b>Recommendation 22</b></p> <p><i>The use of topical antiseptics to reduce bacteria in wound tissue should be reserved for situations in which concern for bacterial load is higher than that of healability.</i></p> <p style="text-align: right;"><i>(Level C)</i></p>		
<p>This recommendation has been modified in the context of current evidence that suggests that the use of topical antiseptics may be beneficial for short term use, particularly when bacterial levels are sufficiently high to cause tissue destruction and the goal of care is the maintenance of the wound. Some antiseptics have been shown to be safe and efficacious for this purpose in wound care. Appendix R (page 18 of this supplement) provides a summary of evidence for various antiseptics.</p> <p><i>Additional literature supports</i> Drosou, Falabella &amp; Kirsner, 2003</p>		+
<h2>Practice Recommendations: Compression</h2>		
<p><b>Recommendation 23</b></p> <p><i>The treatment of choice for venous ulceration uncomplicated by other factors is graduated compression bandaging, properly applied and combined with exercise. (Level A)</i></p> <ul style="list-style-type: none"> <li>■ <i>In venous ulceration, high compression achieves better healing than low compression. (Level A)</i></li> <li>■ <i>Compression bandages should only be applied by a suitably trained and experienced practitioner. (Level B)</i></li> <li>■ <i>The concepts, practice, and hazards of graduated compression should be fully understood by those prescribing and fitting compression stockings. (Level B)</i></li> <li>■ <i>Ankle circumference should be measured at a distance of 2.5 cm (one inch) above the medial malleolus. (Level C)</i></li> </ul>		
<p>Original Recommendations 33, 34, 35, 43 &amp; 44 have been combined and modified to emphasize important considerations when providing compression therapy in the care of venous ulceration. This recommendation no longer addresses care of venous eczema as treatment approaches for conditions that could lead to ulceration, dermatological or otherwise, was beyond the scope of the current review. The level of evidence for original</p>		+

<p>Recommendation 44 has also been updated to reflect current knowledge. The panel notes that despite the evidence to support the use of high compression bandages for the treatment of uncomplicated venous ulcers, there is insufficient evidence to support the choice between using elastic versus non-elastic bandaging systems.</p> <p><i>Additional Literature Supports</i>  Brooks et al., 2004; Edwards et al., 2005; Franks et al., 2004; Iglesias et al., 2004; Nelson, Cullum, &amp; Jones, 2006; Nelson et al., 2004; O'Brien et al., 2003; Padberg, Johnston, &amp; Sisto, 2004; Partsch &amp; Partsch, 2005; Partsch et al., 2001; Polignano et al., 2004; Polignano, Guarnera, &amp; Bonadeo, 2004</p>	+
<p><b>Recommendation 24</b></p> <p><i>External compression applied using various forms of pneumatic compression pumps can be indicated for individuals with chronic venous insufficiency.</i></p> <p style="text-align: right;"><i>(Level A)</i></p>	
<p>The wording of this recommendation has been modified to emphasize the need for clinical judgement in determining whether this treatment is appropriate for a particular client. The change in the wording is for clarification only, and there has been no change in the intent of the recommendation.</p>	+
<p><b>Recommendation 25</b></p> <p><i>The client should be prescribed regular vascular exercise by means of intensive controlled walking and exercises to improve the function of the ankle joint and calf muscle pump.</i></p> <p style="text-align: right;"><i>(Level A)</i></p>	
<p>The wording of this recommendation has been modified for anatomical accuracy. The change in the wording is for clarification only, and there has been no change in the intent of the recommendation.</p> <p><i>Additional Literature Supports</i>  Edwards et al., 2005; Padberg, Johnston, &amp; Sisto, 2004.</p>	+
<h2>Practice Recommendations: Complementary Therapies</h2>	
<p><b>Recommendation 26</b></p> <p><i>Consider electrical stimulation in the treatment of venous leg ulcers.</i></p> <p style="text-align: right;"><i>(Level B)</i></p>	✓
<p><i>Additional Literature Supports</i>  Cherry &amp; Ryan, 2005</p>	+
<p><b>Recommendation 27</b></p> <p><i>Therapeutic ultrasound may be used to reduce the size of chronic venous ulcers.</i></p> <p style="text-align: right;"><i>(Level A)</i></p>	✓
<h2>Practice Recommendations: Reassessment</h2>	
<p><b>Recommendation 28</b></p> <p><i>If signs of healing are not evident, a comprehensive assessment and re-evaluation of the treatment plan should be carried out at three month intervals, or sooner if clinical condition deteriorates.</i></p> <p style="text-align: right;"><i>(Level C)</i></p>	

<p>The wording of this recommendation has been modified to indicate the importance of wound assessment in determining healing. Recommendation 3 (page 4 of this supplement) addresses aspects of ulcer assessment. An improvement in these attributes indicates healing. If an improvement in these attributes is not evident, or if ulcer condition worsens, a comprehensive patient assessment is warranted. The change in the wording is for clarification only, and there has been no change in the intent of the recommendation.</p> <p><i>Additional Literature Supports</i> Flanagan, 2003; Prodigy, 2004</p>	+
<p><b>Recommendation 29</b></p> <p><i>For resolving and healing venous leg ulcers, routine assessment at six-month intervals should include:</i></p> <ul style="list-style-type: none"> <li>■ <i>physical assessment;</i></li> <li>■ <i>Ankle Brachial Pressure Index (ABPI);</i></li> <li>■ <i>replacement of compression stockings; and</i></li> <li>■ <i>reinforcement of teaching.</i></li> </ul> <p style="text-align: right;"><i>(Level C)</i></p>	✓
<p><i>Additional Literature Supports</i> Prodigy, 2004</p>	+
<p><b>Practice Recommendations: Client Education for Secondary Prevention</b></p>	
<p>The section heading was modified to emphasize the importance of client education as a valuable means to promoting effective preventative measures.</p>	+
<p><b>Recommendation 30</b></p> <p><i>Inform the client of measures to prevent recurrence after healing:</i></p> <ul style="list-style-type: none"> <li>■ <i>daily wear of compression stockings, cared for as per manufacturer's instructions and replaced at a minimum every six months;</i></li> <li>■ <i>discouragement of self-treatment with over-the-counter preparations;</i></li> <li>■ <i>avoidance of accidents or trauma to legs;</i></li> <li>■ <i>rest periods throughout the day with elevation of affected limb above level of heart;</i></li> <li>■ <i>early referral at first sign of skin breakdown or trauma to limb;</i></li> <li>■ <i>need for exercise and ankle-joint mobility;</i></li> <li>■ <i>appropriate skin care avoiding sensitizing products; and</i></li> <li>■ <i>compression therapy for life with reassessment based on symptoms.</i></li> </ul> <p style="text-align: right;"><i>(Level C)</i></p>	
<p>This recommendation has been modified to incorporate Recommendations 46, 47, 56 and 57 from the original publication, thereby providing a concise list of essential attributes of patient education with regards to secondary prevention of leg ulcers. Furthermore, although it is recognized that compression therapy for life is a common preventative strategy, the recommendation has also been modified to emphasize the importance of reassessment given the potential for changing client needs. Appendix S (page 19 of this supplement) provides a Client Education Checklist to support the implementation of this recommendation.</p> <p><i>Additional Literature Supports</i> Edwards et al., 2005; Prodigy, 2004</p>	+

<b>Education Recommendations</b>		
<p><b>Recommendation 31</b></p> <p><i>Guidelines are more likely to be effective if they take into account local circumstances and are disseminated by an ongoing education and training program.</i></p> <p style="text-align: right;"><i>(Level C)</i></p>		✓
<p>Additional Literature Supports</p> <p>Brooks et al., 2004; McGuckin et al., 2001</p>		+
<p><b>Recommendation 32</b></p> <p><i>Using principles of adult learning, present information at an appropriate level for the target audience, including healthcare providers, clients, family members and caregivers.</i></p> <p style="text-align: right;"><i>(Level C)</i></p>		
<p>The wording of this recommendation has been modified to emphasize the importance of considering adult learning principles when designing educational programs. The change in the wording is for clarification only, and there has been no change in the intent of the recommendation.</p> <p>Additional Literature Supports</p> <p>Brooks et al., 2004; McGuckin et al., 2001</p>		+
<p><b>Recommendation 33</b></p> <p><i>All healthcare professionals who manage lower limb ulcers should be trained in leg ulcer assessment and management.</i></p> <p style="text-align: right;"><i>(Level C)</i></p>		
<p>The wording of this recommendation has been modified to recognize that particular health care professionals, and not necessarily all health professionals, require specialized training in leg ulcer care. The change in the wording is for clarification only, and there has been no change in the intent of the recommendation.</p> <p>Additional Literature Supports</p> <p>Brooks et al., 2004</p>		+
<p><b>Recommendation 34</b></p> <p><i>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.</i></p> <p style="text-align: right;"><i>(Level C)</i></p>		✓
<p><b>Recommendation 35</b></p> <p><i>Education programs for healthcare professionals who manage lower limb ulcers should include:</i></p> <ul style="list-style-type: none"> <li>■ <i>pathophysiology of leg ulceration;</i></li> <li>■ <i>leg ulcer assessment;</i></li> <li>■ <i>need for Doppler ultrasound to measure Ankle Brachial Pressure Index (ABPI);</i></li> <li>■ <i>normal and abnormal wound healing;</i></li> <li>■ <i>compression therapy theory, management, and application;</i></li> <li>■ <i>dressing selection;</i></li> <li>■ <i>principles of debridement;</i></li> <li>■ <i>principles of cleansing and infection control;</i></li> <li>■ <i>skin care of the lower leg;</i></li> </ul>		

<ul style="list-style-type: none"> <li>■ <i>peri-wound skin care and management;</i></li> <li>■ <i>psychological impact of venous stasis disease;</i></li> <li>■ <i>quality of life;</i></li> <li>■ <i>pain management;</i></li> <li>■ <i>teaching and support for care provider;</i></li> <li>■ <i>health education;</i></li> <li>■ <i>preventing recurrence;</i></li> <li>■ <i>principles of nutritional support with regard to tissue integrity;</i></li> <li>■ <i>mechanisms for accurate documentation and monitoring of pertinent data, including treatment interventions and healing progress; and</i></li> <li>■ <i>criteria for referral for specialized assessment.</i></li> </ul> <p style="text-align: right;"><i>(Level C)</i></p>	
<p>The wording of this recommendation has been modified to recognize that particular healthcare professionals, and not necessarily all health professionals, require specialized training in leg ulcer care. The change in the wording is for clarification only, and there has been no change in the intent of the recommendation.</p>	+
<p><b>Recommendation 36</b></p> <p><i>Healthcare professionals with recognized training in leg ulcer care should mentor and transfer their knowledge and skills to local healthcare teams.</i></p> <p style="text-align: right;"><i>(Level C)</i></p>	
<p>This wording of this recommendation was modified to suggest the means by which healthcare professionals can disseminate their specialized knowledge and skill regarding leg ulcer care. The change in the wording is for clarification only, and there has been no change in the intent of the recommendation.</p>	+
<p><b>Recommendation 37</b></p> <p><i>The knowledge and understanding of the healthcare professional is a major factor in adherence to treatment regimens.</i></p> <p style="text-align: right;"><i>(Level C)</i></p>	✓
<p>Additional Literature Supports</p> <p>Brooks et al., 2004; McGuckin et al., 2001</p>	+
<h2>Organization and Policy Recommendations</h2>	
<p><b>Recommendation 38</b></p> <p><i>Successful implementation of a venous ulcer treatment policy/strategy requires:</i></p> <ul style="list-style-type: none"> <li>■ <i>dedicated funding</i></li> <li>■ <i>integration of healthcare services</i></li> <li>■ <i>support from all levels of government</i></li> <li>■ <i>management support</i></li> <li>■ <i>human resources</i></li> <li>■ <i>financial resources</i></li> <li>■ <i>functional space</i></li> <li>■ <i>commitment</i></li> <li>■ <i>collection of baseline information about vulnerable populations</i></li> <li>■ <i>resources and existing knowledge</i></li> <li>■ <i>interpretation of above data and identification of organizational problems.</i></li> </ul> <p style="text-align: right;"><i>(Level C)</i></p>	✓

## Recommendation 39

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

- *An assessment of organizational readiness and barriers to education.*
- *Involvement of all members (whether in a direct or indirect supportive function) who will contribute to the implementation process.*
- *Dedication of a qualified individual to provide the support needed for the education and implementation process.*
- *Ongoing opportunities for discussion and education to reinforce the importance of best practices.*
- *Opportunities for reflection on personal and organizational experience in implementing guidelines.*

*In this regard, RNAO (through a panel of nurses, researchers and administrators) has developed the Toolkit: Implementation of Clinical Practice Guidelines, based on available evidence, theoretical perspectives and consensus. The RNAO strongly recommends the use of this Toolkit for guiding the implementation of the best practice guideline on Assessment and Management of Venous Leg Ulcers.*

*(Level C)*



## Implementation Strategies

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

- Have at least one dedicated person such as an advanced practice nurse or a clinical resource nurse who will provide support, clinical expertise and leadership. The individual should have good interpersonal, facilitation and project management skills.
- Conduct an organizational needs assessment related to the care of adults with leg ulcers to identify current knowledge base and further educational requirements.
- Create a vision to help direct the change effort and develop strategies for achieving and sustaining the vision.
- Establish a steering committee comprised of key stakeholders and interdisciplinary members committed to leading the change initiative. Identify short term and long-term goals.
- Identify and support designated best practice champions on each unit to promote and support implementation. Celebrate milestones and achievements, acknowledging work well done (Davies & Edwards, 2004).
- Provide organizational support such as having the structures in place to facilitate best practices in leg ulcer care. For example, having an organizational philosophy that reflects the value of best practices through policies and procedures. Develop new assessment and documentation tools (Davies & Edwards, 2004).

## Research Gaps and Implications

In reviewing the evidence for the revision of this guideline, it is clear that future research opportunities involve:

- Effective training strategies to improve clinician skill in providing compression therapy
- Evaluation of the effect of practice guidelines on delivery of care, adherence to treatment, and recurrence
- The effect of preventative measures and healthy lifestyles on rates of recurrence
- The effect of various follow-up practices and policies on rates of recurrence
- Further treatment interventions to improve rates of healing
- Comparing overall healthcare costs of prevention versus treatment

Some of the recommendations in this guideline are based on consensus or expert opinion. Further substantive research is required to validate the expert opinion. Increasing the research can impact knowledge that will lead to improved practice and outcomes for patients with venous leg ulcers.

## Deleted Recommendations

In order to maintain the clarity and rigour of this practice guideline, the following recommendations from the original publication were withdrawn as part of the revision process based on panel consensus and current research evidence, where indicated.

### Recommendation 25

*Biological wound coverings and growth factor treatments should not be applied in cases of wound infection. (Level C)*

This recommendation was removed as it was considered too limited in scope. It has been more appropriately integrated into the discussion of revised Recommendation 20 (page 8 of this supplement), where it is described that wound infection may impact on the appropriateness of several different treatment options.

### Recommendation 28

*An infection is indicated when  $>10^6$  bacteria/gram tissue is present. (Level B)*

This recommendation was removed as it is a definition of infection and not a recommendation for practice. Clinical assessment of infection is addressed in revised Recommendation 20 (page 8 of this supplement).

### Recommendation 32

*Topical antibiotics and antibacterial agents are frequent sensitizers and should be avoided. (Level B)*

This recommendation was removed because it no longer reflects current knowledge and clinical practice. Topical antibiotics and antibacterial agents have a wide range of characteristics and may not all be frequent sensitizers and may not all have to be avoided. The appropriateness and safety of these agents in the management of venous leg ulcers should be based on consideration of the particular client, clinician and product. The recommendation to avoid topical antibiotics and antibacterial agents that are known to cause skin sensitivity is reflected in the revised Recommendation 14 (page 6 of this supplement).

### Recommendation 36

*Venous ulceration should be treated with high compression bandaging to achieve a pressure between 35-40 mmHg, at the ankle, graduating to half at calf in the normally shaped limb, as per La Place's Law. (Level C)*

This recommendation was removed based on the difficulty of evaluating these measurements in clinical practice.

### Recommendation 37

*Use protective padding over bony prominences when applying high compression. (Level C)*

This recommendation was removed based on its high specificity towards certain products. The practice of using protective padding over bony prominences may be contraindicated or inappropriate based on the particular compression therapy products being used.

### Recommendation 38

*Arterial insufficiency is a contraindication to the use of high compression. A modified form of compression may be used under specialist supervision. (Level C)*

This recommendation was removed based on the ambiguity related to what constitutes appropriate compression therapy in the cases of arterial insufficiency. As such, this recommendation was considered difficult to apply to clinical practice. The caution required related to the application of compression therapy in these cases has been incorporated into the revised Recommendation 5.

### Recommendation 39

*Use compression with caution in clients with diabetes, those with connective tissue disease and the elderly. (Level C)*

This recommendation was removed based on the ambiguity related to what constitutes appropriate compression therapy in the cases of diabetes, those with connective tissue disease and the elderly.

### Recommendation 40

*Compression therapy should be modified until clinical infection is treated. (Level C)*

This recommendation was removed based on a lack of evidence to support the modification of compression therapy based on the presence of clinical infection alone. Such intervention is considered part of clinical decision making based on a comprehensive physical assessment.

### Recommendation 41

*Bandages should be applied according to manufacturer's recommendations. (Level C)*

This recommendation was removed as it is more appropriately a standard of practice regarding safe product usage and not a recommendation for practice.

### Recommendation 42

*When using elastic systems such as "high compression" bandages, the ankle circumference must be more than or padded to equal 18cms. (Level C)*

This recommendation was removed based on its high specificity towards certain products. Circumference specifications may differ based on the particular compression bandaging systems used.

### Recommendation 45

*Graduated compression hosiery should be measured and fitted by a certified fitter. (Level C)*

This recommendation was removed by panel consensus as its meaning is reflected in the revised Recommendation 23.

### Recommendation 47

*Graduated compression hosiery should be prescribed for life. (Level C)*

This recommendation was combined into the revised Recommendation 36 to emphasize the role of ongoing compression therapy as part of secondary prevention for future venous leg ulcers as well as the need for ongoing reassessment based on changes in the client's condition.

### Recommendation 51

*Hyperbaric oxygen may reduce ulcer size in non-diabetic, non-atherosclerotic leg ulcers. (Level A)*

This recommendation was removed as it is no longer supported by current evidence. A recent systematic review indicates that hyperbaric oxygen may reduce amputation in patients with diabetic foot ulcers, but the effect of this therapy on venous ulcers is not clear (Kranke et al., 2006).

### Recommendation 55

*Measures to prevent recurrence of a venous leg ulcer include: wearing compression stockings, regular follow-up to monitor Ankle Brachial Pressure Index (ABPI), discouragement of self-treatment with over-the-counter preparations, and avoidance of accidents or trauma to legs. (Level C)*

This recommendation, except for the component regarding follow-up ABPI measurement, was combined into the revised Recommendation 36 to reflect that secondary prevention from the clinician's perspective most commonly involves patient education of preventative measures. Although it is recognized that measurement of Ankle Brachial Pressure Index (ABPI) may be included as part of a comprehensive reassessment, this follow-up measure is not considered part of routine preventative care unless indicated by a change in client condition, such as the emergence of symptoms or skin breakdown.

## Appendices

The review/revision process identified a need for updates to the Glossary and the inclusion of additional appendices:

### Appendix B: Glossary of Terms

The glossary has been updated to add:

**Bacterial Balance:** The bacterial level present in a wound and their ability to cause damage or infection. The impact of these bacteria on healing is dependent on several factors, including the number of organisms, the virulence of these organisms and host resistance (Sibbald, Woo, & Ayello, 2006).

**Moisture Balance:** The management of exudate and maintenance of fluids in the wound bed. When healing is the goal, a balanced moist wound environment ensures that there is sufficient moisture to facilitate cellular growth but not in excess to cause further skin breakdown.

### Appendix M: Physical Findings of Venous Disease versus Arterial Disease

#### Physical Findings of Venous Disease versus Arterial Disease

Venous Disease	Arterial Disease
Usually shallow, moist ulcers	Ulcers with a “punched out” appearance
Situated on gaiter area of leg	Base of wound poorly perfused, pale, dry
Edema	Cold legs/feet (in a warm environment)
Eczema	Shiny, taut skin
Ankle flare	Dependent rubor
Lipodermatosclerosis	Pale or blue feet
Varicose veins	Gangrenous toes
Hyperpigmentation	
Atrophie blanche	

Source: RNAO, 2004

### Appendix N: Factors Affecting Healing Potential

#### Factors Affecting Healing Potential

Local	Host	Environment
<ul style="list-style-type: none"> <li>■ Necrosis</li> <li>■ Infection</li> <li>■ Microvascular supply</li> <li>■ Foreign body</li> <li>■ Iatrogenic                             <ul style="list-style-type: none"> <li>• Cytotoxic agents</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>■ Co-morbidities                             <ul style="list-style-type: none"> <li>• Inflammatory condition</li> <li>• Nutrition</li> <li>• Peripheral vascular disease</li> <li>• Coronary artery disease</li> </ul> </li> <li>■ Adherence to plan of care</li> <li>■ Cultural/personal beliefs</li> </ul>	<ul style="list-style-type: none"> <li>■ Access to care</li> <li>■ Family support</li> <li>■ Healthcare sector</li> <li>■ Geographic</li> <li>■ Socioeconomic status</li> </ul>

Adapted from RNAO, 2005.

## Appendix O: Preparing the Wound Bed

### Preparing the Wound Bed: Clinical and Physiological Mechanisms of Action

Clinical Observations	Molecular and Cellular Problems	Clinical Actions	Effect on Clinical Actions	Clinical Outcome
Debridement	Denatured matrix and cell debris impair healing	Debridement (episodic or continuous) autolytic, sharp surgical, enzymatic, mechanical or biological	Intact, functional extracellular matrix proteins present in wound base	Viable wound base
Infection, inflammation	High bacteria, cause ↑ inflammatory cytokines ↑ proteases ↓ growth factor activity ↓ healing environment	Topical/systemic antimicrobials anti-inflammatories protease inhibitors growth factors	Low bacteria, cause ↓ inflammatory cytokines ↓ proteases ↑ growth factor activity ↑ healing environment	Bacterial balance and reduced inflammation
Moisture imbalance	Dessication slows epithelial cell migration  Excessive fluid causes maceration of wound base/margin	Apply moisture-balancing dressings	Dessication avoided  Excessive fluid controlled	Moisture balance
Edge of wound – non-advancing or undermined	Non-migrating keratinocytes  Non-responsive wound cells, abnormalities in extracellular matrix or abnormal protease activity	Reassess cause, refer or consider corrective advanced therapies: <ul style="list-style-type: none"> <li>• bioengineered skin</li> <li>• skin grafts</li> <li>• vascular surgery</li> </ul>	Responsive fibroblasts and keratinocytes present in wound	Advancing edge of wound

Source: Sibbald et al., 2006. Reproduced with permission.

## Appendix P: Key Factors in Deciding Method of Debridement

### Key Factors in Deciding Method of Debridement

	Surgical	Enzymatic	Autolytic	Biologic	Mechanical
Speed	1	3	5	2	4
Tissue selectivity	3	1	4	2	5
Painful wound	5	2	1	3	4
Exudate	1	4	3	5	2
Infection	1	4	5	2	3
Cost	5	2	1	3	4

Source: Sibbald et al., 2006. Reproduced with permission.

Where 1 is most desirable and 5 is least desirable.

## Appendix Q: Signs and Symptoms of Venous Leg Ulcer Infection

### Signs and Symptoms of Venous Leg Ulcer Infection

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Local	Systemic
Increased pain	Fever
New areas of wound breakdown	Rigors
Friable granulation tissue	Chills
Foul odour	Hypotension
Increased exudate	
Bright red granulation tissue	
Bridging of soft tissue and epithelium	
Erythema >2cm beyond the border of the wound	
Increase in ulcer size	

References: Cutting & Harding, 1994; Gardner et al., 2001; Sibbald et al., 2006

## Appendix R: Antiseptic Use

### Antiseptic Use

Compiled by P. Coutts & L. Teague (2007). Published with permission.

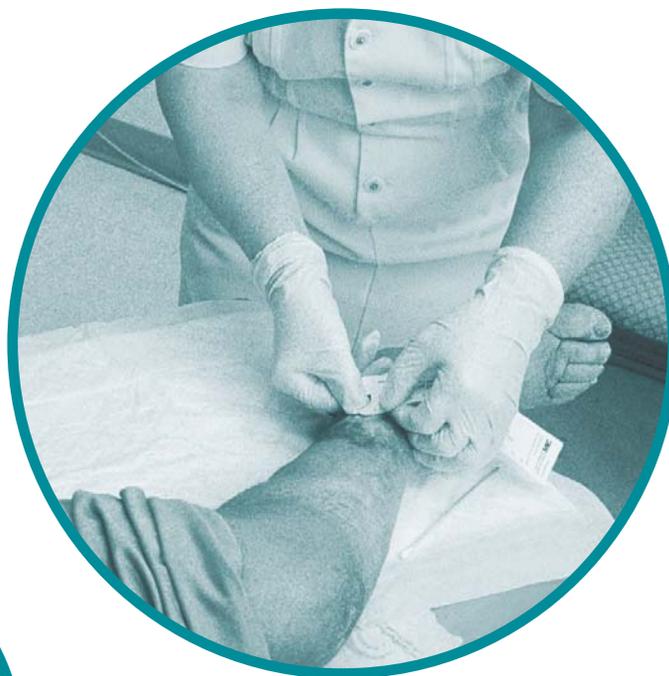
Antiseptic	In-vitro studies support use	In-vivo studies support use	Requires more human trials to assess efficacy and safety	Level of Evidence
Acetic Acid 0.25% or 0.5%	✓	✓		A
Chlorhexadine 0.05% or 0.2%	✓	✓	✓	
Silver Compounds	✓	✓		A
Povidone Iodine	✓	✓	✓	
Cadexomer Iodine	✓	✓		A
Hydrogen Peroxide 3% solution			✓	

Adapted from Drosou, Falabella & Krisner, 2003.

## Appendix S: Client Education Checklist

Inform the client of measures to prevent recurrence after healing:	
✓	
	Daily wear of compression stockings, cared for as per manufacturer's instructions and replaced at a minimum every six months
	Discouragement of self-treatment with over-the-counter preparations
	Avoidance of accidents or trauma to legs
	Rest periods throughout the day with elevation of affected limb above level of heart
	Early referral at first sign of skin breakdown or trauma to limb
	Need for exercise and ankle-joint mobility
	Appropriate skin care avoiding sensitizing products
	Compression therapy for life with reassessment based on symptoms

(RNAO Consensus Panel, 2007)



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