A venous leg ulcer (VLU) is defined as ‘an open lesion between the knee and the ankle joint that occurs in the presence of venous disease and takes more than two weeks to heal’ (NICE, 2013). Guest et al (2015) expressed concern about the number of diagnosed venous leg ulcer patients in the UK, currently estimated at 278,000 in 2012/13, with this number predicted to increase year on year. The majority of these patients are managed in the community setting at a time when the nursing resource available to deliver care is in decline. In the UK, the number of district nurses decreased by 39% between 2002 and 2012, as a result of funding cuts, an increase in the number of nurses leaving practice and retiring and reduced numbers of newly qualified nurses (Royal College of Nursing, 2013). As the number of wounds increases, the demands on nurse time will become unsustainable. It is therefore important that more efficient ways of managing the increased workload are identified.

Guest et al (2015) extracted data of 1000 patients from ‘The Health Improvement Network’ (THIN) database in order to compare the cost of care for patients with wounds compared with the cost of care for patients who did not have a wound. In the UK 2.2 million wounds are treated each year at a cost of £5.3billion per year (Guest et al, 2015). In the study, 53% of the patients with a venous leg ulcer healed during the one-year time frame, with 47% remaining unhealed by study end. The authors calculated the cost of non-healing venous leg ulcers to be £13,500 per year compared with only £3000 for a healed ulcer. It is likely that long-standing venous leg ulcers will have complex systemic and local pathology that will negatively influence the healing process.

Many chronic wounds will be in a state of continuous inflammation in the presence of local and systemic barriers to wound healing (Schultz et al, 2005). The exudate produced by the wound is often the result of cellular dysfunction and pro-inflammatory agents within the wound. Wound chronicity brings with it a risk of increased bioburden, infection and biofilm development.

All of these barriers to wound healing need to be removed for healing to progress, and the underlying venous disease managed using compression therapy (Wounds UK, 2015).

Venous leg ulcers can have a significant impact on a patient’s quality of life, with associated personal, social and psychological effects. There is also a considerable financial impact on healthcare providers, as well as a wider social and economic impact (EWMA, 2016).

As the burden of chronic wounds continues to grow in the UK (Guest et al, 2015), new technologies which may help to lessen the burden of chronic wounds on the NHS should be considered. Products that can simplify wound care for community practitioners, and which can improve wound healing times should be embraced, since they will reduce nursing time needed, and avoid costly complications associated with the delayed healing of venous leg ulcers, such as wound infection and cellulitis. Wound infection can significantly impact on the healing process and also impacts on the patient’s quality of life, with increased pain and increased exudate volume (Cutting and Harding, 2004). Cellulitis can result in costly hospital stays; in 2013-14 there were 104,598...
cases of cellulitis treated in secondary care with a mean bed stay of 6.2 days (Lee and Levell, 2016).

LQD® wound spray is a new spray-on dressing that contains chitosan FH02 TM, a unique form of chitosan.

THE ROLE OF CHITOSAN IN WOUND HEALING

Chitosan is a naturally occurring biopolymer with a similar structure to hyaluronic acid (Dai et al, 2011) which has been shown to have a number of effects that contribute to wound healing.

Chitosan is a natural haemostat with the ability to bind with red blood cells which rapidly causes blood to clot (Kozen et al, 2008). Chitosan is also able to modulate the function of inflammatory cells within the wound and therefore promote granulation tissue formation (Ueno et al, 2001).

Indeed, studies have reported that chitosan can positively influence the speed of healing and there is good evidence to suggest it has a role to play in each stage of the wound healing process (Dai et al, 2011). Chitosan has been shown to enhance the functions of inflammatory cells, such as polymorphonuclear leukocytes (PMN) macrophages and fibroblasts (Ueno et al, 2001). Degim et al (2002) reported on the link between chitosan and improved tensile strength in mice wounds. It influences the behaviour of growth factors to stimulate healing.

Chitosan is a natural antimicrobial for preventing and treating infections. The positively chitosan molecule interacts with the negative charge on the cell wall of the bacteria, disrupting the cell wall structure and causing the contents of the bacteria to leak out (Rabea et al, 2003).

Finally, chitosan is nontoxic, biocompatible and is biodegradable (Dai et al, 2011).

An evaluation of LQD wound spray was carried out in a specialist wound care clinic in Eastbourne to observe the effects it had on wound outcomes in eight patients with static or slow healing venous leg ulcers.

METHOD

Eight patients with venous leg ulcers were considered by the author to be suitable for inclusion in the evaluation since they all had pre-existing venous leg ulceration that

<table>
<thead>
<tr>
<th>Patient</th>
<th>Age (years)</th>
<th>Dressing frequency (start/end)</th>
<th>Wound duration</th>
<th>Tissue type</th>
<th>Length of evaluation</th>
<th>Wound dimensions (length/width/area)</th>
<th>Final dimensions (length/width/area)</th>
<th>Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>88</td>
<td>Weekly throughout</td>
<td>12 weeks</td>
<td>100% slough</td>
<td>7 weeks</td>
<td>4.6x4.9cm 22.54cm²</td>
<td>0cm</td>
<td>Wound healed, Reduced odour, Dressing changes reduced to weekly</td>
</tr>
<tr>
<td>2</td>
<td>80</td>
<td>X2 per week reduced to weekly</td>
<td>8 weeks</td>
<td>100% slough</td>
<td>10 weeks</td>
<td>2.8x2.7cm 7.56cm²</td>
<td>8x0.7cm 0.56cm²</td>
<td>Wound almost healed majority epithelial tissue Stopped using honey dressing</td>
</tr>
<tr>
<td>3</td>
<td>53</td>
<td>X2 week reduced to 1 per week</td>
<td>9 weeks</td>
<td>100% granulation</td>
<td>9 weeks</td>
<td>2.5x2cm 5.00cm²</td>
<td>1.0x1.5cm 1.5 cm²</td>
<td>Slight increase in slough, continues to reduce in size</td>
</tr>
<tr>
<td>4</td>
<td>88</td>
<td>X2 weekly reduced to weekly</td>
<td>8 weeks</td>
<td>100% Slough</td>
<td>9 weeks</td>
<td>2.5x2.2cm 5.50cm²</td>
<td>1.3x0.4cm 0.52cm²</td>
<td>Reduced odour 100% granulation tissue Complexity of secondary dressing reduced</td>
</tr>
<tr>
<td>5</td>
<td>85</td>
<td>X2 weekly reduced to weekly</td>
<td>9 weeks</td>
<td>95% slough 9% granulation</td>
<td>9 weeks</td>
<td>6.1x6.1cm 37.21cm²</td>
<td>Completely healed</td>
<td>Wound healed, dressing complexity reduced</td>
</tr>
<tr>
<td>6</td>
<td>17</td>
<td>3x weekly reduced to 2x weekly</td>
<td>12 weeks</td>
<td>20% slough 55% granulation 25% necrosis</td>
<td>4 weeks</td>
<td>None recorded</td>
<td>Wound healed</td>
<td>Small wound, healed by week 4</td>
</tr>
<tr>
<td>7</td>
<td>84</td>
<td>X2 weekly Reduced to weekly</td>
<td>12 weeks</td>
<td>100% slough</td>
<td>7 weeks</td>
<td>None recorded</td>
<td>Wound healed by week 7</td>
<td>Wound healed by week 7</td>
</tr>
</tbody>
</table>

Table 1: Summary of the outcomes of the evaluation
was not responding in the expected time-frame to standard best practice.

The following were excluded from the evaluation:
- Arterial wounds
- Diabetic wounds present for more than 2 years
- Patients less than 18 years old
- Heavily exuding wounds
- Heavily infected wounds.

For each patient included in the evaluation, the following baseline information was recorded:
- Age
- Gender
- Wound duration
- Current treatment regimen
- Co-morbidities
- Wound dimensions (WxDxL; area)
- Tissue types present (as percentage of the wound bed)
- Frequency of dressing change.

Following initial assessment, LQD wound spray was applied to the wound in accordance with the manufacturer’s instructions as an additional step in the pre-existing dressing regimen.

Wound measurements, tissue types and frequency of dressing change were recorded at each subsequent dressing reapplication and review.

RESULTS

Results for the use of LQD wound spray in seven patients were recorded.

One patient was removed from the evaluation after being diagnosed with pyoderma gangrenosum.

The average wound duration before treatment with LQD wound spray was 10.3 weeks. The average age of the patients included was 76 years.

All seven of the patients who participated in the evaluation either healed, almost healed (>75% healing) or showed significant improvement in their wound status. All seven of the patients had the frequency of dressing change reduced; from two dressing changes per week down to one change in 6 patients and from three dressing changes per week down to two for one patient (Table 1).

Six of the patients saw an improvement in the tissue type present in the wound, with a slight increase in sloughy tissue reported in only one patient. Despite this, however, the wound continued to reduce in size. Of the 7 patients, four had wounds that completely healed, while the wounds of the other three patients reduced in size until they were almost healed.

DISCUSSION

Venous leg ulcers can be problematic to heal due to the complexity of local and systemic factors that can combine to adversely affect the wound healing process. Although many of the patients in this study had comparatively small wounds, the fact that they were present for an average of 10 weeks before inclusion in the LQD evaluation, and were slow or non-healing supports the findings of Guest et al (2017) that 47% of venous leg ulcers will not heal in any given year.

In this small evaluation, following treatment with LQD, 57% of patients (n=4) had wounds that healed, while the remaining three patients showing a decrease in wound area.

Promoting early healing in a leg ulcer is recognised as a key factor to achieving ulcer closure in the long term (Wounds UK, 2016).

CASE EXAMPLE 1

An 88-year-old male presented with a venous leg ulcer of 9 weeks duration that was being managed using Inadine and Zetuvit.

The wound was failing to make progress despite treatment (Figure 1). LQD® wound spray was applied according to manufacturer’s guidelines and dressed using Kerramax and Double setocrepe.

At each review, the wound was seen to be progressing and was healed at visit 12 (Figure 2) following 11 weeks of treatment with LQD wound spray.

Figure 1. Wound at presentation.  Figure 2. Wound at visit 12.
CASE EXAMPLE 2

An 84-year-old male presented with multiple venous leg ulcers of 12 weeks’ duration (Figure 1). The wounds were being managed with Kerramax and Setocrepe. LQD wound spray was applied according to the manufacturer’s guidelines and the wound progressed from first review (Figure 2) to healing by week 6 of treatment (Figure 3).

Figure 1. Wound at presentation.

Figure 2. Wound at first review.

Figure 3. Wound at second review.

The average duration of the wounds in the group was 10.75 weeks before treatment with LQD wound spray. The average time to healing/complete wound closure was 7.85 weeks once LQD treatment was commenced. Therefore the nursing costs of managing this patient group before starting the evaluation were approximately £7651 whereas the nursing costs to healing were £3801 from the beginning of the study. The resulting nursing time costs saved were £3850.

The cost of the LQD spray was £315. Thus savings, including the cost of LQD spray, were £3535.

CONCLUSIONS

Although this evaluation cannot prove that LQD was the defining factor in the healing of venous leg ulcers in the eight patients participating, it could be said that the inclusion of LQD into the existing treatment regimen helped to trigger healing in the non-healing leg ulcers presenting at the clinic.

As discussed by Guest et al (2015), up to 47% of venous leg ulcers do not heal in any given year and the cost of treating non-healing ulcers versus a healed ulcer is 4.5 times greater. Therefore any intervention that can reduce the frequency of dressing changes and improve the overall status of the wound should be considered.

This small evaluation demonstrated that the use of LQD wound spray in the management of venous leg ulcers promoted wound healing or reduction in wound size in a group of patients who had previously failed to heal. Further evaluations are needed to explore the positive outcomes reported here and the associated cost savings.

REFERENCES


