

Telemedicine in wound care: improving patient outcomes

In a bid to reduce waste and improve productivity in the NHS, a number of patients with longstanding wounds were reviewed using the telemedicine system, which uses telecommunications between remote clinical services to diagnose and treat. In 2016, a pilot study took place at Roxton Medical Practice in Immingham, with specialist input from a tissue viability nurse (TVN). The aim was to maximise the potential for healing and reduce the risk of infection. This article focuses on two patients, whose wounds both healed using telemedicine. The care was linked to evidence-based practice and shows how remote interaction between the general practice nurse and telemedicine tissue viability nurse (GPN, TTVN) led to successful outcomes in debridement and skin care. It also looks at how telemedicine aided the use of compression therapy and improved education and concordance, as well as examining the perspectives of the GPN and TTVN involved, reflecting on how this system has changed their practice.

KEY WORDS:

- Skin care
- Compression therapy
- Debridement
- Education and concordance
- Infection

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One of the challenges facing the NHS is improving productivity and eliminating waste, while maintaining quality services. Unfortunately, wound care has failed to meet this challenge: prescribing costs are escalating, as is the cost of nursing, and yet the outcomes for patients are poor (Guest et al, 2017). One reason for this is the lack of a structured approach to wound care (Ashton and Price, 2006; Dowsett, 2009), with patients often complaining that they do not receive continuity of care outside of hospital or access to specialist advice.

Darzi (2009) recommended that the NHS should ensure 'investment

in tissue viability specialists to promote and lead as a priority', but unfortunately this has never been fully implemented. This means, in many areas, community nurses and general practice nurses (GPNs) find it difficult to maintain the skills and competencies required to deliver a safe and effective service.

In a bid to improve wound care in a cost-effective manner and reduce pressure on overstretched practices in the area, the North-East Lincolnshire clinical commissioning group (NEL CCG) decided to see if telemedicine could help bolster the existing tissue viability services. The European Wound Management

Association (EWMA) defined telemedicine as the 'remote exchange of data between a patient and a healthcare professional(s) to assist in the diagnosis and management of healthcare conditions' (EWMA, 2015).

In mid-2016, a pilot project began at the Roxton Medical Practice in Immingham. It was run in conjunction with the NEL CCG, with specialist input from the wound care service, Healogics, and the use of the TELER wound software to record patient data and outcomes. The two patients in the cases below had longstanding wounds (leg ulcers), which had been seen by the local tissue viability service. They were

then assessed by the telemedicine service to see if remote technology and communication between the GPN and a specialist tissue viability nurse (TVN) could maximise the potential for healing.

BACKGROUND TO PILOT PROJECT

The majority of patients (16 in total) referred to the service from July 2015 to July 2016 had leg ulcers of mixed aetiology (Figure 1).

Most of the patients were not receiving optimal levels of compression therapy due to oedema causing false high ankle brachial pressure index (ABPI) readings, or healthcare professionals being unable to locate pedal pulses to rule out arterial involvement and so compression therapy could not be applied.

The age range of the patients varied from 40 to 90 years, with the mean average age being 65–66 years.

For the majority of patients, wounds had been present for an average of six months with no signs of healing, despite being seen in the surgery three times a week for that period of time. Patients with leg ulceration, in particular those with lymphovenous disease, had had their wounds the longest.

Outcomes

Nine patients healed, this included the two patients described in the

cases below, three being cared for by the community nursing services, two who were referred, one who was discharged from care and another who died (healing rates of these patients, excluding the two patients in the case studies, are shown in Figure 2).

The average healing time was four months, with most patients healing within two. This is a 56% healing rate, which is higher than the NHS national average of 44% over six months (Guest et al, 2015). Wounds that had been present for fewer than six months tended to heal within one to three months. However, two patients, whose wounds had been present for longer than six months, healed within an impressive two to three months.

The two patients with longstanding wounds of more than 24 months (or 700 days) healed within four and nine months respectively, and these are the two cases described below.

CASE STUDY ONE

History

This 50-year-old man with a history of substance abuse and poor concordance had been seen three times a week over a seven-year period. He had hyperkeratosis, fibrosed oedema and recurrent episodes of infection, which, due to poor skin care, required systemic antibiotics (Figures 3 and 4). He had a high ABPI of 1.4 and as he was

Telemedicine process...

1. GPN assesses the patient and takes a photograph of the wound and then uploads and sends the information to the TVN via the telemedicine server.
2. The TVN triages the information and contacts the GPN for further discussion about the patient and treatment options.
3. TVN produces a care plan with clear rationale for treatment, and then sends this via the telemedicine server with a set review date, which is usually in two to four weeks.
4. GPN reviews the patient and sends a new photograph on the review date via the server. This is reviewed by the TVN and discussed with the GPN either on the telephone or via the system, with new care plans being produced by the TVN as required

awaiting referral to the vascular surgeon, he was not receiving compression therapy.

Treatment goals

The goals of treatment were to provide the following:

- Intensive skin care
- Appropriate levels of compression therapy
- Reduction of the bioburden on the wound bed

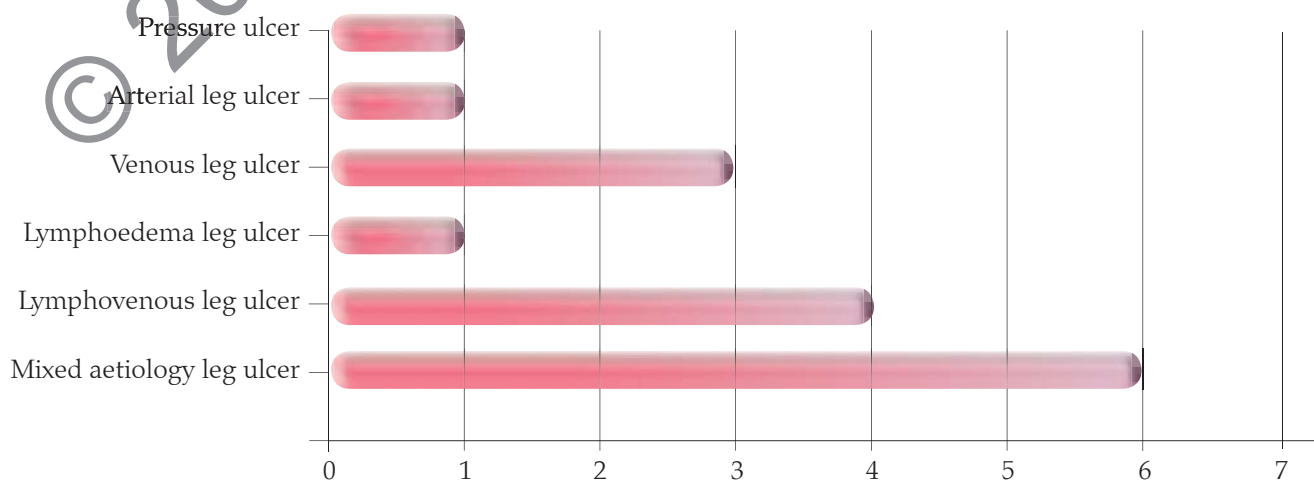


FIGURE 1. Wound types.

- Improve the wound edges to stimulate the wound to proliferate
- Encourage concordance through education, continuity and support.

Treatment pathway

Initially, while waiting for the appointment with the vascular surgeon, it was decided to use a two-layer figure-of-eight retention bandage to the leg, toe-to-knee, applied at 50% overlap and 100% stretch to reduce the volume of exudate.

An antimicrobial iodine ointment was applied for two weeks to reduce the bacterial load on the wound bed. However, on completion, it looked as though the wound bed had a potential biofilm and due to the patient's recurrent infections, it was decided by the TVN in discussion with the GPN to continue with the iodine for a further two weeks.

Review

The patient attended his outpatient appointment with the vascular surgeon, who recommended the use of reduced compression in the form of a three-layer long-stretch system. However, the patient complained that it was too tight, possibly due to its high working and resting pressures. As he had reduced mobility and limited ankle movement, a combination short- and long-stretch system was implemented by the TVN, as this would give lower resting pressures and be more comfortable.

To ease pressure on the nurses, the GP was asked to perform sharp debridement of the dead skin around the wound bed to allow the wound edges to flatten and epithelialisation to begin. A hydrocolloid was used on the wound bed and as the patient became more mobile, the bandage regimen was changed to a short-stretch system using two short-stretch bandages. Unfortunately, the patient's occasional non-attendance at clinic caused an infection, which required systemic antibiotic treatment.

Final review

The treatments chosen allowed for

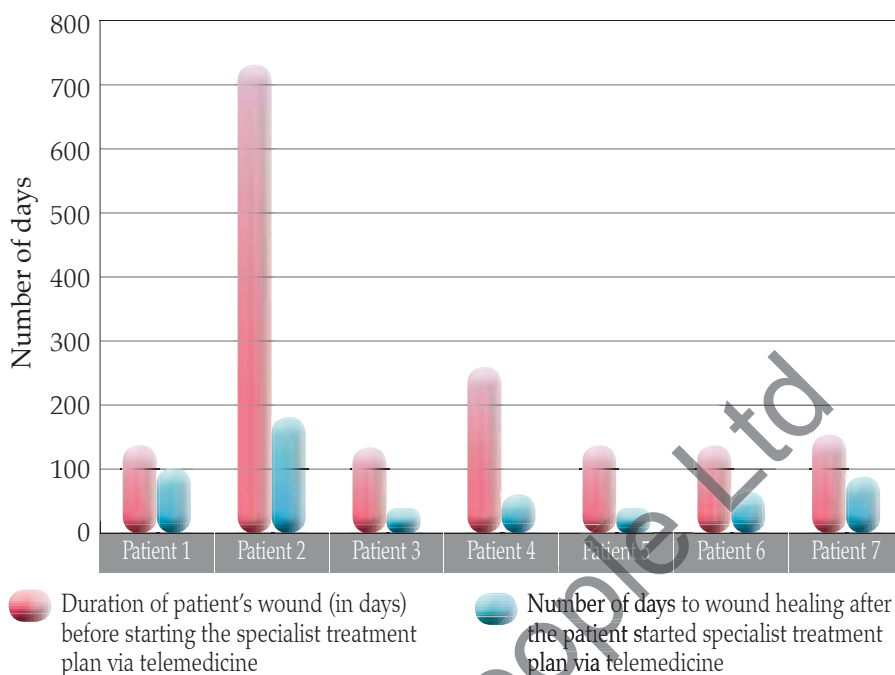


FIGURE 2.

Length of time to healing (in days) after patients were treated via telemedicine.

the problems of concordance and the patient's occasional non-compliance. First, the hydrocolloid would occlude the wound and reduce the risk of contamination. Second, he was prescribed a compression wrap system, which required minimal patient management. He was also given an emollient spray to hydrate his skin quickly and effectively.

The wound healed after nine months (Figure 4), following consistent support from the GPN. She assumed responsibility for the patient and made all the treatment decisions in consultation with the

TVN specialist. This enabled the patient to feel that he had one dedicated point of contact, rather than being seen by various healthcare professionals. Working closely together using a combination of the telemedicine software and telephone discussions, the TVN and GPN established clear treatment rationales, which aided the potential for healing.

CASE STUDY TWO

History

This 67-year-old woman with longstanding lymphovenous disease had suffered with an ulcer for more than three years. It was covered entirely with dark red granulation tissue and was static (Figure 5), with hyperkeratosis of the surrounding skin. Previous treatments included four-layer compression bandage systems and British standard two-layer hosiery kits. She now had one layer of a short-stretch bandage, but it was not sufficient pressure for the size of her ankle, which had a circumference of over 25cm.

Treatment goals

The goals of treatment were again to provide the following:

- Intensive skin care
- Appropriate levels of compression therapy
- Reduction of bioburden on



FIGURE 3.

Case one at initial presentation.

FIGURE 4.

Case one — wound healed after nine months' treatment.

Practice point

Telemedicine requires making time in a busy day for communication and to update results. Although this can be difficult, once the results can be seen, the benefits soon outweigh the disadvantages.

- the wound bed
- Improve the wound edges to stimulate the wound to proliferate
- Encourage concordance through education, continuity and support.

Treatment pathway

Treatment began with two short-stretch bandages: one applied in a figure-of-eight, toe-to-knee, to increase sub-bandage pressure, and the second applied in a spiral toe-to-knee. Due to the patient's lymphatic disease, both bandages were applied toe-to-knee, as opposed to venous bandaging where the second bandage would be started from the ankle in the opposite direction to the first layer in larger ankle sizes. The patient was taught ankle and leg exercises to improve her calf muscle and lymphatic function.

However, the patient did not like compression bandaging and a decision was made to use a much stronger European two-layer hosiery system, which delivered 40mmHg as soon as the wound exudate reduced.

To promote self-care, she was encouraged to do leg and ankle exercises and apply emollients between clinic visits. The ulcer healed within five months, with two reviews undertaken between the TVN and the GPN via the software system (Figure 6).

SUMMARY OF WOUND CARE

In both these cases, wound healing was achieved with evidence-based care, by following treatment goals and adapting therapy to fit the patient's health, as well as encouraging concordance through education (Table 1). The TVN sent

information leaflets and Best Practice guidelines via the telemedicine system to assist the GPN in educating the patient.

Skin care

The skin condition of both patients was poor due to hyperkeratosis, a thickening of the skin that can be itchy, painful, uncomfortable and add pressure. It can also have a distinctive odour, usually caused by the bacterial colonisation within the scaling skin (Jakeman, 2012), and can lead to fungal infections, potentially resulting in a continuous cycle of colonisation, infection and skin breakdown (Wounds UK, 2014). Extra care was needed to reduce the risk of infection and improve the condition of the periwound skin to allow epithelialisation. Hyperkeratosis required 10% urea-based emollients (British Dermatological Nursing Group [BDNG], 2012; Wounds UK, 2014) to deal with the dry skin and a monofilament debridement pad was used to remove skin scales (National Institute for Health and Care Excellence [NICE], 2014).

As the aim of the telemedicine pilot was to encourage patient independence and self-care to facilitate healing, the patients were supplied with a compression wrap system and a two-layer hosiery kit and instructed to apply emollients themselves every day. The photographs provided allowed the TVN to identify the skin problems



FIGURE 5.

Case two — at initial presentation the wound was covered with dark granulation tissue.

FIGURE 6.

Case two — healed ulcer after five months' treatment.

and the shape of the patient's leg, which aided the decision-making process in relation to the choice of emollient and hosiery provision.

Compression therapy

Compression therapy is the cornerstone of treatment for venous and lymphatic disorders (European Wound Management Association [EWMA], 2003). Both patients presented with phlebolympoedema, which 'requires treatment from experienced clinical teams, well versed in the diagnosis and management of the lymphovenous diathesis of lipodermatosclerosis, ulceration, cellulitis and lymphovenous oedema' (White et al 2014). Both patients had been receiving compression therapy for venous disease, rather than to improve lymphatic flow. However, it is lymph transport, not venous capillary reabsorption, that is responsible mainly for interstitial fluid drainage (Mortimer and Levick, 2004), and tissue fluid balance depends critically on lymphatic function (Levick and Michel, 2010).

Cellulitis, infection, ulceration and leakage are common complications (Lymphoedema Framework, 2006), which affected both patients and meant that they required specialist intervention from the TVN, who also had a lymphoedema qualification. The TVN worked with each patient to assess their suitability and selected compression therapy based on their mobility, ABPI, holistic assessment of the ulcer, comorbidities and concordance. This information was relayed back to the GPN via the telehealth system.

The patient in case study one needed to begin compression therapy while awaiting vascular referral. In patients with chronic oedema, performing a hand-held Doppler ultrasound test can be difficult and there is no empirical evidence to support sensitivity and accuracy of this assessment when used on oedematous limbs (Todd, 2016). The patient's initial results were falsely high due to the inability to compress the vessel and determine blood flow, and, for this reason, he was referred

to the vascular surgeon. A type 2 light support bandage, (minimal stretch) was used, as this has limited extensibility and elasticity, and tends to 'lock out' at relatively low levels of extension. It can be applied firmly over a joint to give support without generating significant levels of pressure (Thomas, 1997).

Once his initial oedema had reduced, a compression wrap system was used to improve concordance and facilitate skin care. These adjustable devices consist of low-elastic material sections that wrap across the limb and are secured with hook and loop fasteners. The design allows the patient to self-care and adjust as required throughout the day (Mullings, 2012; NICE, 2015). It is also cost-effective, as the patient can administer his or her own skin care daily, as opposed to relying on nurses (Elvin, 2015; Williams, 2016) — a major objective of the telemedicine pilot.

The patient in the second case study was prescribed a two-layer hosiery system, consisting of two stockings, i.e:

- A liner delivering a lower level of compression (normally between 10–20mmHg)
- A second layer which slides on over the liner (normally delivering 25–35mmHg or 30–40mmHg).

The two layers provide an overall pressure in the region of 40mmHg. The two-layered kit allows leg ulcer healing without the bulk of bandages (Ashby et al, 2014).

Due to her chronic oedema, a European Class kit was chosen. A study undertaken by Ashby et al (2014) found that, again, the hosiery kits were more cost-effective, as they encourage self-care, reducing nursing time and bandage costs. Without

nurses there to help her, this female patient was happy to manage her own skin care, which was one of the key objectives of this project.

Education and concordance

One of the main aims of projects like this is to educate the patient (Brooks et al, 2004). This involves explaining

“ One of the main aims of projects like this is to educate the patient (Brooks et al, 2004). This involves explaining the importance of exercise, diet, compression therapy and skin care to promote healing in leg ulcers. It is also essential that a non-judgmental, therapeutic relationship is established between the nurse and patient...

the importance of exercise, diet, compression therapy and skin care to promote healing in leg ulcers. It is also essential that a non-judgmental, therapeutic relationship is established between the nurse and patient which is based on effective communication and a willingness to listen and not label the patient. In doing so, high levels of concordance can be achieved (Morgan and Moffatt, 2008; Stanton et al, 2016).

In this pilot, the relationship strengthened because one GPN took overall responsibility for providing continuity of care for the patients by liaising with the TVN and being solely responsible for changing treatment plans following discussion with the TVN.

Debridement

Debridement can be defined as the

Practice point

By working closely with a specialist nurse and accessing their expertise, GPNs can develop their own skills.

removal of devitalised tissue, infected tissue, hyperkeratosis, slough, pus, debris or any other type of bioburden from a wound to promote healing (Strohal et al, 2013). One of the most important components of the telemedicine service was to encourage continuous debridement of the static wounds with the use of a monofilament pad (NICE, 2014; Wounds UK, 2017). This ensured that the skins cells were being removed and the wound bed was cleaned of debris. If any potential biofilms were present, this allowed the use of antimicrobials to penetrate.

The male patient had thickened wound edges, which required sharp debridement which was undertaken by the GP. Removing the non-viable edges accelerated wound healing by allowing epithelialisation (Williams et al, 2005; Strohal et al, 2013).

Antimicrobial therapy

A chronic, non-healing wound can be suggestive of a biofilm (Keast et al, 2014; World Union of Wound Healing Societies, 2016). Keast (2014) identified four potential features that may increase the likelihood that a biofilm is present:

- Antibiotic failure
- Infection of more than 30 days' duration
- Friable granulation tissue
- A gelatinous material easily removed from the wound's surface that quickly rebuilds.

Initial assessment of both patients showed static progression, dark red friable granulation tissue and repeated infections, thus suggesting that biofilms were present. A biofilm is thought to delay wound healing by upsetting healing processes, causing additional wound damage and acting as a source of infection (Wounds UK, 2017). Measures were taken to break up and remove the biofilm

Table 1: Aspects of the treatment pathway for cases one and two

Patient	Skin care	Compression	Education and concordance	Debridement	Antimicrobial agent
One	✓	✓	✓	✓	✓
Two	✓	✓	✓	✓	✓

(Wolcott, 2011; Keast et al, 2014; Wounds UK, 2017). An antimicrobial wash was used to cleanse the leg followed by a polyhexamethylene biguanide (PHMB) cleanser (Mulder et al, 2007; Wounds UK, 2010) and a monofilament pad. With the wounds now cleaner, an iodine ointment was used to decrease the number of bacteria present.

GPN PERSPECTIVE

Working within a busy general practice means that the time allocated for wound care can be very small with a 10-minute average appointment slot. The GPN felt that, as a team, they had a basic knowledge of wound care, and this, coupled with a lack of continuity, led to patients having a multitude of dressings applied with no real rationale for treatment. This resulted in the majority of wounds being seen for extended periods of time with poor outcomes, poor healing and poor quality of life for patients.

Initially, the development of the telemedicine service was seen as another task in an already busy day, and it was difficult to set the time aside to undertake the assessments and communication required. However, once the service became established and results started to be seen, the incentive to persevere became greater.

The GPN was able to extend her knowledge as the care plans sent were informative, giving clear

treatment rationales. By working closely with the TVN, she was able to access skills and expertise so, over time, when any new patients presented to the surgery, she could start effective treatment.

“ One of the most important components of the telemedicine service was to encourage continuous debridement of the static wounds with the use of a monofilament pad.

The only negative was the time needed to be allocated into busy schedules to update the results, although if done, the system worked effectively and was evaluated well by patients and staff alike.

The GPN stated that the positives from this system were that the majority of long-term patients healed, which meant that there were no longer any dedicated wound clinics within the practice, which freed up capacity.

SPECIALIST NURSE PERSPECTIVE

The most difficult issue to overcome was entrusting the assessment, management and evaluations to another nurse. A photograph of the wound and an explanation from the nurse, with relevant assessment facts such as wound dimensions, presentation and medical history, can help to allay such fears, but does not replace the physical presence of being in a room with the patient.

The TVN felt that the key to reducing this anxiety was to develop clear lines of communication and an understanding between the clinicians involved as to their roles, responsibilities and accountability in relation to the patient's care. The GPN involved in the pilot was fairly newly qualified and new to practice nursing. However, she was enthusiastic and keen to learn and had a clear understanding of the need to develop her knowledge and skills in the area of tissue viability. She embraced change due to being

frustrated with the lack of progress of the patients in her care, and this was key to developing that important relationship between the TVN and GPN.

Advice was given to approach other specialist services, such as the lymphoedema service, to assist her in developing more specialised bandaging skills, and the GP to undertake sharp debridement.

The TVN stated that the most satisfying part of the project was to see successful healing outcomes, and also the development of the GPN in terms of skill and knowledge in relation to wound care.

CONCLUSION

Both patients had successful outcomes, which shows how the telemedicine system can work effectively by improving the quality of life for patients as well as also improving the capacity and skills of the GPN. **GPN**

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Red Flag

Do not judge or label the patient. Telemedicine works best when there is a strong therapeutic relationship between patient and nurse, so be willing to listen to their concerns and talk through any issues. This will encourage concordance, which benefits healing.

Practice point

To improve concordance with compression therapy, it is important to:

- Develop a good rapport with the patient
- Explain what having a leg ulcer means and the disease process
- Encourage patients to take responsibility for their own treatment
- Outline treatment choices, considering lifestyle factors, such as how active they are (Griffin, 2014).

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Revalidation Alert

Having read this article, reflect on:

- The benefits of appointing one nurse to take overall responsibility for continuity of care
- Why clear levels of communication between GPNs and specialist nurses are essential for telemedicine to work
- The forms of communication which can be used in telemedicine
- How telemedicine could be introduced into your area of practice.
- ✔ Then, upload the article to the free GPN revalidation e-portfolio as evidence of your continued learning; www.journalofpracticenursing.com

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Practice point

Telemedicine can help to improve access to specialist services, which otherwise might not be easily available. Here, the GPN was able to develop her wound care knowledge by working closely with a specialist TVN and learn from her skills and expertise.

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