Prontosan wound irrigation and gel: management of chronic wounds

Ann Horrocks

Abstract
Chronic wounds present a challenge that is costly in terms of quality of life to the patient and in financial terms for the NHS. Several factors contribute to the development of a chronic wound, in particular the influence of bacteria as a biofilm within the wound environment. Irrigating a wound with normal saline has long been advocated as the most appropriate method of wound irrigation but biofilms are now known to be resistant to this method of cleansing. A small (10 patient) evaluation of the use of Prontosan® in patients whose duration of chronic wounds exceeded 1 year has demonstrated that Prontosan wound irrigation and Prontosan gel are an appropriate alternative for cleaning, moistening and decontaminating encrusted, contaminated and chronic skin wounds, and can have a dramatic influence of the quality of life for such patients. This article discusses the cause of chronicity within a wound and discusses in depth three of the ten patients in the evaluation.

Key words: Wounds ■ Quality of life ■ Infection control

The care and management of wounds is claimed to cost the NHS £1 billion per year (Thomas and Harding, 2002). The aim in treating the majority of these wounds is to establish an environment that will promote normal and appropriately timed healing (Attinger et al, 2006).

Wound healing occurs as a result of a series of complex and highly ordered biochemical and cellular processes (Ovington and Eisenbud, 2004) that includes cell proliferation, migration, differentiation and remodelling (Thomas and Harding, 2002).

When cells and the wound environment are either compromised by local or systemic conditions, then healing is hindered and the wound may become chronic (Ovington and Eisenbud, 2004). A chronic wound is one that has not progressed normally through the stages of wound healing (Planagan, 1999) and has become fixed, usually in the inflammatory stage (Attinger et al, 2006).

Three factors contribute to the development of a chronic wound. These are firstly, cellular and systemic factors that occur due to ageing; secondly, repeated ischaemia, a reperfusion injury often with underlying ischaemia; and thirdly, bacterial colonization, also known as bioburden (Mustoe, 2004). It is also claimed that in addition to the wound’s bioburden other factors, such as foreign matter or necrotic tissue, if present in a wound, can delay or prevent normal healing by production of metalloproteases (Attinger et al, 2006). Metalloproteases are enzymes normally produced in the wound bed at specific times. There are four main types and they have an important role in all stages of wound healing. However, if their production becomes prolonged then they can be considered detrimental to wound healing (Toy, 2005).

Edwards and Harding (2004) argue that all wounds are contaminated with bacteria and that this alone will not disrupt the wound healing process. White et al (2001, 2002) emphasize that it is when this contamination changes to a state of critical colonization or infection that the bioburden in the wound is the most important contributing factor that impedes healing. Thus, the prevention of wound infection is considered the most important contributing factor if an acute wound is to be prevented from becoming chronic (White et al 2001, 2002).

Chronic wounds affect more than 1% of the population (Edwards and Harding, 2004) and form a large part of the community nurses’ workload (Stevens and Chaloner, 2005).

Irrigation has long been considered one of the most appropriate methods of cleansing a wound (Whiteside and Moorhead, 1999; Stotts, 2004). Substantial evidence exists that this should involve irrigation with a fluid that has a similar osmotic pressure to that found in living cells (Lawrence, 1997; Whiteside and Moorhead, 1999; Stotts, 2004). Although there is no clear consensus of opinion as to which is best in the community, cleansing of chronic wounds to remove foreign matter, necrotic tissue or bacteria is either with normal saline or tap water (Lawrence, 1997; Whiteside and Moorhead, 1999; Stotts, 2004; Beam, 2006).

It is known that various types of bacteria are sustained in chronic wounds (Edwards and Harding, 2004). Recent developments in wound care have identified that many of these bacteria live in communities known as biofilms (Cooper and Okhira, 2006). Biofilms are highly resistant to cleansing by irrigation and by treatment with antibiotics (Beam, 2006; Cooper and Okhira, 2006; Eberlein et al, 2006). Biofilms usually consist of several different types of aggregated bacteria that have become embedded in the wound surface by a self-secreted extracellular matrix.

Ann Horrocks is Tissue Viability Nurse Specialist, Somerset Primary Care Trust & Yeovil Foundation NHS Trust, Yeovil, Somerset

Accepted for publication: June 2006
Traditionally, wound cleaning and irrigation has been carried out using saline, often with limited effect.

**Gentle Power**
- Prontosan is a novel solution that has been shown to clean wounds gently, safely, and with greater efficiency as it contains betaine, a surface active solution that helps in removing difficult wound coatings.

**Cost Effective**
- We all know if you clean wounds better then they can heal quicker. This saves the health service money and improves the quality of life for patients.

**Available Now**
- Prontosan is available on drug tariff from November 1st 2006 in bottles, pods and an innovative gel which you can leave on between dressings for even greater effect.

---

For more information on how to clean wounds better, simply contact Freephone 0800 093 0100 or fill in your details below and return using the FREEPOST address.

- Please send me more information
- I would like samples
- Please arrange for a representative to visit me

Name: __________________________________________
Address: ________________________________________
Postcode: ________________________________________
Telephone: _______________________________________
polysaccharide matrix (Edwards and Harding, 2004). Critical colonization of a wound can lead to infection for which the use of antibiotics is controversial (Cutting, 2003). Advances in wound care have seen a range of silver dressing products become available, which appear to have some clinical benefit in eradicating critical colonization. However, evidence within the author's own Trust would indicate that the use of silver dressings is often in excess of the manufacturer's guidelines for duration of use and, therefore, inappropriate and costly.

It is claimed that due to the complexity of factors influencing a chronic wound, no single therapeutic intervention will have any significant impact on improving the wound (Mantoe, 2004). However, in May 2004 a consensus paper became available that advocated the use of an active substance, polyhexanide, as a first choice treatment for chronic, hard-to-heal wounds (Kramer et al, 2004).

**The product**

Clinical indications for Prontosan® wound irrigation and wound gel are for cleaning, moistening and decontaminating encrusted, contaminated and chronic skin wounds. Prontosan was first released in Holland and has been defined as a medical device, class Ilb. It became available on Drug Tariff prescription in the UK from 1 November 2006. Prontosan irrigation is suitable for wound bed preparation to remove biofilm prior to further treatment, and for the absorption of wound odours. The same bottle can be used for up to 8 weeks after opening. Prontosan gel is suitable for deep wounds and cavities. The irrigation is available in 350 ml bottles and 40 ml ampoules and is applied directly from the squeeze bottle. The gel is dispensed in a 30 ml cartridge bottle. Prontosan contains polyhexanide, which acts as a preservative against bacterial growth, Undecylenamidopropyl Betaine, a surfactant (See Box 1).

**Box 1. Prontosan wound irrigation and gel**

- Optimal wound conditioning
- Fast and effective removal of wound coatings
- Absorption of wound odours
- Can be used up to 8 weeks after opening

**Application**

Irrigate the wound with Prontosan solution and then for a minimum of 10 minutes apply gauze soaked in Prontosan irrigation. If applying Prontosan gel, apply a thin film over the wound bed, at least 3 mm thick if the wound is dressed daily, or 3-5 mm thick if the wound is to only be changed after several days. This is then followed by the use of an appropriate conventional wound care product as indicated by wound assessment. Initially it is advantageous to irrigate or soak the wound with Prontosan daily but improvements have been noted when wound cleansing with Prontosan has occurred less frequently. The author has found significant improvements to the wound, and removal of biofilm should be noted within 3 weeks.

**Aim of evaluation**

The aim was to undertake an evaluation of 10 patients in the community (see Table 1) who had chronic wounds that had previously been cleansed and irrigated for more than one month with normal saline. All use of normal saline was to be discontinued on commencing use of Prontosan.

**Objectives**

- Removal of biofilm: normal wound bed becoming visible within 3 weeks
- Reduction in wound size
- Compare use of antibiotic/silver prior to and during use of Prontosan
- Patient comfort
- Ease of application
- Note any adverse reactions

The evaluation of Prontosan wound irrigation and Prontosan wound gel with 10 patients was approved by the Wound Care Formulary Group, of which the author is a member.

Patients were only included if they gave informed consent. Further inclusion criteria were as follows:

- Patient was an adult (over 18 years)
- Patient had a chronic wound of more than one-month duration that had been treated with normal saline
- Normal saline was discontinued during the evaluation
- Patient had a wound that 'appeared' to contain biofilm
- No other change was to be made to wound care regimen or patient's care.

**Table 1. Patients included in survey**

<table>
<thead>
<tr>
<th>Pt. no.</th>
<th>Age - Sex</th>
<th>Type wound</th>
<th>Wound duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>67 - female</td>
<td>Venous leg ulcer</td>
<td>&gt;4 years</td>
</tr>
<tr>
<td>2</td>
<td>75 - female</td>
<td>Mixed aetiology leg ulcer</td>
<td>&gt;2 years</td>
</tr>
<tr>
<td>3</td>
<td>58 - female</td>
<td>Venous leg ulcer</td>
<td>&gt;4 years</td>
</tr>
<tr>
<td>4</td>
<td>85 - female</td>
<td>Bilateral mixed aetiology leg ulcers</td>
<td>&gt;5</td>
</tr>
<tr>
<td>5</td>
<td>71 - female</td>
<td>Venous leg ulcer</td>
<td>&gt;3 years</td>
</tr>
<tr>
<td>6</td>
<td>65 - male</td>
<td>Sacral &amp; hip grade 4 pressure ulcers</td>
<td>&gt;5 years</td>
</tr>
<tr>
<td>7</td>
<td>32 - male</td>
<td>Buttock wound</td>
<td>&gt;1 year</td>
</tr>
<tr>
<td>8</td>
<td>77 - male</td>
<td>Bilateral venous leg ulcers</td>
<td>&gt;2 years</td>
</tr>
<tr>
<td>9</td>
<td>38 - male</td>
<td>Abdominal wound</td>
<td>&lt;1 year</td>
</tr>
<tr>
<td>10</td>
<td>81 - female</td>
<td>Venous leg ulcer</td>
<td>&gt;2 years</td>
</tr>
</tbody>
</table>

In 7 of the 10 patients dramatic improvements to their wounds were noted within 3 weeks. As biofilm was eliminated, staff also reported significant reductions in exudate levels. Photography and tracing confirmed visual assessment that wound dimensions were reducing in size. In addition, patients and staff reported that previously malodorous wounds no longer had an odour.

Previously, all patients in the evaluation had required frequent periods when silver dressings were used as part of their wound care. During the evaluation 6 of the 7 patients with 'dramatic improvements' did not require the use of any silver product or antibiotics. One of the 7 required silver dressings daily for 2 weeks but no antibiotics. Of the
other 3 patients initially enrolled in the evaluation, 1 was withdrawn from the evaluation after 2 months as she was not concordant with any aspect of her treatment regimen, and the other 2 did not note any significant outcome after 3 weeks and were also withdrawn from the evaluation with their consent.

All patients reported that the use of Prontosan irrigation and Prontosan gel in the care and management of their chronic wounds resulted in significant improvements to the quality of their lives. One unexpected finding was that all patients reported that the wound pain they experienced was either totally eliminated or considerably reduced.

Morale and motivation was also seen to improve in the community nursing teams. All of the teams involved in caring for these patients had done so for some considerable time, often on a daily basis. With the use of Prontosan irrigation and Prontosan gel, not only were indolent wounds seen to improve but visits by the community nurses reduced from daily to alternate days or twice weekly visits. No adverse effects were noted with any patient.

Case studies

Although 7 of the 10 patients successfully completed this product evaluation, for the purpose of this article 3 case studies are described in detail, in particular quality of life outcomes.

Patient 1

Mr W was 65-year-old man with 5-year history of grade 4 pressure damage to both his right buttock extending into his hip and left buttock. Since January 2001 he had received daily visits from community nurses.

His past medical history included:
- Tetraplegia for 18 years following a road traffic accident
- Non-insulin dependent diabetes
- Chronic anaemia.

Previous failed treatment included:
- Plastic surgery
- Numerous wound care products
- Silver dressings for several months.

Both wounds:
- Contained biofilm and necrotic tissue
Were constantly malodorous, bled and often became infected.

Frequently necessitated antibiotic therapy.

Mr W received Prontosan irrigation, 10 minute soaks and then a thin application of Prontosan gel. No other change to treatment or pressure relief was made from the existing regimen. Dramatic results were seen to both pressure ulcers on commencing Prontosan. The patient, his wife and community nursing staff stated that the changes made a huge difference to morale.

The large ulcer to right hip and buttock measured 15 cm x 7 cm and was 3 cm deep. For the first few weeks it required daily dressing changes, but then the community nurses were able to reduce the dressing changes to alternate days. On one occasion the wound became critically colonized with *Pseudomonas aeruginosa* and a silver hydrofibre dressing was added to the regimen for 2 weeks after irrigation with Prontosan and an application of Prontosan gel.

Previous critical colonization had only been contained in both pressure ulcers by alternating silver hydrofibre and normal hydrofibre on a fortnightly basis for more than a year. In addition, the wound was no longer malodorous and exudate levels were considerably reduced. All bleeding from the wound, which used to occur regularly stopped. The left area of ulceration was originally 1.5 cm wide and 2 cm deep. The dressings for this ulcer were reduced to alternate days as soon as the Prontosan irrigation and gel were used. All bleeding and malodour were eliminated.

The mood and morale of the patient and his wife were so improved that they both attended their son’s wedding a few weeks later without any detriment to either of the pressure ulcers. This was the first time Mr W had left the house or the two of them had been to any social event together for 5 years. To date, the large pressure ulcer now measures at its widest and deepest points, 12 cm x 4.5 cm and 1 cm deep. The smaller pressure ulcer healed within 3 months.

**Patient 2**

Mrs Y was an 85-year-old woman with bilateral leg ulceration (circumferential to left leg and semi-circumferential to right leg) for more than 5 years. Both ulcers had been venous in origin, but Doppler studies indicated that they became mixed in aetiology and were no longer suitable for compression bandaging. Mrs Y had lived at home alone with daily support from her daughter.
Her past medical history included:
- Hypertension
- Arterial fibrillation
- Osteoarthritis.

Mrs Y received care and management of her leg ulcers from the community nurse whose daily visits took in excess of 1 hour. Both wounds contained more than 90% biofilm. Mrs Y was not able to tolerate going to bed for very long at night and was reluctant to take appropriate analgesia as prescribed by her GP. She experienced considerable pain especially at dressing changes.

For several years prior to commencing treatment with Prontosan, both legs had been irrigated with normal saline on each daily dressing change and once or twice a week washed in buckets of warm water prior to dressing. Wound care had been managed with a plethora of wound care products, including numerous silver products over many months with frequent courses of antibiotics prescribed. Within 2-3 hours of her ulcers being redressed Mrs Y experienced exudate striking through all layers of dressings and bandaging. This subsequently resuluted in her having wet legs and slippers.

Within 1 week of daily Prontosan wound irritation, followed by 10 minute soak and then application of Prontosan gel to all ulcerated areas, 50% of the biofilm in both ulcers disappeared.

This woman was very apprehensive about trying Prontosan as she had experienced so much pain with other dressings as well as with the use of saline and tap water. However, within 1 week exudate levels reduced and she no longer had wet dressings or slippers. Pain was less, especially on dressing change. Mrs Y reported that she found the Prontosan soothing, especially the gel.

Unfortunately, Mrs Y fell at home and fractured her femur. However, Prontosan had made such an improvement that both she and her daughter insisted on taking Prontosan into hospital for ward nurses to continue the treatment regime. Ward staff were given instruction in the use and application of Prontosan and the condition of the leg ulcers continued to improve. Sadly Mrs Y died from an unrelated illness while receiving nursing care in a community hospital. At the time of her death, her leg ulcers were completely free from biofilm.

One leg ulcer had contracted in size by more than 60% and the other had almost completely healed. Before her death, Mrs Y stated that she no longer dreaded wound care, and her dressing changes had been reduced to alternate days.

**Patient 3**

Mr R was a 77-year-old piano teacher, with bilateral venous leg ulcers (3 in total) and lymphoedema. He had lived alone since being widowed 2½ years ago, and had an elderly, 95-year-old father-in-law living locally who he looked after.

Mr R used to visit the local leg ulcer clinic, but 5 months previously found treatment of his leg ulcers so painful that he was unable to go out and, therefore, community nurses undertook his care. Pain from the ulcers had become so unbearable that he couldn’t walk after they were redressed despite taking analgesia, which included an opiate prior to dressing changes. On one occasion the pain caused him to feel faint and he required oxygen and a GP assessment. He had become unable to teach the piano on days that his dressings were changed.

When community nurses undertook Mr R’s wound care he had become housebound and could no longer look after.
his father-in-law. Visits for wound care were initially twice a week but wound exudate often leaked through dressings and bandages causing extensive maceration. Nurses were concerned about the detrimental effect of the exudate on the surrounding skin despite the use of skin barrier preparations.

After dressing changes Mr R. was unable to walk for at least 2 hours and was not able to prepare a meal at evening. It wasn’t until the next day that he would resume normal activities, such as teaching piano. Even so, he had found that this had become increasingly difficult and he had reduced his teaching load considerably. He slept poorly and would wake in the night with pain and had to take analgesia before he could get up in the morning. He looked pale and was unable to carry out his usual independent life of shopping, going to concerts and visiting his family. He became unable to drive.

Infection of the leg ulcers occurred regularly and to alleviate this, a honey dressing was used continuously.

His past medical history included:
- Fungal skin infections
- Slight anaemia — not treated by a GP
- Venous leg ulcers — largest for 2½ years and the other two for 1 year

Prontosan was commenced twice weekly. Pain levels were reduced immediately. However a change in the wound beds was noted. They had been pink and granulating slowly with the use of the honey dressing, but on commencing Prontosan they became sloughy and developed a yellow film. The Prontosan regimen was changed to daily and this improved the condition of the wound beds in ulcers 1 and 3 which became pink and granulating again. Ulcer 2, the largest and deepest ulcer, reduced in size and depth, but remained sloughy. Surrounding skin was no longer macerated as exudate levels were reduced significantly. Lymphoedema bandaging, which he had been unable to tolerate previously, was then incorporated into the treatment regimen.

On commencing treatment with Prontosan, Mr R. was able to walk around his house with a walking stick immediately after his dressing changes. By the evening he had resumed watering his roses, which he’d been unable to do before. Since commencing Prontosan as part of his wound care regimen Mr R. had not taken any opiate for breakthrough pain and his complexion changed from pale to pink. He started to see piano students the same day as dressing changes; he started to drive his car short distances around the town, started to do his own shopping again and run errands for his father-in-law. He also went out to the theatre and had lunch out with family and friends.

**Conclusion**

To conclude, in the treatment of chronic, indolent wounds that contain biofilm, this evaluation has demonstrated that Prontosan wound irrigation and Prontosan gel appears to offer, in the majority of patients, a safe and cost effective method of cleansing wounds which is more efficient than normal saline.


Erlstein T, Feussner H, Hoffmann M (2006) Expert assessment on the benefits of systemic application of Prontosan solution in wound treatment with particular focus on cost-efficiency when compared to current standard treatment (saline/Ringer) [German]. *Die Schweiz Der Pflegl* 45 Jahrg 9/06


**KEY POINTS**

- The care and management of wounds costs the NHS approximately £1 billion per year.
- Three factors contribute to the development of a chronic wound: 1) cellular and systemic factors that occur due to aging, 2) repeated ischemia — reperfusion injury often with underlying ischemia, 3) bacterial colonization.
- Irrigation is considered one of the most appropriate methods of cleansing a wound.
- Recent developments in wound care have identified that many bacteria live as biofilms which are highly resistant to cleansing by irrigation.
- Prontosan wound irrigation and wound gel for cleaning, moistening and decontaminating encrusted, contaminated and chronic skin wounds offers a safe and cost-effective method of cleansing wounds which is more efficient than normal saline.

This 10-patient evaluation of Prontosan wound irrigation and Prontosan gel was undertaken prior to the products’ availability on prescription and were supplied courtesy of B. Braun.