

# Managing leg ulcers

## – it's not rocket science

Andrew Jull RN MA(Appl) and Julie Betts RN NP<sup>TM</sup> MN

Correspondence to: [a.jull@ctr.u.auckland.ac.nz](mailto:a.jull@ctr.u.auckland.ac.nz)

**Andrew Jull** is a Research Fellow at the Clinical Trials Research Unit in the School of Population Health at the University of Auckland, Editor for the Cochrane Wound Review Group, and Co-editor of Evidence Based Nursing. He led the development of the New Zealand Leg Ulcer Guidelines and his current research projects include the HALT Trial, an HRC-funded multicentre randomised controlled trial evaluating the effectiveness of manuka honey in addition to compression for venous leg ulcers. He is the author of book chapter on drug treatments for venous leg ulcers in the forthcoming book 'Leg ulcers – A problem based learning approach'.

**Julie Betts** is a nurse practitioner in wound care for Waikato District Health Board. Her role focuses on the management of patients with chronic or complex wounds, in both delivering direct patient care and service development to support best practice and maximise patient outcomes. She is currently establishing specialist wound/leg ulcer clinics throughout Health Waikato. Previous Chairperson of New Zealand Wound Care Society, founding member of the International Union of Wound Healing Societies. She is currently a member of the education committee, International Union of Wound Healing Societies and the National Leg Ulcer Working Party (NZ).

A leg ulcer is generally considered to be a wound with tissue loss on the lower leg, including the foot, which has not healed within four to six weeks of injury or opening of the wound. Internationally chronic venous insufficiency is the causative aetiology for 50% of all leg ulcers, with mixed venous/arterial disease accounting for up to another 20% of ulcers. Arterial ulcers, diabetic ulcers and ulcers caused by a mix of all three account for the remainder. Although this information is derived from international literature, there is no reason to suppose New Zealand differs significantly.

The period prevalence of leg ulcers in New Zealand over the course of a year is 0.78/1000 population.<sup>1</sup> This is lower than other countries and capture-recapture analysis (which estimates the number of missed cases) suggests the figure is an underestimate of the actual prevalence.<sup>2</sup> Prevalence of leg ulceration increases dramatically with age, although ulcers can occur in quite young people and there are records of people suffering with venous ulcers for up to 60 years. Leg ulcers have considerable impact on people's quality of life in comparison to the general population; the impact is of an order similar to that of diabetes and arthritis.<sup>3</sup>

The management principles for leg ulceration are relatively simple; identify the underlying condition, correct or palliate the condition, and include other members of the health

team as appropriate. Diabetic ulcers are best considered as part of the broader issue of managing the diabetic foot and so are not considered in this paper. A guideline for managing leg ulcers is available from the New Zealand Guidelines Group website ([www.nzgg.org.nz](http://www.nzgg.org.nz)).

### Community diagnosis of leg ulceration

Diagnosis is usually clinical in primary and community care. Given that venous insufficiency is the most common presentation, this condition should be ruled out first. Apart from the presence of varicose veins, several other clinical features point to venous disease:

- **Ankle flare** – dilated venules and venular capillaries are often observed in the area adjacent to the medial malleolus extending downwards to the sole of the foot.
- **Skin hyperpigmentation** – the extrusion of red blood cells through capillaries releases haemosiderin, causing purple through to brown discolouration (depending on the age of the deposition) usually observed extending from above the malleolus to mid-calf.
- **Venous eczema** – skin surrounding may be dry, flaky or scaly or more vesicular and weeping.
- **Lipodermatosclerosis** – progressive fibrosis giving the legs a 'woody' induration above the ankle and the appearance of inverted champagne bottles (so called 'champagne legs').

- **Atrophie blanche** – slightly grey or white depressed patches millimetres in diameter, generally found around and above the medial malleolus.
- **Pain** – approximately 30% of patients with venous ulcers will also have a painful ulcer.
- **Venous ulcers** are usually shallow, moist, irregular in shape and commonly occur in the area defined by the lower third of the calf to 2.5cm below the malleoli.

The patient may have a history of DVT, leg trauma (fracture, crush or major laceration), treatment for varicose veins, prior history of ulceration or family history of venous disease.

In order to rule out arterial insufficiency, inflow should be assessed using a handheld Doppler to determine the Ankle Brachial Index (ABI). Simple palpation for ankle pulses is inadequate. An ABI is the ratio of systolic blood pressure at the arm over that at the ankle; a ratio of  $\geq 0.8$  usually rules out significant arterial disease. District nurses can obtain an ABI if venous ulceration is suspected. If the ABI is 0.6–0.8, mixed disease is present and further vascular studies may be indicated, especially if the clinical picture does not suggest venous disease. Arterial ulcers have a punched out appearance, a poorly perfused base often covered with slough, and are pale and dry. The surrounding skin is often taut and shiny, with dependent rubor. Symptoms of rest pain at night or intermittent claudication with walking usually accompany arterial ulceration. An ABI  $< 0.6$  indicates arterial ulceration.

Malignancy can also be both a cause of ulceration and a sequel of venous ulceration. Some yet-to-be-published research has found the prevalence of non-melanoma skin cancers in leg ulcer patients is four times that of the general population. Patients with ulcers that have an irregular nodular appearance, or a raised or rolled edge, or fail to re-

spond to treatment, should be investigated for squamous cell or basal cell carcinomas.

Leg ulcers commonly occur in patients who have rheumatoid arthritis. The underlying aetiology of rheumatoid ulcers is multi-factorial and may be due to poor venous return, vasculitis and/or arterial insufficiency. Rheumatoid ulcers clinically appear the same as venous, arterial or vasculitic ulcers depending on which underlying aetiology is predominant. They can be large, shallow and granulating, or deep, punched out and sloughy, or a combination of all of these. Rheumatoid ulcers are usually painful. Due to the complex nature of these ulcers specialist assessment is recommended.

## Treatment

Treatment follows accurate identification of aetiology. External compression for leg ulcers is the mainstay of venous ulcer management. It was probably Richard Wiseman (1622–1676), surgeon to Charles II, who appreciated the relationship between ulceration and circulatory pathology. Wiseman coined the term ‘varicose ulcer’ and developed a laced stocking made of dog leather to compress the leg and eliminate venous oedema.

There are many ways of applying compression: compression stockings, short-stretch bandages or inelastic systems, rigid paste systems (e.g. Unna’s boot) and multilayer elastic bandages (see Box 1). Each system has its proponents, although multilayer bandages are thought to be easier to apply and maintain consistent levels of compression. Multilayer bandages are probably also more effective than single layer bandages. However, multilayer bandages are generally left on for a number of days and are thrown away once removed, whereas short-stretch bandages are reusable. The chief consideration, apart from patient values, is to get patients into as high a level of compression bandage as they can

tolerate. Bandaging systems that achieve high levels of compression are more effective at healing venous ulcers.<sup>4</sup> In order to reduce variation of bandaging pressures, staff who have received training in their application should apply compression bandages. Compression bandaging is usually available through district nursing services.

Venous ulcers can occur in the presence of arterial disease (ABI 0.6–0.8) and these ulcers can still be treated with compression. However, such patients should receive lighter compression and be closely monitored for any signs of arterial compromise. While increases in pain can signal the onset of infection, pain could in these patients also indicate critical ischaemia. Patients with mixed

### Box 1. Compression systems

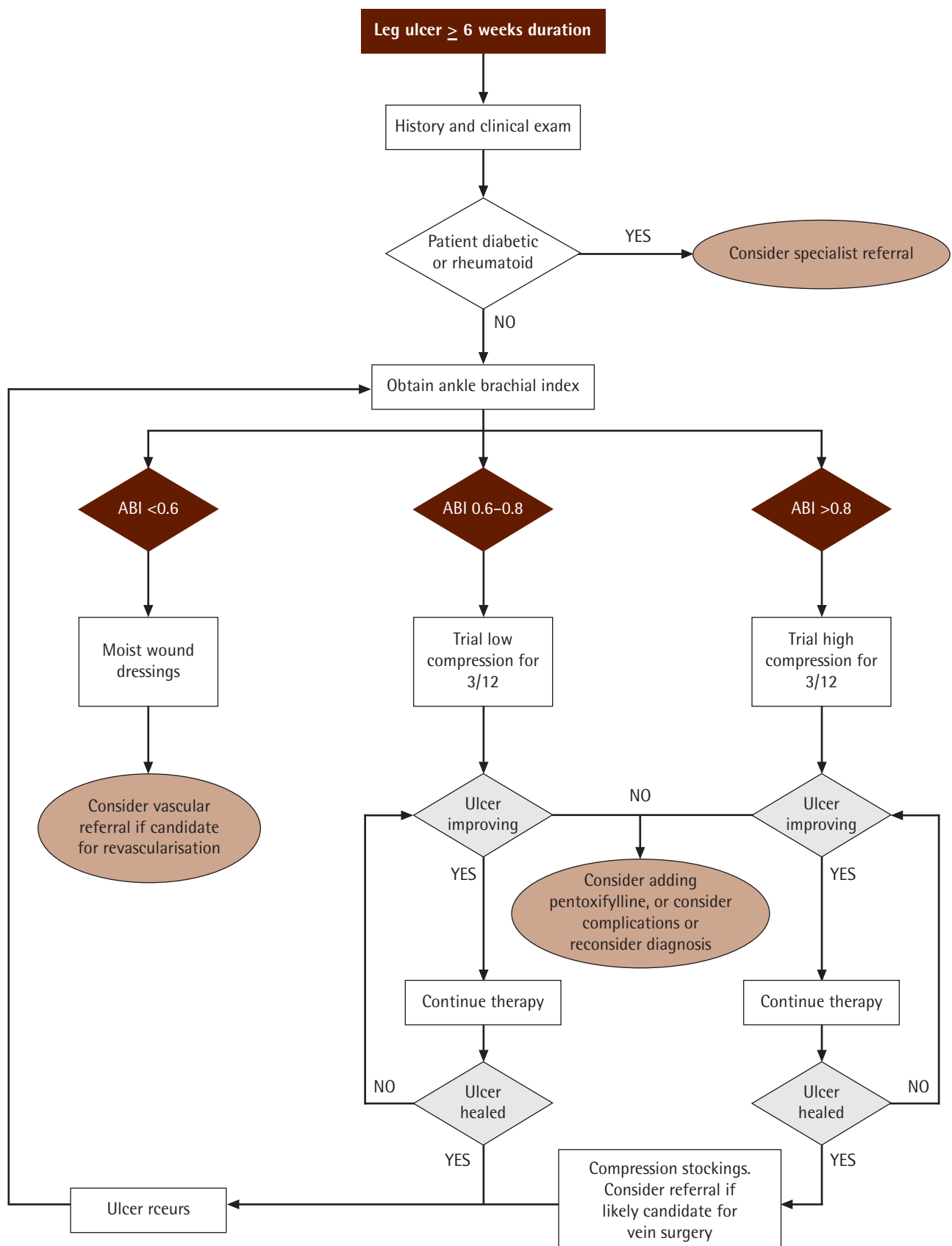
#### Single layer systems

- **Class 3a:** light compression. Bandages that apply 14–17mmHg at the ankle.
- **Class 3b:** moderate compression. Bandages that apply 18–24mmHg at the ankle.
- **Class 3c:** high compression. Bandages that apply 25–35mmHg at the ankle when applied as a simple spiral.

#### Multilayer systems

- **Short-stretch/inelastic:** orthopaedic wool plus 1–3 rolls of short-stretch bandage.
- **Unna’s boot:** zinc oxide paste bandage plus support bandage.
- **Three layer elastic multi-layer:** orthopaedic wool plus class 3c bandage plus shaped tubular bandage.
- **Four layer elastic multi-layer:** orthopaedic wool plus support bandage. plus class 3a bandage plus cohesive bandage.

Figure 1. Treatment algorithm for leg ulceration



venous-arterial ulcers should be instructed to remove their bandages if increasing pain is present and to contact a health professional as soon as possible.

Topical treatment of venous ulcers is not complex. The ulcers can be cleansed with either sterile saline or drinking quality tap water. Patients can remove their bandage and bathe immediately prior to the visit by the district nurse to reapply the bandage. Necrotic tissue can be debrided and simple non-adherent dressings applied underneath compression. Routine topical antibiotics are unnecessary and topical agents should generally be avoided, as patients with venous ulcers are very prone to contact dermatitis. Dermatitis will usually resolve following removal of common sensitisers and treatment with a topical steroid (see Box 2). The patient should also be encouraged to exercise regularly (i.e. walking), elevate their leg above the heart when resting, and to include adequate amounts of protein in their diet.

Although there are many adjuvant treatments for venous ulcers, there is an absence of evidence for most. Laser therapy, ultrasound, electromagnetic therapy, honey and silver dressings, larval therapy (maggots – also called biosurgery), hyperbaric oxygen, intermittent pneumatic compression, skin grafting, topical warming and negative pressure dressings remain treatments that should be considered cautiously and on a case-by-case basis.

The mainstay of managing arterial ulcers is to improve peripheral arterial inflow. Advances in technology mean less invasive options to surgery, such as angioplasty, are now available. Patients with arterial ulcers should be referred to a vascular specialist as a priority, particularly in cases where the ABI < 0.5. Pain control can be a challenge and patients experiencing resting pain may require the use of opiates. Topical treatment of arterial ulcers should focus on removing slough or necrotic tissue,

reducing the risk of infection, and comfort. Compression therapy is contra-indicated.

Management of rheumatoid ulcers depends on the underlying aetiology. Assessment by a specialist in leg ulcer management or vascular specialist is recommended. Improvement in peripheral arterial inflow, venous return and optimal management of the rheumatoid arthritis is required to heal these ulcers. If compression bandaging is required it should be applied with care to avoid damage to bony prominences, which are more susceptible to trauma in patients with rheumatoid arthritis due to dermal thinning. Topical treatment of rheumatoid ulcers should focus on removing slough and necrotic tissue, reducing the risk of infection and comfort.

### Prognosis

About five out of every 10 people will still have a venous ulcer after 12 weeks of compression bandaging, and these patients comprise a cohort that may benefit from adjuvant treatments. However, it has not been possible to identify these patients until relatively recently. Although the velocity of wound closure has been reported as a prognostic index, a more simple method exists that discriminates between normal healers and patients likely to remain unhealed even after 24 weeks of compression bandaging.<sup>5</sup> This prediction rule allocates 1 point each for wounds that are greater than 5cm<sup>2</sup> (ulcer area determined by measuring maximum length and width) and ulcer duration greater than six months. Thus an ulcer can be scored 0, 1 or 2. If an ulcer is scored 0, one patient in 20 will remain unhealed at 24 weeks; if an ulcer is scored 1, three to four patients in 10 will remain unhealed at 24 weeks, and if an ulcer is scored 2, between six and seven patients in 10 will remain unhealed at 24 weeks. This prediction rule is accurate about 80% of the time.

### Box 2. Common sensitisers

- Wool alcohols, amercinol L101 (bath additives, creams, emollients)
- Parabens (medicaments, creams)
- Cetyl alcohol, stearyl alcohol (creams, ointments)
- Fragrance mix, balsam of Peru (bath oils, moisturisers, baby products)
- Colophony, ester of rosin (adhesive bandages and dressings)
- Neomycin, framycetin, bacitracin

### Box 3.

**Pentoxifylline** (Trental) is rheological agent that has been available since the 1970s. Although results from individual trials are varied, an update of a Cochrane review found an overall effect in favour of pentoxifylline for trials where the drug was used in addition to compression. It may also be effective in patients who refuse or cannot tolerate compression. Pentoxifylline is generally well tolerated; the most common side effects are gastrointestinal.

The prediction rule gives a good indication of how long a patient might have to stay in compression. If a patient's ulcer is scored 2, then a protracted healing time is quite likely. The advantage of the prediction rule is that it allows the early identification of patients who are unlikely to heal with simple compression, so that such patients should be considered for adjuvant drug treatments. Such adjuvants are few (e.g. Daflon) and are not generally available in New Zealand. However, pentoxifylline (Trental) is available; its use has been reported in 11 published trials and is associated with a 70% increase in healing rates (RR 1.72, 95% CI 1.31–

2.26).<sup>6</sup> Pentoxifylline can be obtained on GP application to HBL, but is only registered for use in patients with post-thrombotic ulcers that have been unsuccessfully treated with compression for 16 weeks.

### Prevention

Once a venous ulcer has healed, patients will need to go into compression stockings. Compression stockings have been shown to halve the five-year risk of ulcer recurrence.<sup>7</sup> Strong compression stockings (providing 25–35mmHg at the ankle) reduce the risk of recurrence slightly

more than lighter compression stockings (providing 18–24mmHg at the ankle), but more patients are likely to be compliant with the lighter grade of compression stocking. However, patients should be encouraged to wear the highest grade of compression they can tolerate. The stockings are now available in a variety of colours, but usually will need to be paid for by the patient.

Vein surgery is another option that could be considered once a patient's ulcer has healed. Although surgery does not influence healing rates in patients with active ulceration, vein sur-

gery has been shown to reduce 12-month ulcer recurrence by more than half.<sup>8</sup> This effect may be limited to patients with superficial or mixed superficial and segmental deep reflux.

### Competing interests

Andrew Jull was the principal investigator for the HALT (Honey as Adjuvant Leg ulcer Therapy) Trial (ISRCTN 06161544), which received free product and an unconditional cash contribution to the operational conduct of the trial from Comita NZ Ltd. Julie Betts, no competing interests declared.

### References

1. Walker NK. Epidemiological studies of leg ulcers in Auckland, New Zealand [PhD]. University of Auckland, 2000.
2. Walker NK, Vandal AC, Holden JK, Rodgers A, Birchall N, Norton R, et al. Does capture-recapture analysis provide more reliable estimates of the incidence and prevalence of leg ulcers in the community. *Aust NZ J Public Health* 2002; 26(5):451–455.
3. Jull A, Walker N, Hackett M, Jones M, Rodgers A, Birchall N, et al. Leg ulceration and perceived health: A population based case-control study. *Age Ageing* 2004; 33(3):236–241.
4. Cullum N, Fletcher AW, Nelson EA, Sheldon TA. Compression bandages and stockings in the treatment of venous ulcers (Cochrane Review). *Cochrane Database Syst Rev*. Oxford: Update Software, 2000.
5. Margolis DJ, Berlin JA, Strom BL. Which venous leg ulcers will heal with limb compression bandages? *Am J Med* 2000; 109:15–19.
6. Jull AB, Waters J, Arroll B. Oral pentoxifylline for treatment of venous leg ulcers (Cochrane Review). *Cochrane Database Syst Rev* [In press].
7. Vandongen YK, Stacey MC, Rashid P. The effect of compression stockings on venous ulcer recurrence. *First World Wound Healing Congress*; 2000, 10–13 September; Melbourne.
8. Barwell JR, Davies CE, Deacon J, Harvey K, Minor J, Sassano A, et al. Comparison of surgery and compression with compression alone in chronic venous ulceration (ESCHAR study): randomised controlled trial. *Lancet* 2004; 363(9424):1854–9.

## Disciplinary Action by Medical Boards and Prior Behavior in Medical School

*'In this case-control study, we found that physicians who were disciplined by state medical-licensing boards were three times as likely to have displayed unprofessional behavior in medical school than were control students. This association was observed among graduates of three geographically diverse medical schools, both public and private, and among 40 state licensing boards. Unprofessional behavior as a student was by far the strongest predictor of disciplinary action. Furthermore, the types of unprofessional behavior displayed by students were associated with subsequent disciplinary actions. Among students who were subsequently disciplined, the most irresponsible had a risk of later disciplinary action that was eight times as high as that for control students, and those who were the most resistant to self-improvement had a risk of later discipline that was three times as high as that for controls. Among students who were subsequently disciplined, students with low MCAT scores and those with low grades in the first two years of medical school were also at risk for future disciplinary action, but these were associated with, at most, only one quarter of the risk attributed to unprofessional behavior. Recent objectives for undergraduate and graduate medical education provided by the Association of American Medical Colleges and the Accreditation Council for Graduate Medical Education include professionalism as a core "competency." Our study provides empirical support for its inclusion and also provides concrete data regarding what is meant by unprofessional behavior.'*

Papadakis MA, Teherani A, Banach MA et al. *Disciplinary Action by Medical Boards and Prior Behavior in Medical School*, *New Eng J Med* 2005; 353:2673–2682.