

# Venous Leg Ulcers: Infection Diagnosis & Microbiology Investigation

Association of  
Medical Microbiologists

Quick Reference Guide for Primary Care  
For consultation and local adaptation



- Venous leg ulcers affect 1.7% of those  $\geq 65$  years.<sup>1</sup>
- A  Compression bandaging is the recommended treatment to heal uncomplicated venous leg ulcers.<sup>2-5</sup>
- All venous leg ulcers contain bacteria; most are colonisers, but some cause clinical infection.<sup>6</sup>
- B  Microbiology investigations should only be undertaken when there are clinical signs of infection.<sup>3</sup>

## TAKING A MICROBIOLOGICAL SAMPLE

### What can a microbiological sample from a venous leg ulcer tell me?

- A The organisms present and their antimicrobial susceptibilities only. Microbiology swab samples cannot be used to determine the presence of infection in a leg ulcer, as this is a clinical diagnosis.<sup>[a]5-7</sup>

### When should I sample a venous leg ulcer?

When clinical criteria indicate that infection is present:<sup>[b]4,7</sup>

- A  Increased pain
  - A  Enlarging ulcer
  - Cellulitis
  - Pyrexia.
- A microbiology sample should only be taken when antimicrobials are indicated. The sample should be taken before antibiotics are started.<sup>4,8</sup>
- B Routine bacteriology sampling should not be undertaken.<sup>[c]3,5</sup>

### How should I sample a venous leg ulcer for microbiology investigation?

**Wound swabs** offer ease-of-use, low cost and recent studies indicate they give similar results to **tissue biopsies** that were previously considered the gold standard.<sup>[d]9,10</sup>

- D 1. **Use a swab with** transport medium and charcoal, to aid survival of fastidious organisms.<sup>8,11</sup>
  - D 2. Cleanse the wound with tap water or saline to **remove surface contaminants.**<sup>[e]12</sup>
  - D 3. **Slough and necrotic tissue should also be removed.**<sup>4,9</sup>
  - D 4. Swab **viable tissue** displaying signs of infection whilst **rotating the swab.**<sup>[f]</sup>
- With all specimens include all clinical details (about patient, ulcer and current or recent treatment) to enable accurate processing and reporting of the specimen.

**Transport specimens to the laboratory as soon as possible to aid survival of fastidious organisms.**

## INTERPRETING THE LABORATORY REPORT

### How do I interpret the laboratory report?

**Organisms isolated and amount of growth:**

- Group A  $\beta$ -haemolytic streptococci can be associated with significant infection and delay healing.<sup>9,13</sup>
  - The significance of other organisms depends on the presence of the clinical criteria above.
  - B  Bacterial colonisation of wounds is not considered to adversely affect healing.<sup>[d]3,13</sup>
- Antibiotic susceptibilities:** The inclusion of antibiotic susceptibilities on the report does not necessarily mean that an organism is significant or that it requires antibiotic treatment.

### How do I treat a wound that is clinically infected?

**Systemic antibiotics** are indicated in the **presence of cellulitis or clinical infection.**

**First line treatment:** Empirical therapy with **oral flucloxacillin** (erythromycin if penicillin-hypersensitive) **500mg, four times a day, for 7 days.** Review after 3 days in light of the microbiology results.<sup>4</sup>

Refer to local microbiology laboratory for MRSA treatment recommendations.

Refer to Clinical Knowledge Summary guidelines for treatment protocols: [Venous Leg Ulcer](#) & [Cellulitis](#)

**KEY**    **A**    **B**    **C**    **D**    **indicates grade of recommendation**     **good practice point**

This guidance was produced by the South West GP Microbiology Laboratory Use Group in collaboration with the Association of Medical Microbiologists, GPs and experts in the field and is in line with other UK GP guidance including Clinical Knowledge Summaries.

## Notes

- [a]: A HTA systematic review<sup>7</sup> has been conducted to look at sampling and treating infected diabetic foot ulcers (but also included studies on venous leg ulcers due to the expectation of only a limited number of relevant studies). This review identified one study addressing the diagnostic performance of specimen collection techniques,<sup>14</sup> which suggested that wound swabs were not a useful tool for identifying infection in chronic wounds (defined as  $>10^5$  CFU per gram of tissue).
- [b]: The HTA review by Nelson *et al.*,<sup>7</sup> addressed the diagnostic performance of clinical examination in the identification of infection: only one relevant study was identified.<sup>15</sup> The validity of classic signs of infection (pain, erythema, oedema, heat and purulent exudate) and signs specific to secondary wounds (serous exudate plus concurrent inflammation, delayed healing, discolouration of granulation tissue, friable granulation tissue, pocketing of the wound base, foul odour and wound breakdown) were investigated. Infected ulcers were defined as those with  $10^5$  or greater organisms per gram of viable tissue or wounds containing  $\beta$ -haemolytic *Streptococcus*. Only increasing pain and wound breakdown were identified as valid predictors of infection. Purulent exudate was found to be a very poor predictor of infection. This study was based on a small number of patients (n=36) and included a variety of wound types, only 7 of which were venous ulcers and therefore the findings should be treated with caution.<sup>7</sup> Cellulitis is an acute spreading infection which extends into the subcutaneous tissue and pyrexia is a recognised characteristic of infection, although it can be due to non-infectious causes.<sup>16</sup>
- [c]: Microbial contamination of leg ulcers is universal but is not thought to adversely affect healing. Routine bacteriology is therefore of no benefit.<sup>3,5</sup> Nelson *et al.*, found no trials that compared empirical antibiotic treatment with treatment following diagnostic tests.<sup>7</sup> Davies *et al* have shown that percentage change in ulcer surface area at 4 weeks in an uninfected ulcer was the greatest predictor of long-term healing ( $p<0.001$ , and bacterial burden nor bacterial diversity added extra information to this in a healing predictive model.<sup>10</sup> When bacterial burden and diversity were used alone in the healing model they did predict long-term healing, but are an unnecessary investigation if the simpler parameter of ulcer size can be used.
- [d]: Quantitative tissue biopsy has been considered to be the gold standard for identifying infecting organisms present in the deep tissue of wounds.<sup>9</sup> However, tissue biopsy is unavailable in many settings and is skill-intensive for both the laboratory and the clinician, and invasive for patients.<sup>17</sup> Wound swabs are suggested here as a practical alternative as more recent literature indicates an excellent correlation between swabs and biopsies.<sup>10</sup> Surface contamination that could lead to misleading results can be reduced by cleansing the wound before taking the wound swab.<sup>9</sup>
- [e]: Reference 13 In this systematic review tap water used for cleansing of wounds did not increase infection rates compared to sterile water or saline. There is little evidence regarding the benefit of wound cleansing prior to sampling. However to minimise the likelihood of obtaining only surface contaminants, wound cleansing prior to sampling is recommended.<sup>9</sup>
- [f]: There is very limited evidence regarding the optimal swabbing technique to identify potentially causative pathogens. Other suggested techniques for swabbing include targeting areas of necrotic and moist tissue, taking swabs before debridement, wound exudate and swabbing the whole area of the wound using a z-shaped motion.<sup>17</sup>

## Grading of guidance recommendations

Study Design	Recommendation Grade
Good recent systematic review of studies	A+
One or more rigorous studies, not combined	A-
One or more prospective studies	B+
One or more retrospective studies	B-
Formal combination of expert opinion	C
Information opinion, other information	D

Guidance first produced in 2006 with Medline search for systematic reviews, research papers and other guidance in this area.

In January 2009 a Medline search was undertaken using the terms: venous leg ulcer plus microbiology or bacteriology; venous leg ulcer plus guidelines or guidance or protocols.

## References

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