

# Australian and New Zealand Clinical Practice Guideline for Prevention and Management of Venous Leg Ulcers

Abridged version



**AWMA**  
Australian Wound  
Management Association Inc.  
National



**NEW ZEALAND  
WOUND CARE  
SOCIETY**

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**Disclaimer:**

This guideline was developed by the Australian Wound Management Association and the New Zealand Wound Care Society. The guideline presents a comprehensive review of the assessment, diagnosis, management and prevention of venous leg ulcers within the Australian and New Zealand healthcare context, based on the best evidence available up to January 2011. The guideline is designed to provide information to assist in decision-making and is based on the best information available at the date of compilation.

This document is a general guide to appropriate practice, to be implemented by a qualified health professional subject to his or her clinical judgment of each individual case and in consideration of the patient's personal preferences. The guideline should be implemented in a culturally safe and respectful manner in accordance with the principles of protection, participation and partnership.

Copies of this guideline can be downloaded from the Australian Wound Management Association website: [www.awma.com.au](http://www.awma.com.au) or the New Zealand Wound Care Society website: [www.nzwcs.org.nz](http://www.nzwcs.org.nz)

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## INTRODUCTION

This is an abridged version of the *Australian and New Zealand Clinical Practice Guideline for Prevention and Management of Venous Leg Ulcers*. The guideline was developed by the Australian Wound Management Association (AWMA) and the New Zealand Wound Care Society (NZWCS). The guideline presents a comprehensive review of the assessment, diagnosis, management and prevention of venous leg ulcers (VLUs) within the Australian and New Zealand health care context, based on the best evidence available up to January 2011. The guideline is designed to provide information to assist in decision-making and is based on the best information available at the date of compilation. The guideline is not intended to have a regulatory effect. Research was appraised and graded using methods outlined by the National Health and Medical Research Council (NHMRC). Details of this process are available in the full version of the guideline.

This document is a general guide to appropriate practice, to be implemented by a qualified health professional subject to his or her clinical judgement of each individual case and in consideration of the patient's personal preferences. The guideline should be implemented in a culturally safe and respectful manner in accordance with the principles of protection, participation and partnership.

The Expert Working Committee recommends consulting specific product information, the National Prescribing Service ([www.nps.org.au](http://www.nps.org.au)), Australian Therapeutic Guidelines ([www.tg.org.au](http://www.tg.org.au)) or New Zealand Medicines and Medical Devices Safety Authority ([www.medsafe.govt.nz](http://www.medsafe.govt.nz)) before prescribing medications.

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### **Focus of the guideline**

The guideline focus is leg ulcers of a venous origin. **The Expert Working Committee alerts the users of this guideline to the importance of accurate diagnosis of the type of ulcer being treated before implementing recommendations on the management of VLUs.**

### **Practice points**

Most recommendations are accompanied by practice points to assist clinicians to implement the recommendations. The practice points were developed by the Expert Working Committee and reflect their considerable experience in assessing and managing VLUs in a range of clinical settings.

## SUMMARY OF RECOMMENDATIONS

<b>Recommendation grades<sup>1</sup></b>	
<b>Evidence-based gradings developed from critical appraisal of the research</b>	
<b>A</b>	Excellent evidence — body of evidence can be trusted to guide practice
<b>B</b>	Good evidence — body of evidence can be trusted to guide practice in most situations
<b>C</b>	Some evidence — body of evidence provides some support for recommendation(s) but care should be taken in its application
<b>D</b>	Weak evidence — body of evidence is weak and recommendation must be applied with caution
<b>Consensus-based recommendation (CBR)</b>	
<b>CBR</b>	Consensus evidence – a graded recommendation could not be made due to a lack of evidence from systematic reviews or RCTs in populations with VLUs. The CBRs are supported by all members of the Expert Working Committee.

<b>PREVENTING INITIAL OCCURRENCE OF VLUs</b>	<b>Grade</b>
Prevent and manage venous hypertension by: <ul style="list-style-type: none"> <li>• providing deep vein thrombosis (DVT) prophylaxis</li> <li>• detecting and managing DVT early</li> <li>• promoting access to venous surgery and phlebology interventions.</li> </ul>	<b>CBR</b>
When there are no contraindications, apply compression therapy to prevent the initial development of a VLU in those at risk.	<b>CBR</b>
<b>ASSESSMENT, DIAGNOSIS AND REFERRAL</b>	<b>Grade</b>
A health professional trained in the assessment and management of VLUs should conduct a comprehensive assessment of all patients presenting with a leg ulcer. A comprehensive assessment should include: <ul style="list-style-type: none"> <li>• clinical, pain and leg ulcer history</li> <li>• examination of the leg and ulcer</li> <li>• investigations to support diagnosis.</li> </ul>	<b>CBR</b>
A comprehensive assessment of the leg ulcer should be made on initial presentation and at regular intervals thereafter to guide ongoing management.	<b>CBR</b>
Use CEAP classification to evaluate and classify venous disease.	<b>CBR</b>
Refer patients with a non-healing or atypical leg ulcer for consideration of biopsy.	<b>CBR</b>
Local guidelines should provide clear indication of appropriate criteria for referral to specialist health professionals.	<b>CBR</b>
<b>MANAGING PAIN ASSOCIATED WITH VLUs</b>	<b>Grade</b>
Provide adequate pain management to promote quality of life and VLU healing.	<b>CBR</b>
When there are no contraindications, apply EMLA® cream to reduce pain associated with the debridement of VLUs.	<b>A</b>
Electrotherapy could be considered for reducing pain from VLUs.	<b>C</b>
<b>MANAGEMENT OF VLUs</b>	<b>Grade</b>
<b>Managing the patient</b>	
Provide patients with appropriate education on their condition and its management.	<b>C</b>
Provide psychosocial assessment and support as an essential component in the patient's management plan.	<b>CBR</b>
Elevate the patient's leg to promote changes in microcirculation and decrease lower limb oedema.	<b>C</b>
Progressive resistance exercise may improve calf muscle function.	<b>C</b>
Optimise the patient's nutrition and hydration to promote healing in patients with VLUs.	<b>CBR</b>
<b>Prepare the leg and ulcer</b>	
Cleanse the leg and ulcer when dressings and bandages are changed.	<b>CBR</b>
Treat venous eczema and impaired peri-ulcer skin promptly.	<b>CBR</b>

Consider using topical barrier preparations to reduce peri-ulcer erythematous maceration in patients with VLU.	<b>C</b>
Enzymatic debriding agents have no effect in promoting healing in VLUs.	<b>C</b>
Consider other debridement methods to prepare the ulcer bed for healing.	<b>CBR</b>
<b>Treat clinical infection</b>	
Cadexomer iodine could be used to promote healing in VLUs when there is known increased microbial burden.	<b>B</b>
Silver products offer no benefit over standard care in reducing the healing time of VLUs.	<b>C</b>
Honey offers no benefits over standard care in promoting healing in VLUs.	<b>A</b>
Topical antimicrobial agents should not be used in the standard care of VLUs with no clinical signs of infection.	<b>B</b>
There may be a role for judicious use of topical antimicrobials when there is known or suspected increased microbial burden.	<b>CBR</b>
Use topical antibiotics judiciously in managing VLUs as there is a concern that their use is associated with antibiotic resistance and sensitivities.	<b>CBR</b>
Systemic antibiotics should not be used in the standard care of VLUs that show no clinical signs of infection.	<b>B</b>
<b>Select a dressing and topical treatment</b>	
No specific dressing product is superior for reducing healing time in VLUs. Select dressings based on clinical assessment of the ulcer, cost, access and patient/health professional preferences.	<b>B</b>
Consider using dressings or bandages impregnated with zinc oxide to provide comfort and promote epithelialisation of a healthy, granulated, superficial VLU.	<b>CBR</b>
Topical pale sulphonated shale oil could be used to promote healing in VLUs.	<b>C</b>
<b>Apply compression</b>	
When there are no contraindications, apply compression therapy to promote healing in VLUs.	<b>B</b>
<b>Other interventions</b>	
Consider bi-layered bioengineered skin grafts to promote healing in persistent VLUs.	<b>B</b>
Health professionals benefit from education on VLUs and their management. Patient outcomes may be superior when ulcer care is conducted by a trained health professional.	<b>C</b>
When there are no contraindications, pentoxifylline could be used to promote healing in VLUs.	<b>B</b>
When there are no contraindications, micronised, purified flavanoid fraction may be used to decrease the healing time for VLUs.	<b>C</b>
<b>Rural and remote populations</b>	
Where access to specialist services is limited, health professionals could contact a VLU specialist via telecommunications for advice and support in assessing and managing a patient with a VLU.	<b>CBR</b>
<b>PREVENTING RECURRENCE OF VLUs</b>	
Maintaining practices that promote the health of the legs may reduce the risk of VLU recurrence.	<b>CBR</b>
Consider the continued use of compression therapy to reduce the risk of VLUs recurrence.	<b>B</b>

## PREVENTING INITIAL OCCURRENCE OF VENOUS LEG ULCERS

### Management of venous hypertension

#### Recommendation

Prevent and manage venous hypertension by:

- providing DVT prophylaxis
- detecting and managing DVT early
- promoting access to venous surgery and phlebology interventions. (CBR)

### Compression therapy

#### Recommendation

When there are no contraindications apply compression therapy to prevent the initial development of a VLU in those at risk. (CBR)

#### Caution

Refer to the caution statement and the contraindications in the recommendation for use of compression therapy in the treatment of VLUs. (see section 8.5 in full guideline version)

#### Practice points

- Commence primary prevention compression therapy after a patient experiences DVT or severe leg trauma, or during prolonged immobility, especially when there is a past history of DVT.
- There is insufficient evidence on the most effective degree of compression required to prevent an initial ulcer; however, the Expert Working Committee's consensus is that compression should usually be within the range of **18–30 mmHg**.
- Further practice points can be found in the section on compression therapy for the treatment of VLUs (section 8.5 in full guideline version).

## ASSESSMENT, DIAGNOSIS AND REFERRAL

### Assessment

#### Recommendation

**A health professional trained in the assessment and management of VLUs should conduct a comprehensive assessment of all patients presenting with a leg ulcer.**

**A comprehensive assessment should include:**

- **clinical, pain and leg ulcer history**
- **examination of the leg and ulcer**
- **investigations to support diagnosis. (CBR)**

#### Clinical, pain and leg ulcer history

**An assessment to identify the aetiology of the ulcer is essential before commencing compression therapy as damage to the lower limb can result if compression is applied to underlying arterial aetiology.<sup>2,3</sup>**

Assessment should seek to identify comorbidities that may influence treatment of the VLU and/or require concurrent management. Comorbidities that require further investigation and management include peripheral arterial disease, rheumatoid arthritis, vasculitis, a past history of multiple skin cancers (lesions) and diabetes mellitus.<sup>2,3</sup> Assessment should be conducted and documented by a health professional with education and experience in the management of VLUs.<sup>2-5</sup>

#### Medical and surgical history

A clinical history indicative of a leg ulcer of venous origin includes:<sup>3</sup>

confirmed venous disease

- family history of leg ulceration
- varicose veins
- previous or current DVT
- decrease of calf muscle pump function
- phlebitis
- surgery or trauma of the affected leg
- chest pain, haemoptysis or pulmonary embolism
- occupations of prolonged standing or sitting
- obesity
- multiple pregnancies.

The patient's leg ulcer history helps develop a comprehensive picture of the disease history. Information that can assist includes:<sup>3</sup>

- the duration of the current ulcer
- previous ulcers and the time they have taken to heal
- time spent free of venous ulcers
- strategies used to manage previous venous ulcers.

#### Nutritional assessment

A nutritional assessment should be conducted.<sup>4,5</sup> This may include:

- weight and/or body mass index (BMI)<sup>3-6</sup>
- food and fluid intake<sup>7</sup>
- hair and skin changes<sup>7</sup>
- validated nutritional assessment<sup>7</sup>.

## Pain assessment

A pain assessment that investigates pain with a validated pain scale should be conducted.<sup>3-5,7</sup> This may include:

- location of the ulcer-related pain
- quantity/severity of the pain
- quality/characteristics of the pain
- when pain occurs (for example, at dressing changes, background pain)
- triggers and relievers
- impact of the pain on QOL.

## Psychosocial, quality of life and social assessments

Conduct psychosocial assessments using appropriate, validated assessment tools.<sup>4,5</sup> These may include:

- mini mental examination<sup>7</sup>
- QOL scales for specific health populations,<sup>7,8</sup> for example the Cardiff Wound Impact Schedule (CWIS) and Chronic Venous Insufficiency Questionnaire (CVIQ) have both been validated in patients with venous disease.<sup>8</sup>

## Examination of the leg and ulcer

### Recommendation

**A comprehensive assessment of the leg ulcer should be made on initial presentation and at regular intervals thereafter to guide ongoing management. (CBR)**

**Table 1: Clinical indicators of venous leg ulcers<sup>9</sup>**

**Signs or symptoms in isolation may not be clinical indicators of VLU. A grouping of the following signs and symptoms is indicative of an ulcer of venous origin.**

<b>Predisposing factors</b>	Confirmed venous disease History of DVT, varicose veins, phlebitis, chest pain, haemoptysis or pulmonary embolism Obesity Familial history of venous ulcers Trauma or surgery to the leg/s Decrease of calf muscle pump function Occupations of prolonged standing or sitting Multiple pregnancies
<b>Associated changes in the leg</b>	Firm ("brawny") oedema Haemosiderin deposit (reddish brown pigmentation) Lipodermatosclerosis Evidence of healed ulcers Dilated and torturous superficial veins Limb may be warm Atrophie blanche Eczema Altered shape — inverted "champagne bottle" Ankle flare
<b>Ulcer location</b>	Anterior to medial malleolus Pretibial area Generally lower third of leg (gaiter region)
<b>Ulcer characteristics</b>	Irregular shaped edges Ruddy granulation tissue Predominantly viable tissue

<b>Ulcer-related pain</b>	Pain varying from nil, to mild or extreme Pain may be relieved by elevation of leg
<b>Surrounding area Peri-ulcer</b>	Leaking oedema may result in maceration, pruritus and scale Heat and/or itch
<b>Pulses</b>	Normal foot/leg pulses

Ulcer assessment includes:

- measurement of the ulcer size<sup>2-5</sup>
- amount and type of exudate<sup>4,5</sup>
- appearance of the ulcer bed<sup>2,4,5</sup>
- condition of the ulcer edges<sup>2,4,5</sup>
- signs of clinical infection (for example, inflammation, increased pain, increased exudate, pyrexia)<sup>2,4,5</sup>
- peri-ulcer skin<sup>7</sup>
- ulcer odour<sup>7</sup>

### **Practice points**

- The acronym HEIDI can be used to guide assessment and diagnosis:<sup>10</sup>
  - **H**istory
  - **E**xamination
  - **I**vestigations
  - **D**agnosis
  - **I**ndicators
- Measurement of the ulcer should include length, width<sup>2,4,5</sup> and depth.<sup>3</sup>
- Tracing the ulcer margins provides a reliable indication of the progress of wound healing.<sup>2,4,5</sup> Other techniques for measuring ulcer size include using a disposable ruler or photography, including a calibrated measure.<sup>11</sup>
- Computerised calculation (planimetry) of the ulcer area from wound tracings or digital photography could be considered if resources are available.<sup>11</sup>
- The patient's position should be replicated as closely as possible when re-measuring the ulcer to increase the accuracy of results.<sup>11</sup>
- Characteristics of the ulcer and peri-ulcer skin should be documented regularly. The documentation system used should allow comparison of ulcer characteristics over time to evaluate progress.<sup>11</sup>
- When ongoing assessment indicates that the VLU is not healing at an optimal rate (25% improvement within four weeks<sup>12</sup>) dressing choice and overall management should be reviewed.

## **Investigations to support diagnosis**

### **Vascular assessment**

The aim of vascular assessment is to distinguish arterial aetiologies from venous and other aetiologies and assess the extent of venous insufficiency.

**Table 2 describes investigations that can assist in the diagnosis of ulcer aetiology.**

<b>Table 2: Investigations</b>	
<b>Blood pressure (BP)<sup>3-6</sup></b>	Measures the pressure of the blood on the vessel walls using a sphygmomanometer. It provides an indication of the possible presence of a range of cardiovascular diseases. The systolic BP is used in the calculation of ABPI.
<b>Ankle brachial pressure index (ABPI)<sup>2-7</sup></b>	<p>A non-invasive vascular test using handheld Doppler ultrasound that identifies large vessel peripheral arterial disease in the leg. It is used to determine adequate arterial blood flow in the leg before use of compression therapy. Systolic BP is measured at the brachial artery and also at the ankle level. Using these measurements, ABPI is calculated as the highest systolic blood pressure from the foot arteries (either dorsalis pedis or posterior tibial artery) divided by the highest brachial systolic pressure, which is the best estimate of central systolic blood pressure.<sup>13</sup> An ABPI of 0.8 to 1.2 is usually considered indicative of good arterial flow in the absence of other clinical indicators for arterial disease. An ABPI of less than 0.8 and a clinical picture of arterial disease should be considered as arterial insufficiency. An ABPI above 1.2 is suggestive of possible arterial calcification.</p> <p>ABPI = <math>\frac{\text{highest systolic foot pressure}}{\text{Highest systolic brachial blood pressure}}</math></p>
<b>Duplex ultrasound<sup>7</sup></b>	A non-invasive test that combines ultrasound with Doppler ultrasonography, in which the blood flow through arteries and veins can be investigated to reveal obstructions. <sup>14</sup>
<b>Photoplethysmography (PPG)<sup>7</sup></b>	A non-invasive test that measures venous refill time by using a small light probe that is placed on the surface of the skin just above the ankle. The test requires the patient to perform calf muscle pump exercises for brief periods followed by rest. <sup>15</sup> The PPG probe measures the reduction in skin blood content following exercise. This determines the efficiency of the musculo-venous pump and the presence of abnormal venous reflux. Patients with problems with the superficial or deep veins usually have poor emptying of the skin and abnormally rapid refilling usually less than 25 seconds
<b>Pulse oximetry<sup>2,6</sup></b>	A non-invasive test that measures the red and infrared light absorption of oxygenated and deoxygenated haemoglobin in a digit. Oxygenated haemoglobin absorbs more infrared light and allows more red light to pass through a digit. Deoxygenated haemoglobin absorbs more red light and allows more infrared light to pass through the digit. There is insufficient evidence to recommend this investigation as the primary diagnostic tool. <sup>2,6</sup>
<b>Toe brachial pressure index (TBPI)</b>	A non-invasive test that measures arterial perfusion in the toes and feet. A toe cuff is applied to the hallux (or second toe if amputated) and the pressure is divided by the highest brachial systolic pressure, which is the best estimate of central systolic blood pressure. The TBPI is used to measure arterial perfusion in the feet and toes of patients with incompressible arteries due to calcification, which may occur in patients with diabetes and renal disease. <sup>16</sup>
<b>Transcutaneous oxygen (TCPO<sub>2</sub>)<sup>7</sup></b>	Measures the amount of oxygen reaching the skin through blood circulation. There is insufficient evidence to recommend this investigation as the primary diagnostic test. <sup>2,6</sup>

### Biochemical analysis

Appropriate biochemical analysis may include:

- blood glucose<sup>3-5,7</sup>
- haemoglobin<sup>7</sup>
- urea and electrolytes<sup>7</sup>
- serum albumin<sup>7</sup>
- lipids<sup>7</sup>
- rheumatoid factor<sup>7</sup>
- auto antibodies<sup>7</sup>
- white blood cell count<sup>7</sup>
- erythrocyte sedimentation rate<sup>7</sup>
- C-reactive protein<sup>7</sup>
- liver function tests<sup>7</sup>.

### Microbiology and histopathology

Microbiology assists in the identification of infection and histopathology can identify malignant or other aetiologies. Investigations may include:

- bacterial wound swab or biopsy for bacteriological analysis<sup>7</sup>
- wound biopsy if malignancy or other aetiology is suspected.<sup>3,6,7</sup>

### **Recommendation**

**Patients with a non-healing or atypical leg ulcer should be referred for consideration of biopsy. (CBR)**

### **Practice points**

- Bacterial swabs should only be taken when the ulcer shows clinical signs of infection.<sup>3,6</sup>
- A structured, systematic leg ulcer assessment tool can assist in a clearly documented, accurate and comprehensive assessment. An example of an appropriate tool is the NZWCS Venous Ulcer Clinical Pathway<sup>17</sup> and its companion tool the Venous Leg Ulcer Assessment Form.<sup>18</sup>

### **Diagnosis**

The CEAP classification is an international consensus method of assessing venous disease.

**Table 3: CEAP clinical classification<sup>19</sup>**

C0	No signs of venous disease
C1	Telangiectasias or reticular veins
C2	Varicose veins
C3	Presence of oedema
C4a	Eczema or pigmentation
C4b	Lipodermatosclerosis or atrophie blanche
C5	Evidence of a healed VLU
C6	Active VLU

### **Recommendation**

**Use CEAP classification to evaluate and classify venous disease. (CBR)**

**Practice points**

- Other pathophysiology should be considered when VLUs fail to heal, or if they recur or remain persistently infected. Appropriate investigations include plain X-rays, bone scan or magnetic resonance imaging (MRI). Investigation is often best directed by a specialist with appropriate expertise in this area.
- When ongoing assessment indicates that the VLU is not healing at an optimal rate (25% improvement within four weeks<sup>12</sup>) the diagnosis should be reviewed.

**When should a patient with a venous leg ulcer be referred to a specialist?****Recommendation**

**Local guidelines should provide clear indication of appropriate criteria for referral to specialist health professionals. (CBR)**

Possible indicators for specialist referral include:

- diagnostic uncertainty<sup>3</sup>
- atypical ulcer characteristics and location<sup>2</sup>
- suspicion of malignancy<sup>2,3</sup>
- for treatment of underlying conditions including diabetes, rheumatoid arthritis and vasculitis<sup>2,3</sup>
- peripheral arterial disease indicated by an ABPI less than 0.8<sup>2,3</sup>
- ABPI above 1.2<sup>3</sup>
- contact dermatitis<sup>2,3</sup>
- ulcers that have not healed within three months<sup>3</sup>
- recurring ulceration<sup>3</sup>
- healed ulcers with a view to venous surgery<sup>3</sup>
- antibiotic-resistant infected ulcers
- ulcers causing uncontrolled pain.

**Practice points**

- Early referral to specialists and/or a leg ulcer clinic can help ensure appropriate management.
- Patients presenting with a traumatic injury and history of venous disease should be referred to a local leg ulcer specialist service or leg ulcer clinic as soon as possible
- In locations where specialist services are not readily available (for example, rural or remote areas) consultation could be made with a specialist using telecommunication services. One study indicated that advice from a specialist could be effectively implemented at a local level using digital images of the ulcer.<sup>20</sup> However, this is not to be considered a replacement for specialist review.
- Offer investigations of venous disease in patients with healed VLUs and no previous diagnosis.

## MANAGEMENT OF PAIN ASSOCIATED WITH VENOUS LEG ULCERS

### Pain management

#### Recommendations

**Provide adequate pain management to promote QOL and VLU healing. (CBR)**

**When there are no contraindications, apply EMLA® cream to reduce pain associated with the debridement of VLUs. (Grade A)**

#### Practice points

- If a patient is experiencing moderate to severe pain, the ulcer and its management, and the patient's pain management plan should be reviewed.
- Consider the use of topical analgesics such as EMLA® cream prior to debridement.
- Apply EMLA® cream according to the manufacturer's instructions.
- EMLA® cream should be applied 30 minutes before debriding the VLU.<sup>21</sup>
- EMLA® cream should be covered with a dressing (such as film) following application. It is also available as a patch that does not require additional dressings.<sup>21</sup>

**Skin sensitivity may result from topical products used for extended periods. Side effects from EMLA® cream may include local itching, burning sensation, swelling, paleness or redness.<sup>21</sup>**

### Electrotherapy

#### Recommendation

**Electrotherapy could be considered for reducing pain from VLUs. (Grade C)**

#### Practice points

- If a patient is experiencing moderate to severe pain the ulcer and its management, and the patient's pain management plan should be reviewed.

## MANAGEMENT OF VENOUS LEG ULCERS

### Manage the patient

#### Patient education

##### **Recommendation**

**Provide patients with appropriate education on their condition and its management. (Grade C)**

##### **Practice points**

- Both verbal and written education leads to improvements in patient knowledge about management of their VLU.<sup>22</sup>
- Patient education includes:
  - basic pathophysiology of venous hypertension and VLU
  - compression therapy and the role it plays in managing VLUs and venous hypertension. This includes the potential implications of declining compression therapy
  - devices and appliances that may assist in donning and doffing compression garments
  - elevation and exercise
  - nutrition
  - skin care
  - potential adverse effects of any therapies and when to seek assistance
  - managing comorbidities (for example, diabetes)
- Leg ulcer support groups provide patients with education and psychosocial support to manage their ongoing disease, although they are not available in all locations.
- Patients in rural or remote areas may consider accessing online supports.

#### Psychosocial support

##### **Recommendation**

**Provide psychosocial assessment and support as an essential component in the patient's management. (CBR)**

##### **Practice points**

- Include patients in the development of their management plan. This may increase the plan feasibility and patient concordance.<sup>23</sup>
- Provide patients with clear information about their own progress (for example, graphs of wound size). This may contribute to patient concordance.<sup>23</sup>
- QOL scales specific to populations with VLU and/or venous disease (for example, the CWIS and CVIQ) include assessment of psychosocial factors.<sup>8</sup>
- Support groups provide patients with education and support to manage their ongoing disease, although they are not available in all locations.
- Patients in rural or remote areas may consider accessing online supports.

#### Elevation

##### **Recommendation**

**Elevate the patient's leg to promote changes in microcirculation and decrease lower limb oedema. (Grade C)**

### **Practice points**

- For optimal effect, legs should be elevated during periods of inactivity, and ideally above the level of the heart, with consideration to the patient's lifestyle and limitations.
- Maintenance of an elevation diary by the patient can increase concordance with an elevation regimen.<sup>24</sup>

### **Exercise**

#### **Recommendation**

**Progressive resistance exercise may improve calf muscle function. (Grade C)**

### **Practice points**

- Exercises should be designed to improve calf muscle strength, for example weight-bearing foot and ankle exercises and heel-toe walking. Ensure that the patient can perform exercises in a safe manner and with consideration to personal tolerance levels.
- Gait analysis is a key factor in patient assessment. Correction of gait may improve calf muscle function.
- Consider referral to a physiotherapist or exercise physiologist with experience in treating patients with venous insufficiency.

### **Nutrition and hydration**

#### **Recommendation**

**Optimise the patient's nutrition and hydration to promote healing in patients with VLUs. (CBR)**

### **Practice points**

- Nutritional requirements should be based on energy/caloric requirements with additional consideration to the stress response to illness.<sup>25</sup>
- Protein requirements in healthy patients are 0.8 g protein/kg daily. This may need to be increased to 1.5 to 2 g protein/kg daily in patients with heavily exudating ulcers.<sup>25</sup>
- There is no research on the effect of L-arginine supplements in improving VLU healing.
- Oral zinc supplements are not effective for improving wound healing unless zinc deficiency is diagnosed.
- Patients with heavily exudating VLUs may require an increase in fluid intake<sup>25</sup> if they have no fluid restrictions related to comorbidities, particularly in warmer weather.
- Patients with heavily exudating VLUs may require closer electrolyte and albumin management, especially in warmer climates.

### **Prepare the leg and ulcer**

### **Skin and ulcer hygiene**

#### **Recommendation**

**Cleanse the leg and ulcer when dressings and bandages are changed. (CBR)**

**Practice points****Leg hygiene**

- Cleanse the leg with a pH-appropriate skin cleanser. To obtain optimal ulcer and skin pH, avoid the use of alkaline soaps and cleansers.<sup>7</sup>
- Normal hygiene of the leg should be attended at each dressing change and the leg dried gently with a clean towel. Hygiene could be achieved through:<sup>7</sup>
  - showering in potable water
  - washing the leg in a dedicated bowl of potable water
  - wiping the leg with a moist cloth.
- Applying a moisturiser contributes to the maintenance of the healthy skin.

**Ulcer care**

- Avoid cleansing the ulcer aggressively unless the goal of care is debridement or removal of foreign bodies.<sup>7</sup>
- Clean wound management technique (using potable water) should be used in most instances. Aseptic wound management techniques should be considered when:<sup>7</sup>
  - the patient is immunosuppressed
  - the wound-healing environment is compromised.

**Management of surrounding skin****Recommendations**

**Treat venous eczema and impaired peri-ulcer skin promptly. (CBR)**

**Consider using topical barrier preparations to reduce peri-ulcer erythematous maceration in patients with VLU. (Grade C)**

**Practice points**

- Red skin near the ulcer may be related to infection, venous eczema and/or hypersensitivity that will require further investigation and treatment.
- Review current topical agents with consideration to hypersensitivity.
- Consider applying a topical barrier preparation to the peri-ulcer skin to protect it from exudate.<sup>2</sup>
- Venous eczema may be treated with a wide range of products including:<sup>2</sup>
  - topical corticosteroids
  - topical zinc-impregnated bandages
  - other dermatological preparations.

**Wound debridement****Recommendations**

**Enzymatic debriding agents have no effect in promoting healing in VLUs. (Grade C)**

**Consider other debridement methods to prepare the ulcer bed for healing. (CBR)**

**Caution**

Adverse events do not commonly occur with enzymatic debriding agents. Collagenase debriding agents are contraindicated in patients with hypersensitivity due to the risk of allergic reaction.<sup>26</sup>

### **Practice points**

- Mechanical debridement methods (ultrasound; high-pressure irrigation) and wet to dry dressings may reduce non-viable tissue, bacterial burden and inflammation.
- When debriding a VLU, the goal is to remove all excess non-viable tissue; however, for patient comfort smaller amounts of non-viable tissue may be removed in each session.
- Conservative sharp wound debridement should only be performed by health professionals with appropriate training.

### **Treat clinical infection**

Wound infection interrupts the normal healing process. It is imperative that an assessment of the patient and their ulcer is performed to determine infection, its severity and appropriate subsequent management is implemented. Antimicrobial therapy, which includes topical agents such as cadexomer iodine, silver, honey and other topical antiseptics, as well as systemic antibiotics, can be prescribed when a wound exhibits signs of infection. **All products should be used in accordance with the manufacturer's directions.**

### **Cadexomer iodine**

#### **Recommendation**

**Cadexomer iodine could be used to promote healing in VLUs when there is known increased microbial burden. (Grade B)**

#### **Caution**

Unless the patient has a hypersensitivity to iodine, cadexomer iodine is usually not associated with significant adverse events.<sup>27,28</sup> Cadexomer iodine ointments and impregnated dressings should not be used in patients with a history of Hashimoto's thyroiditis, Graves' disease, lithium medications, non-toxic nodular goitre or thyroid disorders, or impaired renal function, in children or in pregnant or lactating women. Risk of systemic absorption increases when cadexomer iodine products are used on larger wounds or for prolonged periods.<sup>28</sup>

#### **Practice points**

- Cadexomer iodine should not be used for longer than three months continuously.<sup>28</sup>
- Cadexomer iodine dressings should only be used when there is evidence of heavy bacterial load/ local wound infection and stopped once local infection has been controlled.
- Cadexomer iodine should not be covered with povidone iodine soaked gauze/tulle gras as this practice results in the dumping of iodine, increasing toxicity.

### **Topical silver**

#### **Recommendation**

**Silver products offer no benefit over standard care in reducing the healing time of VLUs. (Grade C)**

#### **Caution**

Potential renal toxicity should be considered when using topical silver agents for extended periods (for example, greater than four weeks) on large wound beds. The risk appears to be low but caution is warranted. As with other anti-microbial therapies there is a risk of bacterial resistance with extended use of silver products.<sup>29</sup>

**Practice points**

- For trained health professionals or patients who choose to use silver, despite the current lack of high level evidence for an effect in healing VLUs:
  - use silver products as directed by the manufacturer
  - there is insufficient evidence to indicate any one specific silver product is superior to others.
- Colloidal silver, either internally or topically, is not recommended.

**Topical honey****Recommendation**

**Honey offers no benefits over standard care in promoting healing in VLUs. (Grade A)**

**Caution**

Treating VLUs with honey has been reported to lead to ulcer pain, deterioration of the ulcer and an increase in wound exudate.<sup>30</sup> Adverse events (for example, ulcer pain, deterioration of the VLU and increased exudate) are more likely to occur in VLUs treated with honey compared with hydrogel or standard dressings and there was no difference in infection rates.<sup>31</sup>

**Other topical antimicrobials**

**Topical antimicrobial agents should not be used in the standard care of VLUs healing with no clinical signs of infection. (Grade B)**

**There may be a role for judicious use of topical antimicrobials when there is known or suspected increased microbial burden. (CBR)**

**Caution**

The Expert Working Committee does not recommend the use of hydrogen peroxide in wound management. Deaths have been reported as a result of irrigation of closed cavity wounds with hydrogen peroxide.<sup>32-34</sup>

Skin sensitivity may result when products are used for extended periods.

Toxic effects of antimicrobial/antiseptic solutions on fibroblasts and macrophages *in vitro* are well documented.<sup>34-36</sup>

Acetic acid has been associated with pain at the ulcer site and skin irritation at higher concentrations. There is a risk of acidosis when used for extended periods over very large wound surfaces.<sup>37</sup> It has been demonstrated that there is no dilution of acetic acid that is toxic to bacteria without being toxic to fibroblasts.<sup>36</sup>

**Practice points**

- When using povidone iodine 10% solution it should be used at full concentration and rinsed off after two to five minutes.<sup>38</sup>
- Topical antiseptic solutions should generally only be used for treatment of topical contamination or minor skin infections and should be avoided on clean, healing ulcers.<sup>39</sup>
- The length of treatment with topical antimicrobials should be determined by the response of the VLU and the patient.<sup>39</sup>
- Acetic acid at 3% concentration may be considered for treatment as a topical wash to reduce the burden of pseudomonas where other topical interventions are unavailable or have been ineffective.

## Topical antibiotics

### **Recommendation**

**Use topical antibiotics judiciously in managing VLUs as there is a concern that their use is associated with antibiotic resistance and sensitivities. (CBR)**

### **Caution**

**Skin sensitivity may result from topical products used for extended periods.**

### **Practice points**

- Topical metronidazole may be used for a short period to reduce odour related to anaerobes.

## Systemic antibiotics

### **Recommendation**

**Systemic antibiotics should not be used in the standard care of VLUs that show no clinical signs of infection. (Grade B)**

### **Caution**

**Adverse effects for systemic antibiotics were not reported in the trials. Side effects include gastrointestinal tract (GIT) signs and symptoms and signs of allergic reaction (for example, skin rash, itching and, rarely, difficulty breathing). Interactions with other medications are common.<sup>40</sup> The development of antibiotic resistance due to overuse of antibiotics is also of major concern.**

### **Practice points**

- All ulcers should be assessed regularly for indicators of infection.<sup>39</sup>
- Systemic antibiotics only have a role when the ulcer is clinically infected. A wound swab should generally be taken to guide appropriate antibiotic therapy, although the results are not to be considered binding.<sup>39</sup>
- The length of treatment with systemic antibiotics should be determined by the response of the ulcer and the patient.<sup>39</sup>
- For complex, unresponsive, recalcitrant or recurrent VLU infection, consider consulting a microbiologist or infectious disease specialist.<sup>39</sup>

## Select a dressing and topical treatment

### Dressings

### **Recommendation**

**No specific dressing product is superior for reducing healing time in VLUs. Select dressings based on clinical assessment of the ulcer, cost, access and patient/health professional preferences. (Grade B)**

### **Practice points**

- There should be some form of dressing between the compression layer and the VLU.
- Clinicians and patients may have preferences for particular dressings over others. Characteristics that are likely to influence preference include:<sup>41-45</sup>
  - ease of application and removal
  - ability to absorb exudate and odour
  - pain experienced on dressing changes
  - appearance of the dressing
  - accessibility.

- The Expert Working Committee recommends that choice of a primary dressing should be made in consideration of:
  - wound bed preparation:
    - ulcer size and location and tissue characteristics
    - level of bacterial burden
    - amount and type of wound exudate
  - patient tolerance and preference
  - skill and knowledge of the health professional
  - cost and availability
  - presence of pain and/or odour
  - minimal adherence to wound bed
- Dressings that are less bulky in appearance will assist in maintaining optimal compression levels and may increase QOL.<sup>42</sup>
- If the wound is exuding heavily, select a dressing that is reported to have a high absorptive capacity.<sup>41-43</sup>
- Prolonged or continued heavy wound exudate should be investigated and managed appropriately.

## Zinc-impregnated bandages

### **Recommendation**

**Consider using dressings or bandages impregnated with zinc oxide to provide comfort and promote epithelialisation of a healthy granulated superficial VLU. (CBR)**

### **Practice points**

- Zinc-impregnated bandages can be used to soothe venous eczema and associated inflammation.<sup>46</sup>
- Zinc-impregnated bandages alone do not provide therapeutic compression.
- All previous zinc should be carefully removed from the patient's VLU and surrounding skin before a new zinc-impregnated bandage is applied. Moisturiser can assist removal of bandages and prevent skin damage.
- Apply zinc-impregnated bandages according to the manufacturer's directions.

## Topical pale shale oil

### **Recommendation**

**Topical pale sulphonated shale oil could be used to promote healing in VLUs. (Grade C)**

## Apply compression

Compression therapy aims to promote venous return, reduce venous pressure and prevent venous stasis. To achieve this, compression bandages or stockings are applied to the legs. When elastic bandages are applied with an even tension, a graduated compression is achieved in a leg of normal proportions, with the greatest magnitude of compression at the ankle and pressure magnitude decreasing to the calf.

### **Recommendation**

**When there are no contraindications, apply compression therapy to promote healing in VLUs. (Grade B)**

### **Caution**

**Trials investigating the effectiveness of compression therapy were generally conducted in populations without diabetes, cardiovascular disease, malignancy or mixed aetiology ulcers. Compression should be used with greater caution in these populations and may be contraindicated in some patients.<sup>47</sup> Other contraindications in the high-risk patient may include:**

- heart failure
- peripheral arterial disease
- an ABPI below 0.8 mmHg or above 1.2 mmHg
- peripheral neuropathy
- some vasculitic ulcers.

**Although compression may relieve lower limb oedema, the aetiology should be determined and the patient's condition monitored closely when compression therapy commences, due to a risk of fluid overloading the systemic circulation. High levels of pain following application of compression should be assessed urgently.**

Compression therapy should only be used in patients who can detect increasing pain or complications and for whom the compression system can promptly be removed (for example, by the patient or another person).<sup>47</sup> Potential modifications in the high-risk patient include:

- increased frequency of review by a health professional specialised in VLU management
- increased frequency of assessment for signs and symptoms of complications (for example, tissue necrosis, skin trauma, discolouration, pain, pallor, paraesthesia, impaired capillary return)
- reduction in the level of compression
- increased padding/comfort layer under the compression
- reviewing the initial diagnosis
- referral to a pain management specialist if the patient continues to experience uncontrolled pain.

## Compression systems

**Table 4: Examples of available compression systems**

Compression system	Also referred to as	Description and function
<b>Multi-component system</b>	Two-, three- and four-layer bandaging (4LB)	A compression system with more than one layer or aspect. Most bandaging systems include at least a padding layer and bandages so are classified as multi-component systems. Can also refer to a system that consists of several layers using a combination of elastic and inelastic bandages (i.e. 4LB system). This system is also available as a kit.
<b>Inelastic compression bandages</b>	Short-stretch bandages	Bandages with minimal or no elastomers. Low extensibility and high stiffness (high SSI). Low resting pressure and high working pressure.
<b>Single-component bandage system</b>		Compression bandaging system that has only one layer or aspect to the system. Most bandage systems currently used in practice include a padding layer and so are not described as single-component systems.
<b>Medical grade compression hosiery</b>	Tubular stockings, compression stockings, multi-layer hosiery systems	Available in a range of compression levels. International consensus on compression scales is lacking and different scales are used around the world. Two scales and/or classifications of compression hosiery commonly used by Australian and New Zealand manufacturers include: Scale one: <sup>48</sup> <ul style="list-style-type: none"> <li>• extra light (5 mmHg)</li> <li>• light (15 mmHg)</li> <li>• mild (18–24 mmHg)</li> <li>• moderate (20–40 mmHg)</li> <li>• strong (40–60 mmHg)</li> <li>• very strong (&gt;60 mmHg)</li> </ul> Scale two: <ul style="list-style-type: none"> <li>• Class I</li> <li>• Class II</li> <li>• Class III</li> <li>• Class IV</li> </ul>
<b>Unna boot</b>	Unna's boot	Although there are several systems referred to as Unna's boot, it is commonly a gauze bandage impregnated with zinc paste under a cohesive inelastic bandage.
<b>Pneumatic compression</b>	Pump compression	Pressure is applied via a boot inflated by a machine either continuously, intermittently or in sequential cycles.

### Practice points

- A general rule is that higher pressure is better than lower pressure and some pressure is better than no pressure.
- Incorrectly applied compression systems may not be effective or may cause tissue damage. Clinicians and patients require education and experience to ensure that bandaging is applied correctly and achieves an appropriate level of compression.<sup>49</sup> There is minimal evidence to suggest that there is a superior compression system. Research suggests that:
  - a single-component bandage compression system is less effective than 4LB<sup>50,51</sup>, but a two-layer system is as effective as 4LB<sup>52,53</sup>
  - different variations of 4LB systems are as effective as each other<sup>50,51</sup>
  - medical-grade compression hosiery is comparable to multi-layer bandaging systems<sup>54</sup>
  - an elastic component or two-layer medical grade compression hosiery are more effective than an inelastic component<sup>50</sup>
  - pneumatic compression is as effective as bandaging systems.<sup>55</sup>

- The Expert Working Committee recommends that choice of a compression system should be made in consideration of:
  - shape and size of the leg
  - patient tolerance and preference
  - clinician experience in application
  - the environment (for example, temperature)
  - ease of application and removal
  - access to systems
  - presence of other disease
  - level of activity/weight-bearing
  - cost.
- Consider the shape of the patient's leg and comfort in selecting a compression system. For example:
  - unusually shaped legs may require custom-made, medical-grade compression hosiery
  - some patients benefit from additional support in particular areas (for example, the foot arch and posterior medial malleolus region)
  - adaptations such as the Southland Snail<sup>56</sup> or stasis pads can provide localised supplemental pressure over the ulcer area to flatten wound edges and ensure pressure is applied evenly.
- There is no evidence to show anti-embolic stockings will heal VLUs.
- A sub-bandage pressure gauge can determine the effectiveness of the bandaging application; however, ongoing monitoring of sub-bandage pressure does not influence effectiveness of bandaging.<sup>49</sup>
- Medical-grade compression hosiery may be associated with less pain than compression bandaging.<sup>50</sup>
- Compression stockings, socks and bandages should be replaced regularly. For most patients this will be two to three pairs of stockings or socks per year. Bandages should be applied, cared for and laundered according to manufacturer's instructions and replaced when bandaging integrity is compromised.
- Various devices and styles of stocking are available to assist in the donning and doffing of compression hosiery.

## Other interventions

### Skin grafting

#### **Recommendation**

**Consider bi-layered, bioengineered skin grafts to promote healing in persistent VLUs. (Grade B)**

#### **Caution**

**Skin grafting may cause blood loss, pain, scarring, reduced sensitivity at the graft site or infection. Grafting performed under anaesthetic has increased risks (for example, allergic reaction to medications).<sup>57</sup> Reporting of adverse events in the trials included in the literature was limited. Most trials found no increase in adverse events such as infection or contact dermatitis. One trial reported squamous cell carcinoma associated with grafting.<sup>58</sup>**

**Practice points**

- Compression is required after skin grafting to ensure the graft takes and to prevent further leg oedema.

**Health professional education****Recommendation**

**Health professionals benefit from education on VLUs and their management. Patient outcomes may be superior when ulcer care is conducted by a trained health professional. (Grade C)**

**Practice points**

- Education in the assessment and management of VLUs should be provided to all health professionals caring for patients with VLUs.
- An accredited or endorsed program should be sought as such programs promote sound education and practice advice.

**Medications**

**Best practice supports the use of compression therapy wherever possible and, if used, pharmacological interventions should be concurrent with compression therapy.**

**Pentoxifylline****Recommendation**

**When there are no contraindications, pentoxifylline could be used to promote healing in VLUs. (Grade B)**

**Caution**

**Pentoxifylline is not recommended for patients with a history of severe haemorrhage (for example, retinal haemorrhage, cerebral haemorrhage, active peptic ulcer), acute myocardial infarction, angina or marked liver or kidney disease.<sup>59</sup>**

**Pentoxifylline is related to a higher incidence of GIT side effects than placebo.<sup>60,61</sup> Other common side effects include dizziness and headaches.<sup>61</sup> Pentoxifylline increases the effect and toxicity of theophylline, caffeine, and some anticoagulants (including warfarin).<sup>62</sup>**

**Practice points**

- Regularly monitor the blood pressure of hypertensive patients taking pentoxifylline.<sup>59</sup>
- Pentoxifylline should be taken with meals to reduce GIT side effects.<sup>61</sup>
- Pentoxifylline may take up to eight weeks to show full effects.<sup>59,61</sup>
- Patients should inform their surgeon or dentist if they are taking pentoxifylline before undergoing major procedures.<sup>61,62</sup>

**Micronised purified flavanoid fraction (MPFF)****Recommendation**

**When there are no contraindications, micronised purified flavanoid fraction may be used to decrease the healing time for VLUs. (Grade C)**

**Caution**

**The risk of adverse events with MPFF is very low and there are no known drug interactions.<sup>63</sup>**

## PREVENTING RECURRENCE OF VENOUS LEG ULCERS

### Maintenance of leg care

#### **Recommendation**

**Maintaining practices that promote the health of legs may reduce the risk of VLU recurrence. (CBR)**

#### **Practice points**

- Progressive resistance exercise may help to promote calf muscle function.<sup>64</sup>
- Regular moisturising of the lower limbs helps to maintain skin integrity.
- Elevation of the limbs when sitting and avoidance of standing for prolonged periods assists in controlling oedema.
- Support groups can promote uptake of and concordance with practices that help maintain skin integrity and provide long-term psychosocial support.

### Ongoing compression therapy

Continuing compression therapy following healing of a VLU can help reduce the long-term effects of venous disease.

#### **Recommendation**

**Consider the continued use of compression therapy to reduce the risk of recurrence of VLUs. (Grade B)**

#### **Caution**

**Refer to the caution statement and the contraindications (see section 8.5 in full guideline version).**

#### **Practice points**

- Medical-grade compression hosiery may be more effective than compression bandages in preventing ulcer recurrence.<sup>50</sup>
- The Expert Working Committee recommends that after healing has been achieved it is ideal that compression bandaging be maintained to the same degree for two to four weeks before changing to medical-grade compression hosiery.
- Mild to moderate compression may be as effective as higher compression in preventing ulcer recurrence. The Expert Working Committee's consensus is that compression of **18–40 mmHg** will reduce the risk of ulcer recurrence. Patients should be offered the strongest compression that they can tolerate and manage.
- Patient acceptance of higher pressure, medical-grade compression hosiery may be an issue.<sup>65-67</sup> Patients require education about the importance of wearing compression hosiery.<sup>67</sup>

## SPECIAL POPULATIONS

### Aboriginal and Torres Strait Islander people and Maori and Pacific Islander people

There is no specific published data on the incidence of VLUs in Aboriginal and Torres Strait Islander people in Australia or Maori and Pacific Islander people in New Zealand. The health of Indigenous populations differs from that of the general population in both countries.<sup>68-70</sup> In New Zealand, this disparity has been directly related to poor socio-economic status leading to susceptibility of disease, poorer health outcomes and a higher rate of chronic disease.<sup>69,70</sup> In Australia, there is a higher prevalence of most long-term health conditions in people from Aboriginal and Torres Strait Island backgrounds compared with non-Indigenous populations.<sup>69,71</sup> In addition, people from Indigenous backgrounds often reside in rural and remote locations, creating greater disparity due to more difficulty specialist accessing health services.

No research specific to the management of VLUs in Australian and New Zealand Indigenous populations was identified in the literature search. The effectiveness of therapies did not appear to be related to ethnicity when therapy was delivered as part of a research study.

### People from culturally and linguistically diverse (CALD) backgrounds

No research specific to the management of VLUs in CALD populations was identified in the research; however, much of the research (particularly that conducted on compression therapy and dressings) was conducted in study sites located worldwide. Research conducted at multiple research sites generally showed no variation in findings associated with study sites, suggesting that there is no variation in effectiveness of therapies associated with ethnicity.

### People from rural and remote locations

People living in rural and remote regions may have limited access to specialist leg ulcer services.

#### **Recommendation**

**Where access to specialist services is limited, health professionals could contact a VLU specialist via telecommunications for advice and support in assessing and managing a patient with a VLU. (CBR)**

## QUICK REFERENCE FLOW CHARTS

The following two pages present:

- Flow chart for assessment of venous leg ulcers
- Flow chart for management of venous leg ulcers



# FLOW CHART FOR ASSESSMENT OF VENOUS LEG ULCERS

Australian and New Zealand clinical practice guideline for prevention and management of venous leg ulcers



**Patient presents with an ulceration on the lower leg**

**1**

**ASSESSMENT**

**HISTORY**

- Patient's clinical history (page 8)**
- venous disease
  - family history of leg ulceration
  - decreased calf muscle pump function
  - surgery or trauma of affected leg
  - chest pain or pulmonary embolism
  - prolonged standing or sitting
  - varicose veins
  - phlebitis
  - obesity
  - number of pregnancies
  - previous or current DVT

- Comprehensive assessment of the patient (page 8)**
- medications
  - psychosocial
  - comorbidities
  - quality of life
  - nutrition
  - pain

- Patient's leg ulcer history (page 8)**
- the duration of the current ulcer
  - previous ulcers and the time they have taken to heal
  - time spent free of ulcers
  - strategies used to manage previous ulcers

**EXAMINATION**

- Venous characteristics (page 9)**  
Associated changes in the leg
- Firm ("brawny") oedema
  - Haemosiderin deposit (reddish brown pigmentation)
  - Lipodermatosclerosis (skin hard and woody)
  - Evidence of healed ulcers
  - Dilated and torturous superficial veins
  - Hair is evident
  - Atrophie blanche (white areas of intact skin)
  - Venous eczema (dry or wet itchy scaly skin)
  - Altered shape – inverted "champagne bottle"
  - Ankle flare (distended veins in foot arch or ankle region)
  - Leaking oedema may result in maceration, pruritis and scale
  - Limb may be warm – heat and/or itch
- Ulcer location and characteristics
- Anterior to medial malleolus
  - Pretibial area (lower third of leg)
  - Shallow with ragged, irregular edges
  - Ruddy granulation tissue
  - Wound exudate moderate to high
  - May be odorous
- Pain
- Varying from nil, to mild or extreme
  - May be relieved by elevation of leg

- Arterial characteristics**  
Associated changes in the leg
- Oedema may be observed if infection present
  - Thin, shiny skin often with minimal hair growth
  - Leg shape is often straight with minimal shape
  - Limb cool to touch
  - Elevated toes/leg become pale, dependent rub (+ve Burger's test)
  - Weak or absent pedal or leg pulses
- Ulcer location/characteristics
- Ulcer margins well demarcated with "punched out" appearance
  - Poorly perfused wound bed
  - Necrotic tissue that may be tenacious (difficult to remove)
  - Minimal wound exudate unless infected
  - Prone to infection
- Pain
- Claudication or rest pain, may be worse at night or if leg is elevated

- Atypical ulcer characteristics**
- None or minimal venous and arterial ulcers characteristics
  - Pain is extreme
  - Oedema
  - Ulcer has an unusual appearance or atypical distribution
  - Suspicion of malignancy
  - Deterioration in ulcer or necrotic tissue present
  - Ulcer that has not healed in three months

**INVESTIGATIONS**

- Non-invasive diagnostic tests may be ordered: (page 11)**
- Pedal and leg pulses
  - ABPI
  - TBPI
  - X-ray
  - Wound swab
  - Arterial and/or venous duplex scanning
  - Photoplethysmography
  - TCPO<sub>2</sub>
  - Pulse oximetry

- Invasive diagnostic tests may be ordered: (page 12)**
- Blood profiles
  - Wound tissue biopsy
  - MRI

**2**

**DIAGNOSIS**

ABPI < 0.8 or > 1.2 or Atypical or arterial characteristics

ABPI 0.8–1.2 or Characteristics of venous aetiology Use CEAP classification

**3**

**REFERRAL**

Referral to specialist health professional (page 13)

**4**

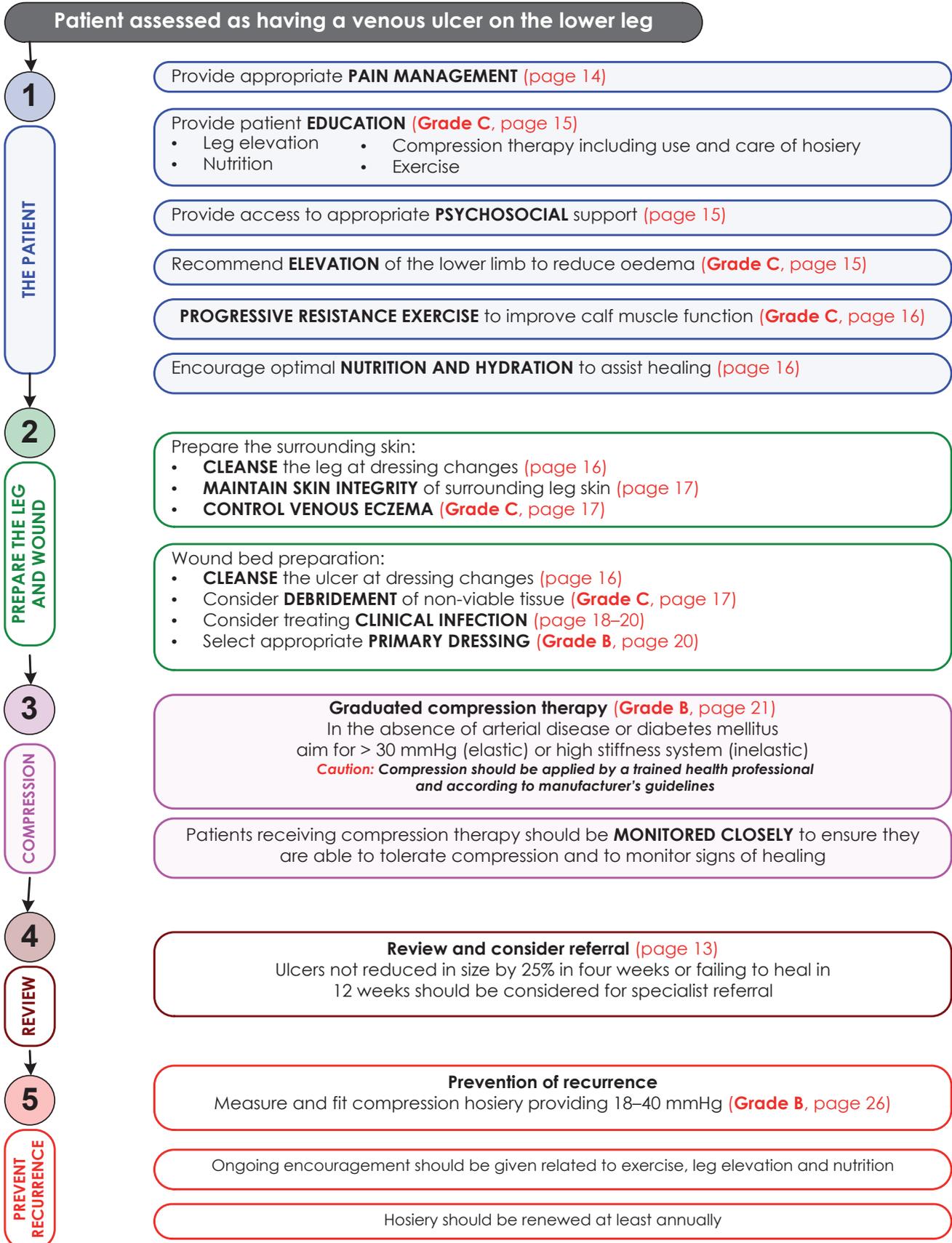
**MANAGEMENT**

Refer to other side for management of the Venous ulcer



# FLOW CHART FOR MANAGEMENT OF VENOUS LEG ULCERS

Australian and New Zealand clinical practice guideline for prevention and management of venous leg ulcers



## COMMONLY USED ABBREVIATIONS

4LB	Four-layer bandages/ing
ABPI	Ankle brachial pressure index
AWMA	Australian Wound Management Association
BMI	Body mass index
CALD	Culturally and linguistically diverse
CBR	Consensus-based recommendation
CEAP	<b>C</b> linical severity, ( <b>a</b> ) <b>e</b> tiology, <b>a</b> natomy, <b>p</b> athophysiology
CI	Confidence interval
CWIS	Cardiff Wound Impact Schedule
CVI	Chronic venous insufficiency
CVIQ	Chronic Venous Insufficiency Questionnaire
DVT	Deep vein thrombosis
EMLA	Eutectic mixture of local anaesthetic
GIT	Gastrointestinal tract
HBOT	Hyperbaric oxygen therapy
HCSE	Horse chestnut seed extract
ITT	Intention to treat
LLLT	Low-level laser therapy
MPFF	Micronised purified flavanoid fraction
N	Number (of participants)
NHMRC	The National Health and Medical Research Council
NNT	Number needed to treat
NS	Not statistically significant
NSBF	No Sting Barrier Film
NZWCS	New Zealand Wound Care Society
OR	Odds ratio
QOL	Quality of life
P value (p)	Probability value
PEMT	Pulsed electromagnetic therapy
RCT	Randomised controlled trial
RR	Relative risk
RRR	Relative risk reduction
SR	Systematic review
SSI	Static stiffness index
VAC	Vacuum-assisted closure
VAS	Visual analogue scale
VLU	Venous leg ulcer
WBP	Wound bed preparation
WMD	Weighted mean difference

## GLOSSARY

Ankle flare	Distended veins in foot arch or ankle region.
Antibiotic	Substance or compound administered systemically or applied topically that acts selectively against bacteria.
Antimicrobial	A term used to encompass antibiotics and antiseptics. A substance that reduces the possibility of infection by inhibiting the growth of, or eradicating micro-organisms.
Arterial disease	Impaired blood flow in the arteries that generally occurs due to a build up of plaque. Plaque is made up of fat, cholesterol, calcium, fibrous tissue and other substances found in the blood.
Atrophie blanche	A type of scarring that infrequently occurs on the lower leg associated with healing that occurs when blood flow is impaired. It appears as ivory/white depressed atrophic plaques with prominent red blotching within the scar.
Bioengineered skin grafts	Manufactured skin replacement products derived from human or animal skin cells.
Chronic venous insufficiency (CVI)	An advanced stage of venous disease that occurs over the long term.
Extensibility	The ability of a bandage to increase its length in response to an applied force.
Haemosiderin pigmentation	A reddish brown pigmentation due to deposits of haemosiderin in the lower legs as a result of venous insufficiency.
Indigenous	Australians from an Aboriginal and Torres Strait Island background and New Zealanders from a Maori background.
Lipodermatosclerosis	A condition that affects the skin immediately above the ankle in patients with long-standing venous disease. Seen as fibrosis of the underlying subcutaneous tissue.
Microcirculation	The flow of blood or lymph throughout the system of smaller vessels (diameter of 100 µm or less) of the body.
Macrocirculation	The large blood vessels that transport blood to the organs.
Pain	In the context of this guideline, pain refers to an unpleasant sensory and emotional experience associated with a leg ulcer. Patients may use varying words to describe pain including discomfort, distress and agony.
Patient	Any person receiving health assessment, care or treatment.
Post-thrombotic syndrome	Describes signs and symptoms that occur due to long-term complications of lower limb DVT. Signs and symptoms include leg aching and cramping, itching, heaviness, skin discolouration and VLU.
pH	A measure on a scale from 0 to 14 of the acidity or alkalinity of a solution, with 7 being neutral, greater than 7 is more alkaline and less than 7 is more acidic.
Resting pressure	The sub-bandage pressure experienced whilst the patient is at rest.
Standard care	The definition of standard care varied amongst the trials reported in the literature and has been described in reports of individual studies. In most instances, standard care for VLU consisted of wound cleansing with normal saline and/or water and a non-adherent dressing, either with or without compression therapy.
Venous disease	Venous disease is related to or caused by pathology or functional abnormality in the veins that leads to sluggish venous blood flow. Either superficial or deep veins may be affected. Pathology includes venous obstruction (e.g. from blood clotting), swelling of the veins or stretched/weakened venous valves.
Venous hypertension	Elevated blood pressure in the veins that occurs due to venous obstruction (e.g. due to plaque) or incompetent venous valves. Pooling of the blood in the veins leads to an increase in pressure and, in the long term, venous disease.
Venous tone	The degree of constriction experienced by a blood vessel relative to its maximal dilated state.
Venous leg ulcer (VLU)	Full-thickness defect of the skin that persists due to venous disease of the lower leg.
Working pressure	The sub-bandage pressure experienced as the patient walks.

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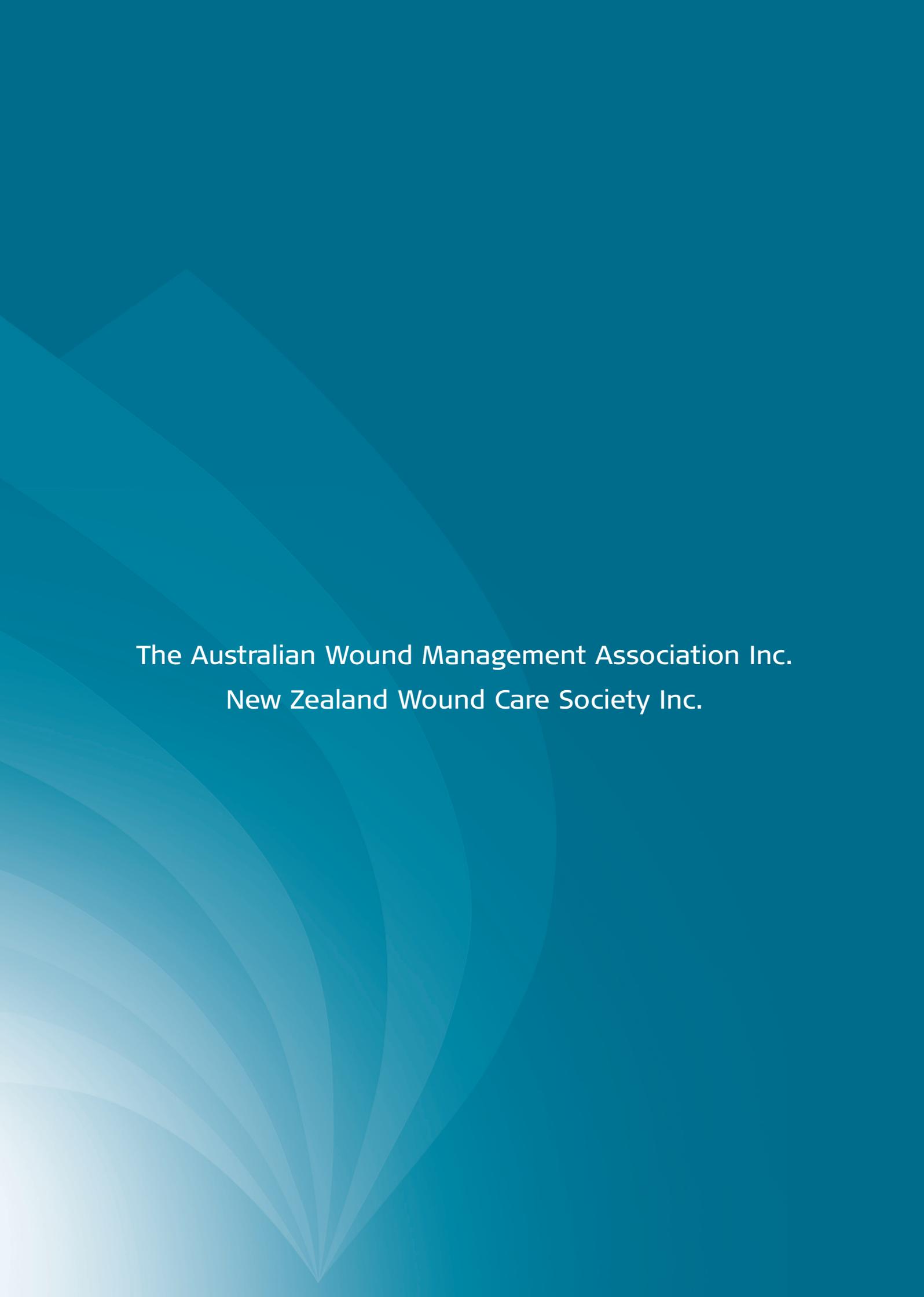
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## NOTES



The background is a solid teal color. On the left side, there are several overlapping, semi-transparent, curved shapes that fan out from the bottom left towards the center, creating a sense of depth and movement. These shapes are in various shades of teal, from light to dark.

The Australian Wound Management Association Inc.  
New Zealand Wound Care Society Inc.