

# How measuring leg ulcers can empower and motivate

This paper will discuss the value of measuring wounds in order to assess the effectiveness of treatment for venous leg ulcers. It will discuss the use of an electronic Leg Ulcer TeleMedicine system (LUTM) which can predict healing times of venous leg ulcers from measurements made during their treatment. Using case studies, it is shown that patients can be empowered and encouraged to continue with treatments when they can see a graphic representation of the healing process. The system also provides an early indicator that a treatment is not working as well as it should and is in need of modification.

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## KEY WORDS

Electronic wound recording

Wound measurement

Prediction of healing

Measuring outcomes

An estimated 70,000 to 190,000 individuals in the UK (1.2–3.2 per 1,000) have an open venous ulcer (Posnett and Franks, 2006). Management of these leg ulcers accounts for 2% of healthcare costs, representing a direct cost of £600m per year in the UK, or £10–£15 per head of population per year (Dodds, 2004). Venous leg ulcers are a major cause of morbidity. There is wide variation in practice with a recent audit classification recording 24% of leg ulcers as not having a definite diagnosis. Those classified as venous (24%) had not had a Doppler and 46% did not have compression (Drew et al, 2007). Many international studies have reported similar results (O'Brain et al, 2002; Ribu et al, 2003).

The Leg Ulcer-TeleMedicine System (LUTM) was developed in 1999 by a vascular team in a medium-sized hospital in north Birmingham. The small group

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of healthcare professionals wanted to improve the care they delivered and reinvented the way in which they worked in order to create a better service for their patients and also a better environment to work in. The result included the use of a dedicated IT software package called LUTM. This system won the NHS Innovated Award for Service Delivery 2004 and now has been taken up by further primary and secondary care areas in the UK, including North Hampshire, Birmingham, Coventry, Salisbury and Eastbourne.

## Leg ulcer measurement and treatment outcomes

Studies looking at the value of measuring venous leg ulcers to predict treatment outcomes all agree that ongoing changes in true area measurement and percentage of wound area size can predict healing outcomes in venous leg ulcers (Kantor and Margolis 2000; Taylor et al 2002; Hill et al, 2004; Meaume et al, 2005; Prince and Dodds, 2006; Kulkarni et al, 2007). The significance of this for clinical practice is that wound measurements can help to identify patients who are not responding to conventional treatment, and who could be offered alternative therapy. In these days of practice-based commissioning, the nurse must be able to base decisions on outcomes and cost. Accurate ongoing wound measuring contributes to improved quality of care (Gethin and Cowman, 2006). Princes and Dodds (2006) explain this further for the

following reasons:

- ▶▶ Patients can see evidence of an improvement, thus aiding compliance
- ▶▶ A non-healing ulcer can be identified early on and the cause investigated
- ▶▶ Early detection of an ulcer is noted, triggering investigation and often a change in the treatment plan.

All this results in an overall reduction in cost (NHS Connection for Health, 2006).

Various methods for measuring the wound circumference have been used. Acetate tracings are a good indicator of wound size and Visitrak digital planimetry (Smith and Nephew Healthcare, Hull) uses a device to enhance the precision of measurement (Gethin and Cowman, 2006). The author uses the LUTM system, which is a total electronic system which can be transmitted securely, via the NHS net or internet, to a remote site for evaluation by a specialist if necessary.

## Leg ulcer measurement using LUTM

The author has used this system in both primary and secondary care for four years. Photographs of the wound are taken using a digital camera with a pre-printed calibration scale placed next to the ulcer. Images are stored as part of the LUTM, which also allows the ulcer area to be measured from the digital images by the operator. At the press of a button, the measurement is transferred to a healing graph which will give the client an estimated healing date. The graph can then be printed and given to



**Figure 1. Case study I. Wound at initial measurement — 25.89cm<sup>2</sup>.**

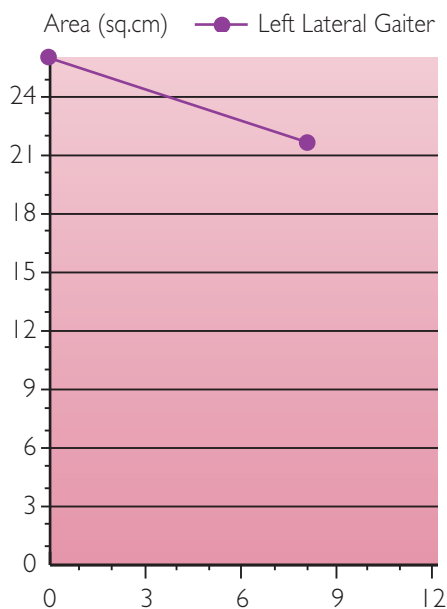
the patient and any carers concerned. Prince and Dodds (2006) conclude in their study that venous ulcers which respond to treatment appear to heal at a near constant rate. This was calculated by analysis of the healing rate for each ulcer. The predicted healing time was calculated from the initial size (cm<sup>2</sup>) and initial healing rate (cm<sup>2</sup>/week), and was then compared with the actual healing rate. The conclusion demonstrated that venous leg ulcers appeared to heal at a near constant rate, enabling this predictive function to be built into the LUTM software.

### Patients' perspective of leg ulceration

Edwards et al (2002) completed a study of 101 patients who were asked about their understanding of their own leg ulceration. Although 66% believed they knew the cause, 51% expressed an interest in acquiring further information, particularly on how they could assist with ulcer healing. Accurate measurement provides reassurance that concordance will actually be of benefit. If a patient has suffered from leg ulceration for many years, it is safe to assume that they have spent a large proportion of their time travelling to and from hospital or practice nurse appointments, or waiting in for the district nurse. The ulcer will have proved very time consuming, and efforts to heal it will not have provided positive results. Faith in a new treatment is likely to be very small, and the practitioner will first have to convince the patient that a new method of treatment could have a positive effect.

### Case studies

All patients referred to the Vascular One-Stop Clinic at Salisbury Foundation Hospital receive a comprehensive assessment, including a duplex scan and a proposed treatment plan which is discussed and agreed with the client. The following case studies are patients who

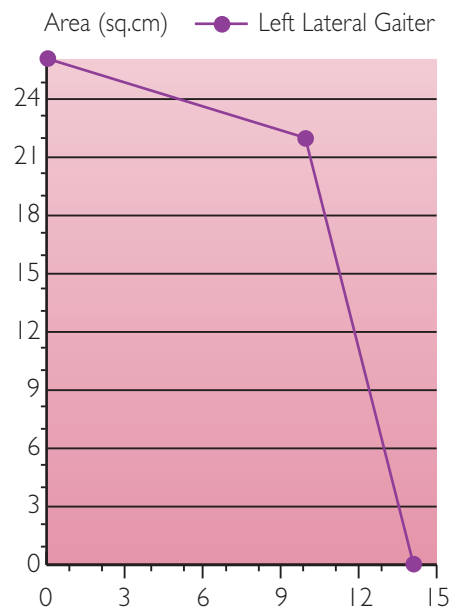


**Figure 2. Case study I. Wound after 6 weeks of treatment.**

attended the clinic. All documentation for these patients was created by using the LUTM system.

### Case study I

The first patient was an active 80-year-old retired school teacher. She had an infected venous leg ulcer measuring 25.89cm<sup>2</sup> (Figure 1) which had been present for 88 weeks. Her nurse had diagnosed it as a venous ulcer but the patient had declined compression as she did not see why this treatment would be effective. A duplex scan diagnosed an incompetent long saphenous vein which was felt to be contributing to her ulcer. Her diagnosis was explained, options discussed and treatment agreed. As the wound appeared critically colonised, Aquacel Ag (ConvaTec, Ickenham) was applied in conjunction with compression bandages. All the discussion was tailored to her needs using simple concepts and straightforward, unambiguous language and diagrams. For example, in her care plan it was written 'I have explained that compression is the treatment, just as a heart pill is taken for a bad heart, compression is for a leg ulcer. We have measured her leg ulcer and expect to see that it is smaller when she returns for review'. She was also offered endovenous laser correction of the long saphenous vein incompetence, which has been proven to prevent recurrence (Barwell et al, 2000) but this was declined.



**Figure 3. Case study I. Wound after 12 weeks of treatment.**

A detailed printed care plan, photograph and assessment was supplied for the patient, her nurse and GP. When she attended the review appointment the standard protocol was followed which is to photograph and measure the wound, and print the graph to discuss progress with the patient. Treatment options are then simple:

- ▶▶ If the wound is healing at a predicted rate, continue
- ▶▶ If the wound is healing at too slow a rate or has enlarged, change the treatment
- ▶▶ If the wound has enlarged, change the treatment.

At her review six weeks later the wound had decreased in size to 21.55cm<sup>2</sup> (Figure 2). The patient had complied with the compression treatment and was absolutely delighted with the graph, as she could see that the wound was decreasing in size. This motivated her to continue with the compression. However, it was healing at too slow a rate for a venous leg ulcer with the predicted healed date in 48 weeks. In the care plan it was written 'pain reduced and graph smaller but at too slow a rate. Predicted to heal in March 2008. Care as amended plan', which was as before but the antimicrobial dressing was changed to Acticoat Absorbent (Smith and Nephew, Hull).

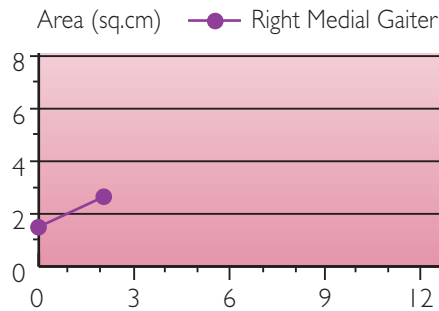
Six weeks later she attended her next review and the ulcer had healed (Figure 3). I wrote on her care plan 'Absolutely amazing! Well done Mrs M and practice nurse (PN)! See graph — healed in six weeks since the change of treatment and 15 weeks since first attending the clinic'. This was printed, with copies for the patient's nurse, GP as well as her own copy.

The patient wrote a letter to the clinic and said 'Both the PN and I am delighted with the outcome. Copies of the photograph of the ulcer, treatment plan and graph are going to be used to put together a leaflet to encourage other patients to seek professional help and to demonstrate how effective compression bandaging can be'. She decided not to progress with treatment of the underlying condition, but together a prevention strategy was agreed.

**Case study 2**

The patient was a 20-year-old man with a burn injury which had been present for 11 months before referral. He was waiting for knee surgery which could not proceed until his wound had healed. His duplex scans were normal and no underlying disease was diagnosed. He had had various types of compression treatment which he described as 'useless' and had even paid for a private consultation.

His wound measured 1.34cm<sup>2</sup> and treatment options were discussed, agreed and printed. Empowering the patient and his mother became the main aim of our discussions and we agreed to review in two weeks at which time I was confident that we would be able to prove there had been a decrease in size and give him a predicted healing date. After two weeks he returned, his wound was photographed and measured and the wound was found to have increased in size to 2.84cm<sup>2</sup> (Figure 4). The patient was extremely upset and angry and he punched the furniture in frustration. His notes state 'Mr C was very disappointed — understandably. He had followed previous instructions'. We agreed on a different treatment regimen for two weeks, with the addition of a topical steroid. At his following visit, we photographed and measured with



**Figure 4. Case study 2. After 2 weeks of treatment the wound increased in size.**

trepidation and found the wound to have decreased in size to 1.00cm<sup>2</sup> and was predicted to heal in a further eight days. The patient was absolutely delighted and the author was able to write: 'All smiles and delighted at the progress. Mum and Mr C are finding it difficult to believe it is so much better'. The patient was able to contact his surgeon to arrange a date for surgery.

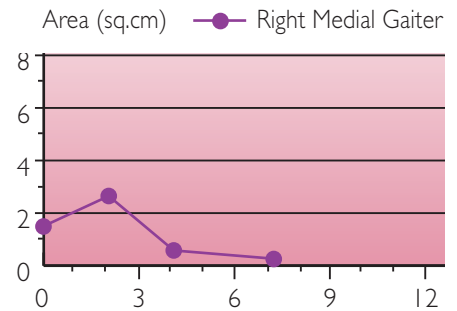
The wound healed in 21 days (Figure 5) rather than the predicted eight and this deviation from the expected course may be because it was not a true venous leg ulcer which is what the healing prediction system of the LUTM was based upon. However, all parties were more than pleased with the outcome.

**Case study 3**

The patient was a 63-year-old woman who had suffered from two venous leg ulcers for 24 weeks, measuring 2.69cm<sup>2</sup> and 6.51cm<sup>2</sup>. They had been diagnosed by duplex scan. After discussion, the patient felt that her ulcers were 'never ending' and 'nothing that anyone did made any difference'. She was normally active and had expected to enjoy a busy retirement.

The assessment included a detailed look at how the patient spent her day. The author formalised a treatment plan with her for which she would take responsibility. It was explained that her ulcers would be measured again in one week in order to assess the effect of the following changes:

- ▶▶ Exercising the ankle as it was very stiff
- ▶▶ Elevating the end of the bed further
- ▶▶ Walking more — 10 minutes every hour
- ▶▶ Elevating the leg further when sitting down



**Figure 5. Case study 2. After a regimen change the wound healed in 21 days.**

- ▶▶ Flexing the ankle further when walking in proper shoes as opposed to sandals.

Dressing and medical treatments were not changed at this stage.

On return, her ulcer measurements had decreased to 1cm<sup>2</sup> and 2.43cm<sup>2</sup> a marked decrease in size and they went on to heal in 14 weeks (Figure 6). I wrote at week one: 'Delighted! Graph smaller; therefore continue. Mrs S is pleased with the progress and feels more motivated. She has implemented the exercising elevation programme discussed last week.'

The satisfaction for staff in the unit was that we had proof that the improvement was due to the fact that she had taken responsibility for her ulcer, rather than through a change in medical treatment. We also suggested that if she could exercise more and elevate her limbs higher, she may be able to 'beat' her predicted healing rate. The patient was also keen to tell her practice nurse, and left with the printed care plan and copies in her hand. Mrs S approached each visit with excitement, as her hope had returned and she could see an end to her suffering. Her ulcer healed completely.

It is interesting to note from Figure 7, that between weeks eight and nine, the rate of healing accelerated. This was due to the addition of a topical steroid which was stopped at week nine whereupon the healing rate slowed down again. On reflection it may have been beneficial to continue with the steroid treatment, but the author still feels very cautious about using topical steroids as the evidence of their benefits is limited (Hofman et al, 2007).

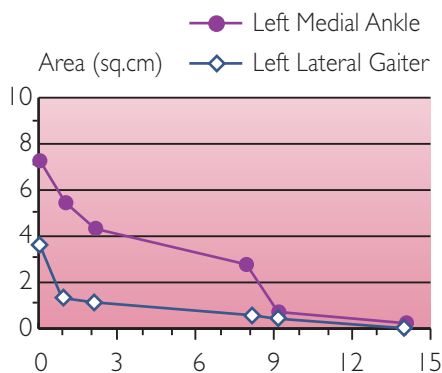


Figure 6. Case study 3. The wound healed after 14 weeks of treatment.

### Discussion

The recording of leg ulcer measurements provides huge benefits to all professionals involved in patient care. It provides increased accuracy of healing prediction and can help to make early identification of factors which are delaying healing. This leads to rapid intervention, greater efficiency of treatment and improved patient outcomes (Flanagan, 2003).

Bawden and Lindsey (2007) wrote one of many papers published which discuss the importance of empowering the patient, so that they are involved in the care of their own legs. In the author's experience, there are two extra powerful benefits. The first is a direct benefit for the patient. LUTM provides tangible evidence that compliance with treatment promotes healing, and from this knowledge the patient can gain empowerment and motivation.

The second benefit is for all the staff involved. The NHS Connecting for Health benefits review (2006) found that staff working at Good Hope Hospital, Sutton Coldfield, had increased their own professional and personal development and gained greater satisfaction. The staff at Salisbury Vascular and Diabetes Unit, where this system has recently been implemented, feel that for the first time they are able to objectively measure the effectiveness of treatment given. There is also great joy in being able to demonstrate to a patient with a chronic leg ulcer their personal graph and give them an estimated date for healing.

Last, there have been positive comments from the nurses who care

for these patients on an ongoing basis. One must remember, however, that staff do feel disappointed when treatments are not effective, but it is still extremely motivating to be able to share and document the joy of successful treatment.

One must also remember that there are instances where wound care implemented is not effective. Measurable outcomes can then become depressing for the patient, carer and also the staff involved. It can reinforce the fact that the treatment discussed and agreed together has not been effective. There are also cases where all parties involved accept that the goal is no longer healing, but quality of life. Other options to achieve this goal include pain relief or even amputation. In this case, there may be no benefit in measuring the wound. The author accepts this as fact and attempts to be honest in an empathic manner with the patient and carer. It must be remembered that all tools are for the benefit of the patient, and care should always be tailor-made and centred on the individual. **WUK**

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### Key Points

- ▶▶ The author used the Electronic Leg Ulcer Telemedicine System to measure leg ulcers and predict a healing date based on previous calculations of healing progress.
- ▶▶ Case studies show that patients can be empowered and encouraged to persist with treatment when shown a graphic representation of their healing progress.
- ▶▶ The system can help to highlight when a treatment is failing and can prompt a change in regimen.