A clinically effective primary wound dressing that supports self-care for chronic and acute wounds

Abstract

Wound care forms a large component of the ever-increasing workload of district and community nurses. The need for a cost-effective product that can be used on a variety of wounds and that meets multiple requirements (e.g. protease modulation, anti-microbial, peri-wound skin protection, maceration control and barrier function) is well recognised. The plethora of wound dressings available today all fulfil some, although not all, of these requirements. Choosing the correct dressing decreases healing time, provides cost-effective care and improves patient quality of life. This article looks at the important properties of wound care products, investigates the need to release nurse time and describes how patients with wounds can engage in effective self-care, with a focus on 1 Primary Wound Dressing® (1PWD), a cost effective, easy-to-use product that has already demonstrated clinical efficacy. Case studies showing the successful use of 1PWD are also presented to highlight the clinical application of this novel product.

■ Self-care ■ Primary dressing ■ Anti-microbial ■ Peri-wound skin ■ Maceration

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It is well recognised that wound care imposes a substantial burden on NHS resources in the UK: Guest et al's (2015) seminal work showed that the cost incurred by the NHS for managing patients with acute and chronic wounds, as well as the associated comorbidities, was £5.3 billion for 2012/2013 (using 2013/2014 prices), and over 2.2 million patients were treated over this 12-month period. These patients were predominantly managed in the community by GPs and nurses and two-thirds of the annual cost was incurred in the community, with the rest being in secondary care (Guest et al, 2017a). Another study suggested that the rate of wound healing must increase by an average of 1% per annum across all wound types in order to slow down the increasing prevalence. Unless significant changes are implemented in the way that wound care is managed, the prevalence of wounds will increase by 11% each year (Guest et al, 2017a; 2017b). Another important factor in increasing wound care burden is the ageing UK population. Between 2015 and 2035, the absolute number of people aged 65 years or older in England will increase by 48.6%, while the numbers living independently will increase by 61% overall (Kingston et al, 2018). The ageing population also implies that wound patients will have an increasing number of comorbidities which impact on the ability of the wound to heal (Mahoney, 2017).

Wound care is managed across multiple settings by a range of health professionals (HCPs), and although tissue viability nurses have a wealth of experience and knowledge in dealing with all types of wounds, the majority of other nurses do not have this level of expertise. Thus, the type of dressing selected does not always follow best practice (Gray et al, 2018). One factor that patients find distressing is a perceived lack of continuity and consistency in dressings (McCaughan et al, 2018). In patients with acute surgical wounds being healed by secondary intention, use of a wide range of different dressings and dressing types is very common and negatively influences the patient's quality of life (Chetter et al, 2019). Thus, it would appear that patients prefer continuity during the wound healing process.

Self-care in wound management

The largest cost to the community nursing service in the NHS is the time spent by nurses with their patients, including that dedicated to changing dressings (Drew et al, 2007). Corrigan (2009) argued that patients are the greatest untapped resource within the NHS and for long now, healthcare research has recognised the importance of self-care and patient activation. Hibbard and Gilburt (2014) showed that the outcomes are better in patients with higher activation. Charles et al (2018)

suggested that patients should be encouraged to take control of their own health and care, and families and carers should be involved in delivering care. A study by Kapp et al (2018) suggested that healthcare systems should create more patient-centred models, specifically of wound care, in a community setting. Self-management of wounds not only reduces nurse time but also avoids travel and expense for patients who can dress the wound in their own home. A review by the Nuffield Trust found that community initiatives designed to support self-care reduced hospital activity and whole-system costs (Imison et al, 2017).

Through self-management of their condition, patients can become involved in problem solving, decision-making, resource utilisation and taking action (Lorig and Holman, 2003). The patient-caregiver relationship transforms into a collaborative partnership with shared responsibility (De Silva, 2011). Patients experience more control over their condition, improvements in their symptoms, better quality of life, and more convenient care (British Medical Association, 2015).

It is necessary to find an easy-to-use, effective product that can be given to patients to self-care, thus reducing the number of times they need their dressing changed by a HCP, releasing nurse time and encouraging patients to participate in the healing of their wound. Although many existing wound-care products fulfil some of the attributes desirable in such products (explored below in this article), few act as a 'one-stop product' that simultaneously meets multiple requirements.

Attributes of a wound-care product

The following attributes have been defined as important during all the wound healing phases:

- Moist wound environment: moisture is one of the most important factors in wound healing and is an essential feature in modern wound-care products (Winter, 1962). A moist wound environment is known to support wound healing by facilitating cell migration and diffusion of signalling molecules and nutrients into the wound area (Sharman, 2003)
- Prevention of dressing adherence (painless dressing change): dressing change may be associated with pain and damage to the granulation tissue and regenerating epithelium due to adherence of the dressing to the wound bed. This should be avoided by the application of a non-adherent primary dressing (Burton, 2004)
- Antimicrobial effect: wounds are prone to bacterial infection during the entire healing phase (Guo and DiPietro, 2010). Minimisation of local infection risk as well as reduction of the existing bacterial load can be achieved by employment of a wound dressing that exerts an antimicrobial effect (Woo et al, 2008)
- Care of the peri-wound skin: two main problems are often encountered in wound care, especially in the treatment of chronic wounds: first, the skin of patients with chronic wounds (mostly older adults, often suffering from vascular pathology and/or diabetes) often has insufficient blood and nutrient supply, leading to dryness and scaling, with impaired skin barrier function (Cameron, 2004). Second, the peri-wound skin may be macerated due to constant exposure to wound exudates (Butcher, 2000). Therefore, improving the elasticity and barrier function of the peri-wound skin as well as protecting against wound exudates is an important part of modern wound care (Cutting and White, 2002).

1 Primary Wound Dressing®

1 Primary Wound Dressing® (1PWD) (distributed in the UK by Gardamed Ltd) is a hydroactive, primary wound dressing, applied in spray form, consisting of a specially formulated combination of neem oil and *Hypericum perforatum* (St. John's wort) oil. Due to its broad mode-of-action, 1PWD enables a very simple treatment of acute and chronic wounds. 1PWD is available on UK Drug Tariff in 10 ml (118 puffs or an area of 378 cm^2) or 17 ml (200 puffs or an area of 640 cm^2).
The advantages of the 1PWD simple wound care protocol (*Figure 1*) are as follows:

- Reduction in the number of visits to the outpatient clinic or visits from the community nurse due to the ability of the patient or a family member to perform the dressing change
- Elimination of products for the protection of the wound edge and improvement of the condition of the peri-wound skin
- Reduction in the number of debridement episodes (Eggenberger, 2013)
- Reduction in the number of wound cleansing episodes with antiseptic solution (Eggenberger, 2013).

Product application

1PWD is sprayed directly onto the wound bed and the peri-wound skin from a distance of 5–10 cm. A clear oil film must be visible. The wound and peri-wound skin is then covered with an appropriate secondary dressing. The recommended secondary dressing is a non-woven gauze or, in rare cases, an absorbent appropriate to the volume of wound exudate. 1PWD has a shelf-life of 42 months, which remains valid even once the product has been used for the first time.

Indications for use

1PWD is indicated for the treatment of following types of acute and chronic wounds:

- Postsurgical wounds that heal by secondary intention (abscess, pilonidal sinus, scalp wounds etc.)
- Acute, traumatic wounds that heal by secondary intention (burn, abrasion, cut etc.)
- Venous or arterial leg ulcers
- Diabetic foot ulcers
- Pressure ulcers

Properties

1PWD creates a thin oil film on the wound surface, which prevents moisture evaporation from the wound due to the hydrophobic nature of the oil. By reducing moisture evaporation, 1PWD creates a moist wound environment. The longer C-molecule chains (12-22 C atoms) in the natural oils present in 1PWD allow semi-permeability. The manufacturer tested 1PWD under simulated lab conditions, and it was found to have the

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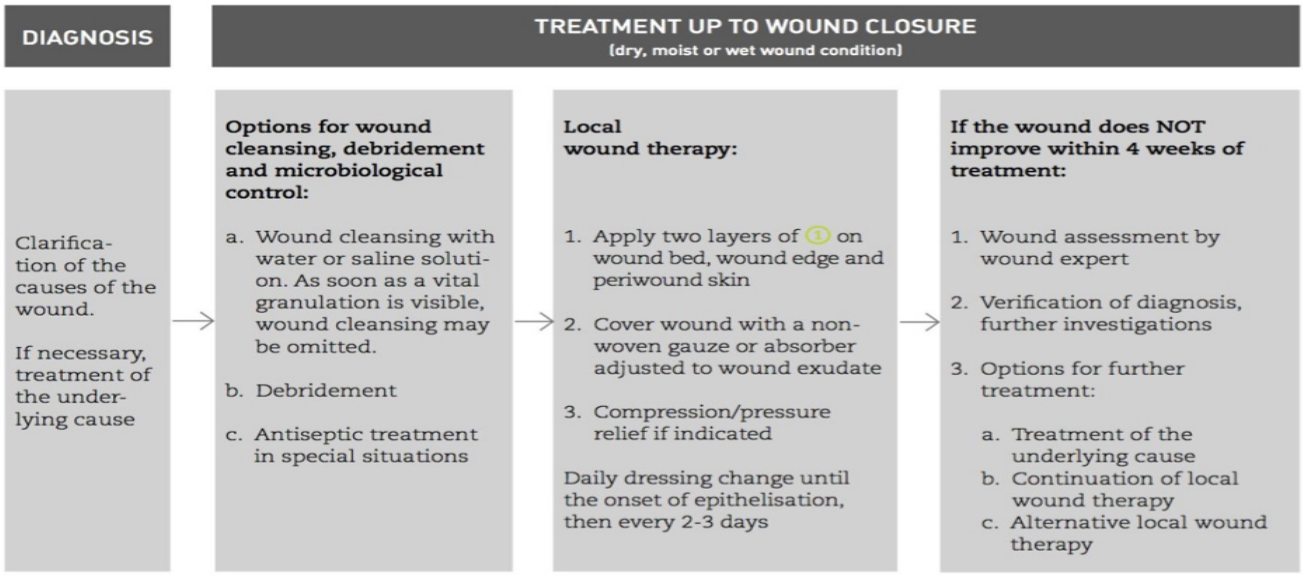

Figure 1. Wound care protocol using 1PWD

ability to create a semi-occlusive barrier that reduces moisture transmission away from the wound site.

1PWD exhibits an antimicrobial effect without cytotoxic side effects that inhibit wound healing. The antimicrobial effect is based on a physical mode of action, due to its high content of unsaturated fatty acids. Fatty acids, such as oleic and linoleic acid, cover the bacterial cell membrane, which immobilises the organisms, and cause lysis of the bacterial cell walls due to their surface activity (Desbois and Smith, 2010; Galbraith and Miller, 1973). The antimicrobial properties of 1PWD mean that even in the uncontrolled environment of a patient's home, infection control is maintained. Additionally, the non-touch application of this product further reduces the risk of infection.

As seen in *Figure 1*, it is necessary to adapt the secondary dressing choice to the amount of exudate. The oil film in 1PWD prevents secondary dressings from adhering to wounds, thus enabling easy and painless dressing changes. 1PWD is not provided on gauze as a carrier material, but as a spray, which can be applied to any size and type of wound. The usage of non-adherent wound dressings supports wound healing, since damage of the granulation tissue and regenerating epithelium during dressing change is prevented. This leads to improved epithelisation and decrease of pain during dressing change. Hunziker et al (2012) examined the changes in subjectively experienced pain during the treatment of 105 patients using 1PWD. They found that the application of 1PWD clearly had a pain-reducing effect for patients with chronic wounds.

Eggenberger (2013) compared the number of dressing changes based on the existing wound care protocol in a care home (phase II, 4 weeks) with the number of dressing changes using 1PWD (phase III, 4 weeks) during a 2-month audit phase. During each dressing change, it was documented whether the wound needed to be cleaned and if debridement was necessary. Eggenberger et al (2013) found that 1PWD appears to reduce the number of debridement episodes and the number of dressing changes with cleansing. During phase II, using the existing wound care protocol, 90% of dressing changes required wound cleansing and 29% needed debridement. During phase III, using 1PWD, only 43% of dressing changes required wound cleansing and 5% needed debridement.

The skin area around a wound is often dry, scaly and irritated by wound exudate (Adderley, 2010). 1PWD protects the skin and supports a healthy skin barrier function (Hunziker et al, 2012) due to its high content of unsaturated fatty acids (Prottey et al, 1976; Viola and Viola, 2009).

In 2011, clinicians and wound experts from eight Swiss hospitals generated 105 case reports from patients who had been treated with 1PWD. There were 37 acute and 68 chronic wounds with an average patient age of 70 years (Hunziker et al, 2012). At the start of treatment, the peri-wound skin of 12.3% (13/105) of wounds was macerated. After 50% of treatment the peri-wound skin of 4% (4/105) of all wounds was macerated; this equates to a reduction of 70%. 1PWD therefore has the potential to reduce maceration of a wound. Out of the 92 wounds without any sign of maceration, no maceration was developed during the course of treatment with 1PWD.

In an observational study, Herzig et al (2014) trialled the use of 1PWD among 174 patients with wounds between November 2012 and October 2013. The types of wounds the patients had included abscess excision (n=60), pilonidal sinus (n=28), traumatic wound (n=12), venous leg ulcer (n=12), suture dehiscence (n=9), burn wound (n=8), diabetic foot ulcer (n=6), arterial leg ulcer (n=4) and others (n=35). Treatment with 1PWD led to complete wound closure in 153 of the 174 patients (88%). In 21 cases (12%), the treatment was stopped for reasons not related to the use of 1PWD (surgical intervention and primary closure, assistant doctor or patient non-compliance). Treatment was only discontinued in 2.8% of cases due to reasons related to 1PWD (e.g. irritation, allergic reactions or maceration). The results suggest that use of 1PWD in combination with a simple secondary dressing is an effective treatment strategy for the majority of acute and chronic wounds.

The specialists involved in the Hunziker study reported that in 57 of the 105 cases (54%) the granulation phase was induced faster with 1PWD than with competitor products. Läuchli et al (2014) compared the results of their observational study using 1PWD with the results reported in the literature for standard treatment. It reportedly takes 13 weeks on average for scalp wounds with exposed bone to heal by secondary intention when modern wound dressings are applied (Becker et al, 1999), and Läuchli et al (2014) reported an average time to healing of 8.1 weeks, which is a clear indication of the speed of granulation associated with 1PWD treatment.

Lenz et al (2015) similarly compared their observational findings using 1PWD with those reported in the literature on the use of conventional dressing to treat pilonidal sinus wounds. According to literature, it takes 64–91 days on average for pilonidal sinus wounds to heal by secondary intention when modern wound dressings are applied, while Lenz et al (2015) reported an average time to healing of 48 days with 1PWD, further supporting the speed of granulation induced by this product.

Support for self-care

The application of 1PWD in combination with a simple secondary dressing improves the self-management of wounds. Herzig et al (2014) showed that among the 174 patients treated with 1PWD over 12 months, 163 patients (94%) or a family member were able to perform the dressing change between the weekly or bi-weekly visits to the outpatient clinic. Läuchli et al (2012) confirmed this result, observing a self-management rate of 80% for patients with post-surgical scalp wounds with exposed bone following a tumour excision.

Case studies

Case 1

A 58-year-old man who had multiple sclerosis and was wheelchair bound had undergone surgery 12 months and 18 days previously, and had a post-surgical wound over the middle of the abdomen that had persisted for over 12 months (*Figure 2a*). This was diagnosed as post-surgical dehiscence by the tissue viability nurse and surgical team. The wound size at presentation was 13.5 x 9 cm. He had been receiving care at home for this wound, provided by a district nursing team. This had involved negative-pressure wound therapy for the first 4 months after the surgery, followed by treatment using a chitosan-based primary dressing every day or on alternate days, depending on the levels of exudate as assessed by the district nursing team. A barrier cream was used on the peri-wound skin/wound edges, and a super-absorbent polymer-based dressing was used as the secondary dressing. The dressing had to be changed by a nurse every day, and each change took about 25 minutes, on average.

Daily application of 1PWD spray was started after the patient's wound had shown no response to the ongoing treatment regimen for 2 months. Each application took 10 minutes on average, and gauze secured with adhesive tape was used as the secondary dressing.

After 2 weeks, the patient's wife took over 1PWD spray application from the nurse, who then only needed to visit twice a week. With just two applications of 1PWD, the peri-wound skin appeared less damaged and the exudate levels reduced (*Figures 2b* and *2c*). Additionally, the patient had been prescribed multiple antibiotic courses for suspected wound infection by his GP, but no longer needed them once 1PWD treatment was initiated. Complete wound closure was achieved in 55 days (*Figure 2d*).

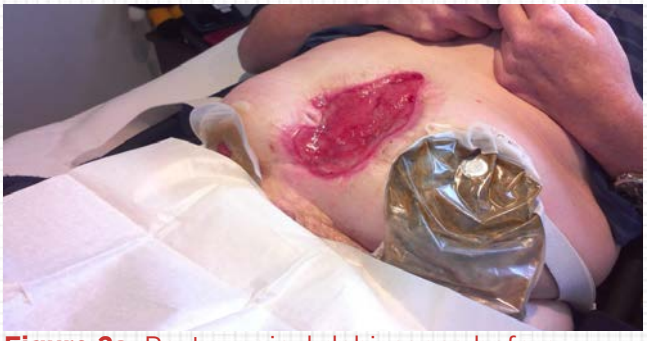

Figure 2a. Post-surgical dehiscence before 1PWD treatment

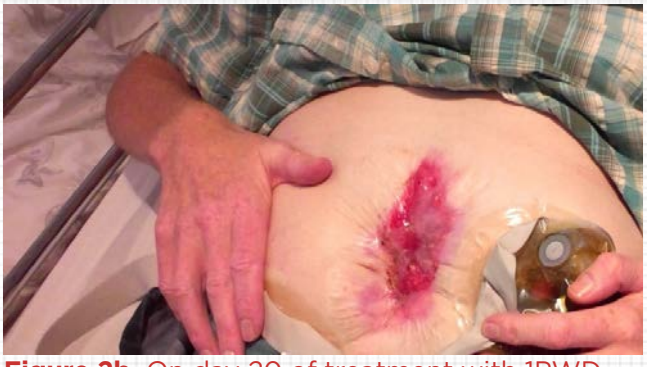

Figure 2b. On day 20 of treatment with 1PWD

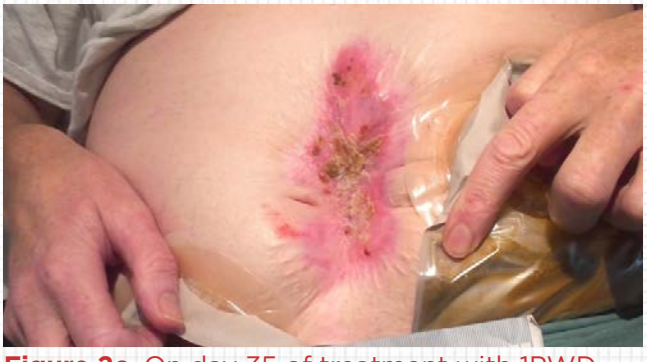

Figure 2c. On day 35 of treatment with 1PWD

Figure 2d. Complete wound closure, observed on day 55 of treatment with 1PWD

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Case 2

A 38-year-old woman with spina bifida who was wheelchair-bound developed a pressure ulcer on the lower back 10 months previously. The wound size was 8.2 x 7.8 cm (*Figure 3a*). This wound had recurred three times in the past 4 years, and the patient was receiving treatment for it at home. The patient was also using a specialist sleep system for offloading.

Treatment consisted of a hydrofibre-based primary dressing and a foam dressing as the secondary one. Although the wound was in a hard-to-access location, this dressing regime was simple and therefore did not take very long to complete; however, it did not produce any notable healing. The dressing had to be changed by the treating nurse every other day.

Treatment with 1PWD spray administered once daily was started, and the patient reported that it was more comfortable than the previous dressings used (*Figure 3b*). After some education, her family members could apply the spray themselves, and the nurse visits reduced from daily to three times a week. Although complete wound healing was not achieved at the time of writing, significant improvements were observed in all wound aspects, and the wound size had reduced to 6.2 x 5.1 cm (*Figure 3c*). Treatment is ongoing.

Case 3

A 51-year-old man presented with post-surgical dehiscence over the abdomen that had not healed for the last 3 years (*Figure 4a*). He was a smoker and had a BMI of 36. Three years previously, he had undergone surgery for a bowel obstruction.

The patient had been receiving treatment for this wound at home. The primary dressing used was a foamed dressing, and no barrier creams or secondary dressings were being used. The dressing had to be changed by a nurse daily.

Treatment with 1PWD spray administered once daily was initiated. At the time of writing, the number of nurse visits had reduced to twice a week, and the patient continued to self-care using 1PWD spray the rest of the days. In this case, complete wound closure was not achieved at the time of writing, but the

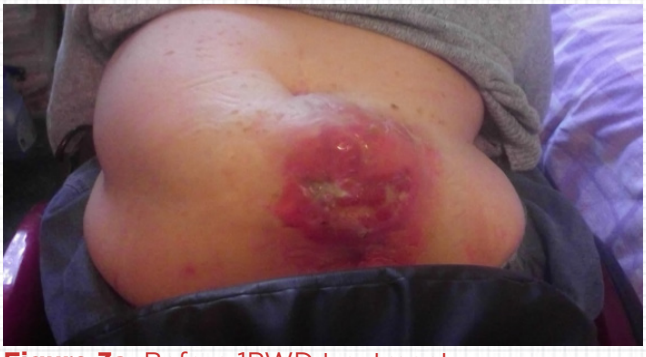

Figure 3a. Before 1PWD treatment

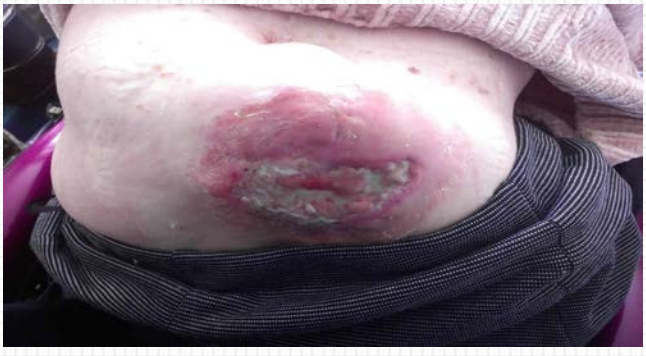

Figure 3b. On day 12 of treatment with 1PWD

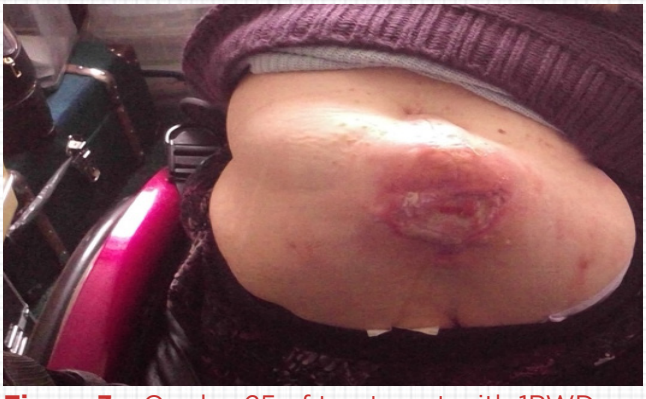

Figure 3c. On day 25 of treatment with 1PWD

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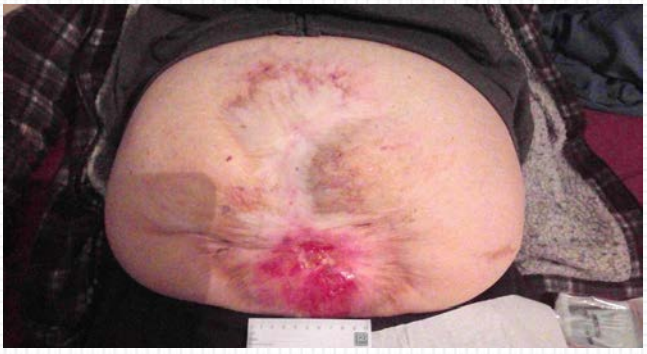

Figure 4a. Before 1PWD treatment

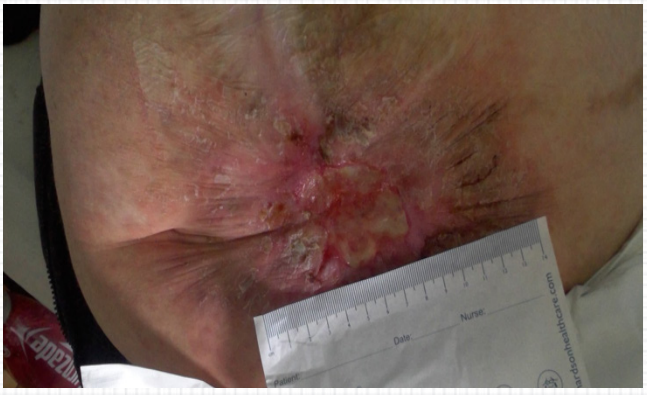

Figure 4b. On day 14 of 1PWD treatment

Figure 4c. On day 48 of 1PWD treatment

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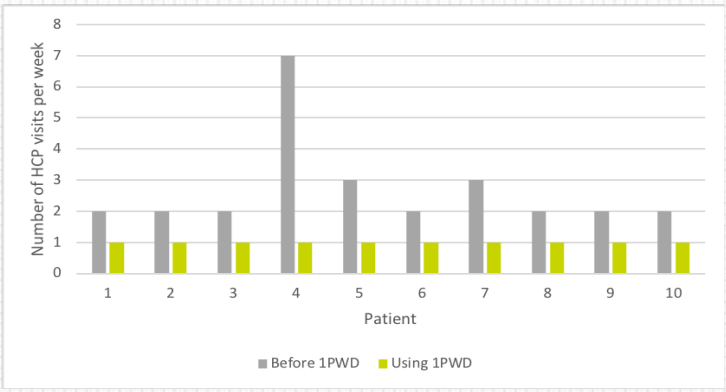

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Figure 5. Reduction in number of health professional (HCP) visits with the use of 1PWD

Table 1. Results of Northumberland trial

Wound type	Number of wounds that healed in 8 weeks	Number of wounds unchanged after 8 weeks	Number of wounds with signs of infection
Leg ulcer (n=3)	2	1	0
Surgical wound (n=1)	1	0	0
Traumatic wound (n=5)	4	0	0
Pressure ulcer (n=1)	1	0	0

wound size, which had remained largely unchanged for the last 3 years, reduced from 4.5 x 3.5 cm to 1.2 x 1 cm (*Figures 4b* and *4c*). Additionally, the patient reported less irritation of the peri-wound with 1PWD spray than with the previously used dressing. Treatment is ongoing.

Snapshot of Northumberland trial

A collaborative project was set up between the tissue viability team at the Northumberland Healthcare NHS Trust and Phytoceuticals SA (the manufacturers of 1PWD), with the purpose of evaluating the use of 1PWD in patients with acute and chronic wounds. This was the first trial of 1PWD in the UK. The evaluation aimed to assess if the use of 1PWD allows for a simple dressing change that enables self-care of wounds, reduces the frequency of nurse visits and simplifies the existing dressing change, with wound healing progress that is equivalent to or better than standard wound care treatment.

The wound types included in the evaluation were leg ulcers, category 2 pressure ulcers, post-surgical wounds and traumatic wounds. Ten patients who were deemed suitable for self-care with 1PWD on a daily basis were recruited. These patients provided signed consent forms to participate in this study. The patients were aged from 52–92 years, and three had leg ulcers, one had a surgical wound, five had traumatic wounds and one had a pressure ulcer. At baseline, the following parameters were assessed by the clinicians:

- Duration of wound
- Size/area of wound
- Previous dressing regime
- Pain medication, if used
- Dressing change frequency carried out in outpatient clinic or in the patient's home by a nurse.

The patients were trained on how to use the 1PWD spray and told to use it on a daily basis at home and to record how long the dressing change took. On a weekly basis, they visited the research nurse, who recorded wound status, size and dressing change time. The wound was treated until it healed or for a maximum of 8 weeks.

The nurse and patients were asked to either tick boxes or assign a score to the following questions:

- Safety: did you observe any adverse events or reactions during treatment with 1PWD?
- Performance: compared to your clinical experience, how do you rate the time to wound closure?
- Efficiency: compared to your clinical experience, how long was the total time needed for a dressing change?
- Simplicity for healthcare specialist: how do you evaluate the handling of the spray?
- Simplicity for patient: ask your patient to evaluate the handling of the spray
- Could the dressing change frequency by a healthcare specialist be reduced?
- Overall impression of the treating specialist

The findings showed that the number of dressing changes by a nurse was reduced by at least 50% from before the use of 1PWD was initiated (*Figure 5*). Further, the results indicated that 8/10 wounds healed within the 8-week time scale, one remained unchanged and one improved (*Table 1*). In 7 of the 10 cases, the performance of 1PWD was deemed faster by the research nurse compared to their previous clinical experience for the same type of wound. All 10 patients or their carers reported that they found the 1PWD spray easy to handle, and the overall scoring by the specialist nurse, when considering product efficacy, cost-effectiveness and ease of use, was an average of 9/10.

Thus, this trial found that 1PWD has the potential to reduce the number of dressing changes performed by nurses by at least 50%. The product was well tolerated by all participants and seemed to be suitable for patients within a wide age range, who found it easy to use. Further, the performance of 1PWD was rated by the specialist nurse as faster than the previously used dressings in 70% of the cases.

Conclusion

As demand for nursing time increases, it is vital to find products that are efficient, easy to use and readily accepted by patients and carers with equivalent or improved healing rates. There is a gap in the UK market for an all-in-one, efficient wound dressing that easily enables patient self-care, and this is the first report of a trial of this product in the UK. 1PWD could help to free nurse time by reducing the frequency of nurse-led dressing changes and enabling patient self-management. This product meets all the

requirements of a complete wound care product and is beneficial to patients in that it reduces pain at dressing change and facilitates self-management. **CWC**

Conflicts of interest: none

Adderley UJ. Managing wound exudate and promoting healing. Br J Community Nurs. 2010;15(3):S15-6, 18, 20. https://doi.org/10.12968/bjcn.2010.15.Sup1.46907

Becker GD, Adams LA, Levin BC. Secondary intention healing of exposed scalp and forehead bone after Mohs surgery. Otolaryngol Head Neck Surg. 1999; 121(6):751–754. https://doi.org/10.1053/hn.1999.v121.a98216

British Medical Association. Self care: question and answer. 2015. https://tinyurl.com/y4z5lqjc (accessed 29 May 2019)

Browning P. The House of Lords debates wound care strategy. J Wound Care. 2017; 26(12):707–711. https://doi.org/10.12968/jowc.2017.26.12.707

Burton F. An evaluation of non-adherent wound-contact layers for acute traumatic and surgical wounds. J Wound Care. 2004; 13(9):371–373. https://doi.org/10.12968/jowc.2004.13.9.26701

Butcher M. The management of skin maceration. 2000. Nursing Times. https://tinyurl.com/y2up63qd (accessed 30 May 2019)

Cameron J. Exudate and the care of the peri-wound skin. Nurs Stand. 2004; 19(7):62–68. https://doi.org/10.7748/ns2004.10.19.7.62.c3737

Charles A, Ham C, Baird B, Alderwick H, Bennett L; the King's Fund. Reimagining community services: making the most of our assets. 2018. https://tinyurl.com/ycajmjpc (accessed 15 May 2019)

Chetter IC, Oswald AV, McGinnis E et al. Patients with surgical wounds healing by secondary intention: a prospective cohort study. Int J Nurs Stud. 2019; 89:62–71. https://doi.org/10.1016/j.ijnurstu.2018.09.011

Corrigan P. 'DIY doctors: patients can boost NHS's value'. Health Serv J. 2009; 119(6154):12–13

Cutting KF, White RJ. Avoidance and management of peri-wound maceration of the skin. Prof Nurse. 2002; 18(1):33–36.

De Silva D. Helping people help themselves. A review of the evidence considering whether it is worthwhile to support self-management. 2011. https://tinyurl.com/y5kscded (accessed 15 May 2019)

Drew P, Posnett J, Rusling L; Wound Care Audit Team. The cost of wound care for a local population in England. Int Wound J. 2007; 4(2):149–155. https://doi.org/10.1111/j.1742-481X.2007.00337.x

Desbois AP, Smith VJ. Antibacterial free fatty acids: activities, mechanisms of action and biotechnological potential. Appl Microbiol Biotechnol. 2010; 85(6):1629–1642. https://doi.org/10.1007/s00253-009-2355-3

Eggenberger K. Ein einfaches Wundkonzept für die Langzeitpflege. 2013. https://tinyurl.com/y2e6u7dy (accessed 15 May 2019)

Evans K. Improving wound care by reducing variation in practice. 2017. https://tinyurl.com/yypu82zd (accessed 15 May 2019)

Galbraith H, Miller TB. Physicochemical effects of long chain fatty acids on bacterial cells and their protoplasts. J Appl Bacteriol. 1973; 36:647–658. https://doi.org/10.1111/j.1365-2672.1973.tb04150.x

Gray TA, Rhodes S, Atkinson RA et al. Opportunities for better value wound care: a multi-service, cross-sectional survey of complex wounds and their care in a UK community population. BMJ OPEN 2018; 8:e019400. https://doi.org/10.1136/bmjopen-2017-019440

Guest JF, Ayoub N, McIlwraith T et al. Health economic burden that wounds impose on the National Health Service in the UK. BMJ Open. 2015; 5(12):e009283. https://doi.org/10.1136/bmjopen-2015-009283

Guest JF, Ayoub N, McIlwraith T et al. Health economic burden that different wound types impose on the UK's National Health Service. Int Wound J. 2017a; 14(2):322–330. https://doi.org/10.1111/iwj.12603

Guest JF, Vowden K, Vowden P. The health economic burden that acute and chronic wounds impose on an average clinical commissioning group/health board in the UK. J Wound Care. 2017b; 26(6):292–303. https://doi.org/10.12968/jowc.2017.26.6.292

Guo S, DiPietro LA. Factors affecting wound healing. J Dental Res. 2010; 89(3):219–229. https://doi.org/10.1177/0022034509359125

Herzig W, Lenz A. A simple, effective and economical protocol for the treatment of acute and chronic wounds. Results from a 12-months observational study. Presented at European Wound Management Conference, Madrid, Spain, 14–16 May 2014

Hibbard J, Gilburt H; The King's Fund. Supporting people to manage their heath. An introduction to patient activation. 2014. https://tinyurl.com/yagdq69v (accessed 15 May 2019)

Hunziker T, Hafner J, Streit M, Läuchli S. Plant-derived wound spray for acute and chronic skin wounds. Wund Manage. 2012; 6:270–274

Imison C, Curry N, Holder H et al. Shifting the balance of care: great expectations. 2017. https://tinyurl.com/y5z6t4fs (accessed 15 March 2019)

Kapp S, Miller C, Santamaria N. The quality of life of people who have chronic wounds and who self-treat. J Clin Nurs. 2018; 27(1–2):182–192. https://doi.org/10.1111/jocn.13870

Kingston A, Comas-Herrara A, Jagger C; for the MODEM project. Forecasting the care needs of the older population in England over the next 20 years: estimates from the Population Ageing and Care Simulation (PACSim) modelling study. Lancet Public Health. 2018; 3:e447. https://doi.org/10.1016/S2468-2667(18)30118-X

Läuchli S, Vannotti S, Hafner J, Hunziker T, French L. A plant-derived wound therapeutic for cost-effective treatment of post-surgical scalp wounds with exposed bone. Forsch Komplementmed. 2014; 21(2):88–93. https://doi.org/10.1159/000360782

Läuchli S, Hafner J, Wehrmann C, French LE, Hunziker T. Post-surgical scalp wounds with exposed bone treated with a plant-derived wound therapeutic. J Wound Care. 2012; 21(5):228–233. https://doi.org/10.12968/jowc.2012.21.5.228

Lenz B, Herrmann U, Illien U, Diener W, Herzig W. Pilonidal sinus wounds: secondary intention healing with a plant-based wound therapeutic. Wund Manage. 2015;9(2):48–53

Lorig KR, Holman H. Self-management education: history, definition, outcomes, and mechanisms. Ann Behav Med. 2003; 26(1):1–7. https://doi.org/10.1207/S15324796ABM2601_01

Mahoney K. More wounds, less time to treat them: 1717 nurses discuss the challenges in wound care in a series of study days. Br J Community Nurs. 2017; 22(6):S33–S38. https://doi.org/10.12968/bjcn.2017.22.Sup6.S33

McCaughan D, Sheard L, Cullum N, Dumville J, Chetter I. Patients' perceptions and experiences of living with a surgical wound healing by secondary intention: a qualitative study. Int J Nurs Stud. 2018; 77:29–38. https://doi.org/10.1016/j.ijnurstu.2017.09.015

Prottey C, Hartop PJ, Black JG, McCormack JI. The repair of impaired epidermal barrier function in rats by the cutaneous application of linoleic acid. Br J Dermatol. 1976; 94:13–21

Sharman D. Moist wound healing: a review of evidence, application and outcome. 2003. https://tinyurl.com/y2vuzrzb (accessed 15 May 2019)

Viola P, Viola M. Virgin olive oil as a fundamental nutritional component and skin protector. Clin Dermatol. 2009; 27(2):159–165. https://doi.org/10.1016/j.clindermatol.2008.01.008

Winter GD. Formation of the scab and the rate of epithelization of superficial wounds in the skin of the young domestic pig. Nature. 1962;193:293–294. https://doi.org/10.1038/193293a0

Woo KY, Ayello EA, Sibbald RG. SILVER versus other antimicrobial dressings: best practices! Surg Technol Int. 2008; 17:50–71

KEY POINTS

- Self-care is an important consideration for decision-making around dressing choice
- Reducing the frequency of dressing changes performed by nurses can help save nurses' time, reduce NHS costs and facilitate patient activation
- There is a dearth of wound management products that meet multiple requirements
- Pain associated with dressing change needs to be explored and managed appropriately.

CPD REFLECTIVE QUESTIONS

- Why is the theory of moist wound healing important?
- How does the reduction of debridement episodes improve the wound healing process?
- What are the benefits for patients who are involved in their own wound healing?