### Royal Perth Hospital
**Nurse Practitioner – (Wound Management Services)**
**Clinical Practice Guideline (CPG)**
**Lower Leg Ulcers (Vascular)**

<table>
<thead>
<tr>
<th><strong>Scope</strong></th>
<th><strong>Outcomes</strong></th>
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| **Nurse Practitioner** | - Inpatient and outpatients with complex lower leg ulcers  
- Smooth coordination of complex cases with referral centres including Telehealth and continuing education | Identify patients suitable for NP CPG |

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<tr>
<th><strong>Exclusion Criteria</strong></th>
<th><strong>Outcomes</strong></th>
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| Refer to Vascular Consultant/Registrar in following situations:  
- Ischaemic limbs  
- Life/limb threatening infections | Patient will be reviewed by Vascular Consultant/Registrar |

### Initial assessment

#### Primary History
- Medical, surgical, allergy history  
- Wound history  
- Current medications (prescribed and over the counter)  
- Previous diagnostic investigations  
- Social and occupational history, including carer or home support  
- Physical mobility  
- Activities of daily living  

Identify patients not suitable for NP CPG → exit CPG

#### Focused clinical assessment

**Assess history of ulcer(s)**
- Duration of ulcer  
- Mechanisms of injury  
- Previous treatment  

**Assess for venous insufficiency**
- Family history of venous disease  
- Patient history of DVT  
- Lower leg fracture or other major leg injury  
- Previous venous surgery  
- Patient history of varicose veins  
- Prior history of ulceration – with or without compression bandaging  

**Assess for arterial insufficiency**
- History of intermittent claudication or rest pain  
- Hypertension  
- Heart disease, stroke, transient ischaemic attack  
- Diabetes mellitus  
- Smoking (or stopped less than 6 months)  

*(In mixed arterial/venous ulcers patients may present with a combination of the features described above)*

**Assess for** diabetes, rheumatoid arthritis, and systemic vasculitis  

**Assess for** correctable factors that may delay healing, including smoking, anaemia and evidence of malnutrition or poor nutrition  

**Assess for** pain and formulate plans that involve exercises (including ankle exercises) and leg elevation for venous ulcers and adequate analgesia irrespective of aetiology  

Patient is referred to service required
Physical examination of the wound and associated area/limb

Conduct lower limb examination of both legs
E.g. the presence varicose veins in venous disease

Examine for signs of arterial insufficiency:
- Lower skin temperature, auscultation of femoral bruit and pulses (weak or absent). Unilateral signs may be present where there is acute deterioration.

Assess for malignancy – can be a cause and may be a sequel of leg ulceration.

Signs suggestive of malignancy are: irregular nodular appearance of the surface of the ulcer, raised or rolled edge, raised granulation tissue above the ulcer base, failure to respond to treatment, rapid increase in ulcer size and abnormal pigmentation.

Assess the wound and surrounding tissue:
- The wound should be measured and photographed at regular intervals (medical photographer and patient consent obtained prior, photographs stored as per SMAHS policy)

Venous ulcers
- Usually moist, shallow ulcers (situated on the gaiter area of the leg; eczema, haemosiderin pigmentation, ankle oedema and ankle flare are often present, varicose veins, atrophie blanche and lipodermatosclerosis may be present

Arterial ulcers
- Have a punched out appearance, impaired tissue perfusion, +/- non-viable tissue, may be pale and desiccated; surrounding skin may be shiny and taut; dependent rubor present.

Lower limb pulses – palpable pulses alone are insufficient to rule out arterial disease

More generalised assessment as necessary
- Clinical features of the wound and skin
- Presence of other wounds/lesions
- Peripheral perfusion
- Neurological examination (e.g. using Semmes Weinstein 10g monofilament)
- Signs and symptoms of infection
- Footwear (diabetes, lower limb wounds)
- Physical and joint mobility

Explore differential diagnosis
# Working diagnosis and Investigations

<table>
<thead>
<tr>
<th>Investigations</th>
<th>Outcomes</th>
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<tbody>
<tr>
<td>Ankle Brachial Pressure Index (ABPI)</td>
<td>Objective evidence to substantiate the presence or absence of peripheral arterial disease (except in those with calcified vessels)</td>
</tr>
<tr>
<td>Toe Pressures (PPG)</td>
<td>Toe pressures are more reliable in patients with calcified vessels</td>
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## Imaging

- Arterial duplex scan in consultation with Vascular Surgeon/Registrar
- Venous duplex scan in consultation with Vascular Surgeon/Registrar
- Venous phlethysmography
- X-Ray

## Pathology

### Histopathology

- Full Blood Picture, CRP
- Urea and Electrolytes
- Liver Function Test (total protein, albumin, pre-albumin)
- Glucose, HbA1C
- Lipids
- Wound swab, wound fluid for microscopy, culture and sensitivity (MC&S)
- Wound/tissue biopsy MC&S +/- Histopathology
- Skin scraping, immunofluorescence

**Note:** Routine bacteriological swabs are unnecessary unless there is clinical evidence of infection

### Biopsy

This may be required if the wound has been non-healing for 4-6 weeks with optimal treatment; is assessed atypical, or has been present greater than 6 months.

### Debridement:

Low Frequency Ultrasonic Debridement if clinically indicated

## Interpretation of results (diagnostic features) and management decisions

### Diagnosis

Make a provisional diagnosis, on clinical picture, assessment and results of investigations.

- Determined treatment plan and optimise healing

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### Referral
- **Urgent referrals for:**
  - Life/limb threatening infection
  - Abnormal test results that require medical intervention
  - Treatment outside the NP scope of practice
  - New patient with a ABPI <0.7 mmHg or ankle systolic <80 mmHg
  - DVT
  - Patient that requires surgical intervention
  - Ulcers on the planter aspect of the foot to have immediate Podiatry referral
  - Significant deterioration in wound since last review

If the wound fails to heal despite optimal therapy then referral to other health care providers and further investigations may be required.

### Patient Discharge Education

<table>
<thead>
<tr>
<th>Follow-up Appointments</th>
<th>Outcomes</th>
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<tbody>
<tr>
<td>Verbal and written instructions from NP</td>
<td>Ensure patient understands problem, treatment and follow up plan</td>
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<tr>
<td>Follow up appointment will be made by clinic clerk or NP’s Secretary</td>
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<tr>
<th>Medication Education</th>
<th>Outcomes</th>
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<tr>
<td>Verbal instructions from NP</td>
<td>Patient will be informed</td>
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<tr>
<td>Contact Clinical Pharmacist to provide medication education for patient when available. Written information as per the Hospital Pharmacy on medications dispensed.</td>
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<tr>
<th>Certificates</th>
<th>Outcomes</th>
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<tr>
<td>Absence from work certificates</td>
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<tr>
<td>WC certificate signed by RMO</td>
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<tr>
<td>Patient Assisted Transport Scheme Forms</td>
<td></td>
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<tr>
<td>Other certificates as deemed appropriate</td>
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### Medications

All medication will be stored, labelled and dispensed in accordance with hospital policy and relevant legislation.

See protocol 3

### Punch biopsy
- Lignocaine (7mg/kg) with Adrenaline (5 micrograms/ml)
- Lignocaine 1% adrenaline 1:100 000 5mL
- Lignocaine 1-2%, 5mL
- Max 3mg/kg

### For infiltration 1-2 mL is sufficient to provide anaesthesia and will not distort the histology
- Lignocaine with adrenaline should not be used on an extremity such as a digit, especially in the presence of arterial disease, to avoid potential tissue necrosis.

### Low Frequency Ultrasonic Debridement
- Emla Cream 5% topically at least 60 minutes prior to procedure
### Stasis/contact dermatitis

**Mild**
- Hydrocortisone acetate 1% cream or ointment 30g. Apply once or twice daily.

**Moderate**
- Betamethasone Valerate 0.02%, 0.05% cream or ointment. Apply once or twice daily.

### Soft tissue infection

**Empirical antibiotics to be commenced whilst waiting for sensitivities**

Gram-negative organisms often colonise ulcers. Therefore for less severe infections antibiotics against gram positive organism should be used initially. If the infection is not responding then review by medical practitioner is required.

**Prescribing quantities as per PBS.**

**For mild to moderate infection** with surrounding cellulitis, use:
- Di/Flucloxacillin 500 mg orally 6-hourly for at least 5 days

**For patients hypersensitive to penicillin (excluding immediate hypersensitivity), use:**
- Cephalexin 500mg 6-hourly for at least 5 days

The patient should be told to seek medical attention should diarrhoea occur.

**For mild to moderate infection** with surrounding cellulitis, use:
- Di/Flucloxacillin 500 mg orally 6-hourly for at least 5 days

**For Patients with Diabetic Foot Ulcers:**

**For mild to moderate infection** with no evidence of osteomyelitis or septic arthritis, use:
- Amoxycillin+clavulanate 875+125mg orally, 12-hourly for at least five days
  
  Or
  
  - Cephalexin 500mg orally, 6-hourly for at least five days
  
  Plus
  
  - Metronidazole 400mg orally, 12-hourly for at least five days

The routine use of antibiotics is not advocated in chronic wounds.

Antibiotics to be commenced only when there is clinical evidence of infection e.g. localised erythema, localised pain, localised heat, cellulitis, and oedema.

For medical review if no clinical improvement within one week (next visit) or to seek medical attention via GP prior to this if symptoms worsen. Prolonged courses (>14 days) should not be given without medical review as resistance selection will occur.

For more severe infections, particularly where systemic symptoms are present, and for, intravenous antibiotics, medical review will be required.
Inform patients that nausea, diarrhoea and metallic taste
an adverse effect whilst taking metronidazole. To seek 
medical attention for nausea and diarrhoea.

For patients with immediate penicillin hypersensitivity 
contact a Clinical Microbiologist or Infectious Disease 
Physician

Antibiotic susceptibilities 
of gram negative 
organisms should be 
reviewed and advice 
obtained from a clinical 
Microbiologist or ID 
Physician. Exit CPG

For severe limb- or life-
threatening infection 
(systemic toxicity/septic 
shock, bacteraemia, 
marked 
necrosis/gangrene, 
ulceration to deep tissues, 
severe cellulitis, presence 
of osteomyelitis). Medical 
review is required. Exit 
CPG

Patients must be informed of the adverse effect of 
diarrhoea with a risk of pseudomembranous colitis, whilst 
taking antibiotics. Patients must be told to report these 
side effects and seek medical attention.

**Tinea**

Clotrimazole 1% cream, or lotion (topically), twice daily for 
2 to 4 weeks, continued for 14 days after symptoms 
resolved

**Analgesics**

Prescribing 

quantities as per 
PBS.

**Mild Pain:**

- Paracetamol 1000mg 4-6 hourly maximum daily dose 
  4000mg

**Mild to moderate pain:**

- Paracetamol with Codeine 500/30mg 1-2 tablets 4 to 
  6 hourly maximum daily dose 4000mg paracetamol
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References

Australian and New Zealand Clinical Practice Guideline for Prevention and Management of Venous Leg Ulcers (2011).


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### Authorship and endorsement

(This Guideline has been developed in collaboration with the WADH Review Committee)

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<thead>
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### Key to terms

- Lower Leg Ulcer flow Chart
- Management pathway for the use of compression therapy
- Compression bandaging systems

### Date revised: 30th October 2014

**Review date:** Should be 3 years from approval date
1. Assessment

Patient History
- Medical history/Co-morbidities
- Wound History
- Current medications
- Social and occupational history
- Activities of daily living

Physical examination
- General health assessment
- Clinical features of wound and skin
- Presence of other wounds/lesions
- Examination of peripheral pulses
- Signs of autoimmune disease eg Rh Arthritis, SLE
- Neurological examination
- Signs of presence of infection eg lymphangitis, lymphadenopathy
- Exclude neoplastic disease

Investigations – as indicated
- ABPI/Doppler signal characteristics/Toe pressures
- Duplex scan
- Photoplethysmography (PPG)
- Full blood examination
- Blood glucose levels, HBA1C, other haematology, biochemical tests
- Wound swab
- Wound biopsy (see ‘Minor surgical procedures’ protocol)

Consider conditions for urgent referral e.g.
- Ischaemic limb/s
- Serious infection
- Diabetic foot infection

2. Diagnosis

Differential diagnosis
- Venous
- Mixed
- Arterial
- Vasculitic, Neuropathic, Infective, Neoplastic, Other

3a. Conditions for specialist referral
- Urgent conditions as indicated above
- Treatment outside of NP scope of practice e.g. cellulitis, surgical intervention required
- ABPI < 0.7

3b. Treatment options / Conditions for NP treatment

Non-pharmaceutical approaches
- Appropriate dressings and graduated compression therapy
- Debridement (see ‘Minor surgical procedures’ protocol)

Pharmaceutical agents as indicated
- Analgesics
- Antibiotics
- Topical antimicrobials
- Local Anaesthetic
- Topical corticosteroids

Patient education for self care
- Hygiene
- Diet
- Foot inspection (diabetes)
- Dressings/Bandaging/Compression
- Exercise regimes

3c. Integrated management of co-morbidities
Includes diabetes, autoimmune disease, cardiac failure
Medical:
- General Practitioner
- Vascular surgeon
- Dermatologist
- Infectious diseases physician
- Plastic surgeon
- Pain Management
- Endocrinologist

Allied Health:
- Dietitian
- Podiatrist/Orthotist
- Pharmacist
- Other health professionals as required

4. Follow-up
- Review as appropriate
- Test results
- Monitor progress
- Maintenance of healed wound
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**Presentations**
- Patient presents with suspected venous leg ulcer

**Assessment**
- Predisposing factors for CVI / VLU
  - Confirmed venous disease
  - History of DVT, PE
  - Varicose veins
  - Obesity
  - Family history of CVI/VLU
  - Trauma/Surgery to the legs
  - Poor calf muscle pump function
  - Prolonged sitting / standing
  - Multiple pregnancies
- Leg changes associated with CVI/VLU
  - Haemosiderosis
  - Lipodermatosclerosis
  - Inverted ‘Champagne bottle’ appearance
  - Evidence/history of previous ulcers
  - Dilated, tortuous superficial veins
  - Atrophie blanche (stippled white scar-like tissue)
  - Eczema
  - Hyperkeratosis
  - Ankle flare
- VLU location
  - Generally lower third of leg (gaiter region)
  - Classically medial or lateral malleolus
- VLU characteristics
  - Irregular shape
  - Ruddy granulation tissue
  - Predominantly viable tissue
  - Moderate – high exudate
- Investigations for CVI/VLU
  - Ankle Brachial Pressure Index (ABPI)
  - Duplex ultrasound
  - Photoplethysmography
  - Pulse oximetry
  - Toe Brachial Pressure Index (TBPI)

**Diagnosis**
- Diagnosis = Clinical Presentation + Vascular Investigations
  - Venous Leg Ulcer
    - Presence of multiple/ overt factors from A-D
    - ABPI 0.8-1.2 (Note: normal ABPI does not confirm CVI)
    - Confirmed CVI via Duplex ultrasound
  - Mixed venous/arterial leg ulcer
    - Factors from A-D present with concurrent factors of peripheral arterial disease
    - ABPI 0.6-0.8
  - Arterial leg ulcer
    - Absence of factors from A-D
    - Presence of factors of peripheral arterial disease
    - ABPI <0.6

**Management**
- Graduated Compression therapy
  - Aim for > 30mmHg (elastic) or high stiffness system (inelastic)
- Maintain leg health
  - Leg elevation
  - Encourage regular heel-toe walking/exercise
  - Optimise nutrition and hydration
  - Avoid prolonged standing
  - Regular skin cleansing and moisturising
  - Treat eczema as required
- Modified/Light compression
  - Aim for < 23mmHg (elastic) or high stiffness system (inelastic)
- Maintain leg health
  - Leg elevation
  - Encourage regular heel-toe walking/exercise
  - Optimise nutrition and hydration
  - Avoid prolonged standing
  - Regular skin cleansing and moisturising
  - Treat eczema as required

**Prevention of Recurrence**
- Lifelong commitment to graduated compression
  - Compression hosiery
  - Maintain leg health
  - (continue as per management)
  - Seek professional advice for any new wound or skin integrity problem

**When to refer on:**
- Ischaemic Limbs
- Serious infection
- Ulcer fails to heal (no reduction in size in 6/52)

**Refer to:**
- Vascular or Leg Ulcer Specialist
  - DO NOT APPLY COMPRESSION

**Other diagnosis includes but not limited to:**
- ABPI >1.2
- Ulceration in absence of factors indicating venous or arterial disease

**Refer to:**
- Vascular or Leg Ulcer Specialist
  - DO NOT APPLY COMPRESSION UNLESS INSTRUCTED TO BY SPECIALIST

**Reproduced with kind permission from Ms Sue Templeton, NP Clinical Practice Consultant - Advanced Wound Specialist RDNS SA**

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