

Hard-to-heal wounds: results of an international survey

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Abstract

Aims: A multinational e-survey was conducted to establish the understanding and clinical practices of treating 'hard-to-heal' ulcers. **Methods:** 1249 fully completed responses were included in the analysis. The majority of respondents were nurses (n=1037; 83%), most of whom had experience in chronic wound management (over 72% had over five years' experience). Most (n=986; 79%) regularly treated hard-to-heal ulcers and regarded them as a significant part of their caseload. Prognostic indicators volunteered for hard-to-heal wounds were: wound size, duration, presence of necrotic tissue, infection, exudate level, and response to treatment. **Results:** Most practitioners (n=986; 79%) monitored healing weekly and the majority of these (n=937; 95%) felt it possible to predict refractory ulcers, although many respondents (n=641; 65%) reported that they did not have validated tools to assess these ulcers. Early detection was recognised as important in avoiding chronicity. Historical healing time data were obtained for venous leg ulcers and diabetic foot ulcers, as were treatments used. **Conclusions:** The proportion of ulcers (30%) failing to heal with current 'standard care' highlighted the need for assessment tools, practitioner education, and access to modern treatments if this figure is to be reduced. **Conflict of interest:** This study was supported by a research grant from Mölnlycke Health Care.

KEY WORDS

'Hard-to-heal' ulcers
Diabetic foot ulcer
Venous leg ulcer
Clinician survey

Chronic' or 'hard-to-heal' wounds can be defined as those lesions that do not follow the normal processes of repair and hence heal more slowly than acute wounds (Harding et al, 2006). Approximately 1–2% of the population will suffer from a chronic wound such as a leg ulcer during their lifetime (Reichenberg and Davis, 2005). The prevalence of such ulcers increases with age to about 20 per 1000 of the population at the age of

80 years (Nelson et al, 2006). Examples of typically 'chronic' wounds are venous leg ulcers (VLUs), diabetic foot ulcers (DFUs) and pressure ulcers. Reported healing rates for both DFUs and VLUs vary considerably. In one DFU study, a 79% healing rate was achieved at 25 weeks with standard care (Piaggese et al, 1998). Conversely, Margolis et al (2005)

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have reported healing rates in DFUs to be as low as 24% at 12 weeks, and 31% at 20 weeks. Approximately 20–30% of VLUs fail to respond to standard treatment (Barwell et al, 2004; Margolis et al, 2005), and in some cases, despite the use of compression therapy, more than 20% of VLUs failed to heal after 70 weeks (Rippon et al, 2007). Such recalcitrant wounds may require the

use of 'advanced therapies' to stimulate and expedite tissue repair (Silhi, 1998; Rippon et al, 2007).

It is essential that clinicians are able to differentiate between a wound that is likely to heal with standard treatment, and a truly non-responding wound, (otherwise referred to as a hard-to-heal wound [Moore, 2003]) that will require (and justify) a different treatment approach. Central to the treatment of such hard-to-heal wounds is that they are recognised as early as possible in order to implement the use of appropriate therapies. Only recently have diagnostic tools and algorithms become available to allow clinicians to identify patients with such wounds (Korstanje, 1995; Benbow et al, 1998; Moore, 2003; Boyd et al, 2004; Charles et al, 2008; Gohel et al, 2008; Vowden et al, 2008; Rayment and Upton, 2009; White, 2010). However, the general availability of these tools and advanced therapies for use by healthcare professionals involved in wound management and the treatment of hard-to-heal wounds is not widely known.

With this in mind, a multinational survey of clinicians involved in wound care was undertaken to assess their

awareness of the mechanisms underlying the development of hard-to-heal wounds and the options available for their treatment. The goals included:

- ▶ Collating and using these data to generate a consensus for future educational needs related to the treatment of hard-to-heal wounds
- ▶ Raising awareness of hard-to-heal wounds
- ▶ Establishing a definition of hard-to-heal wounds
- ▶ Determining clinicians' awareness of new treatments available for VLU and DFUs
- ▶ To identify the obstacles believed to prevent the optimal treatment of these ulcers
- ▶ Evaluating clinicians' awareness, and usage of advanced treatments
- ▶ Determining the educational and information needs required to support the clinician in procuring effective treatments for hard-to-heal wounds.

In obtaining, analysing, and publishing this information, it is hoped that the clinical magnitude of hard-to-heal wounds (and their treatment options) will be further emphasised to healthcare providers, and that mechanisms can subsequently be identified to support them in their treatment of these lesions.

Methods

Between August 2007 and May 2008 a sample of clinicians involved in regular chronic wound care, identified through various national co-ordinators, was canvassed via an email questionnaire using an external consultancy (CanCare, www.cancareservices.com/home.htm). The results of a previous pilot survey (100 respondents) was used as the basis for formulating questions pertinent to the primary objective outlined for this larger survey, culminating in the final questionnaire which was sent out via key opinion leaders and health-related organisations to health workers in the United Kingdom, the United States of America, Canada, Spain, Italy, the Netherlands, Sweden, Norway and Germany. The survey consisted of 39 questions, focusing on issues relating to the identification and treatment of hard-to-heal wounds. For example, the

following specific areas were included:

- ▶ Clarification of definitions of hard-to-heal wounds in relation to VLU and DFU
- ▶ Assessment of the awareness of hard-to-heal wounds in clinical practice
- ▶ Identification and evaluation of treatment options.

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Results were recorded as percentages in relation to respondents' answers to specific questions. However, in some instances, where participants had the option of giving multiple answers, data were presented numerically as the total number of respondents.

Results and discussion

A total of 1249 clinicians responded, with the highest proportion being from the Netherlands (n=524; 42%) and the UK (n=225; 18%). An almost equal response was obtained from practitioners in Spain and the USA (n=175; 14% and n=162; 13%, respectively). Less than 10% of respondents were from Canada (n=87; 7%) and Norway (n=50; 4%), and less than 1% were from Germany, Italy and Sweden.

These large variations in response rates may have biased any interpretation of the data collected, with respect to variations in treatment practice and levels of knowledge regarding hard-to-heal lesions in the different geographical regions considered. However, the results demonstrate surprisingly consistent practitioner awareness across regions regarding the concept of hard-to-heal

wounds. This includes the recognition of wounds that may become 'chronic' by using prognostic signs and biological markers that can be utilised to indicate clinical status and response to treatment (Benbow et al, 1998; Moore et al, 2007; Charles et al, 2008; Gohel et al, 2008; Rayment and Upton, 2009), and knowledge of the advanced treatments available to treat these lesions.

The majority of respondents were nurses (n=1037; 83%), with only a minimal response from doctors (n=50; 4%) and podiatrists (n=26; 2%). This indicates that across all the regions, nurses take on the main responsibility for the day-to-day treatment of patients with hard-to-heal wounds. Of those surveyed, the majority (n=862; 69%) failed to specify their specialty and fell into the 'other' category. Of those that did declare their speciality, the highest proportion (n=187; 15%) worked in community care. Over 72% (n=899) of respondents had more than five years' experience within wound care, with 43% having between six and 15 years of practice, and 30% having over 15 years' experience in this field. This high degree of experience in the survey population adds credibility to the findings with respect to the questions asked in relation to hard-to-heal ulcers.

Overall, 79% of respondents declared that they regularly treat hard-to-heal VLUs or DFUs, indicating that these lesions represent a significant proportion of their caseload. This supports the findings of selected published studies reporting approximately 20–30% of VLUs and 30% of DFUs failing to respond to standard treatment (Barwell et al, 2004; Margolis et al, 2005).

In terms of recognised prognostic indicators for hard-to-heal ulcers, 67% of respondents used wound size for both the VLU and DFU group (*Table 1*). This reflects the usefulness of wound size as a prognostic indicator; supporting published literature on DFUs (Cardinal, 2008; Leese, 2007) and VLUs (Cardinal, 2008; Leese, 2007; Margolis, 2004; Meaume et al, 2005; Phillips et al, 2000). Interestingly, approximately

twice as many of the respondents in the DFU group (63%) than in the VLU group (32%) considered a wound size of >2cm² to be a significant indicator of chronicity. In the VLU group, wounds greater than 5cm² were considered indicative of chronicity by 42% of respondents, compared with only 28% of respondents in the DFU group.

The smaller wound size identified as prognostic as a hard-to-heal ulcer in the DFU group (Table 1) can be explained by the complicated nature of the pathophysiology, which may ultimately lead to amputation (Redekop et al, 2004).

Overall, 92% of respondents agreed that wound age was a valuable prognostic indicator of hard-to-heal ulcers, with fairly consistent results in both the DFU and VLU groups (Table 2). The highest proportion of respondents in the VLU group (29%) chose a wound

duration of more than three months to be of prognostic importance, which supports the recent literature assessing prognostic indicators in relation to VLUs (Meaume et al, 2005).

For VLU and DFU respectively, 67 and 80% of responders recognised the presence of necrosis/slough as important in assessing such wounds as being 'hard to heal'. Elimination of this tissue prevents recurrent wound infections which, in turn, may minimise pain and provide a suitable environment for the efficacious use of advanced treatment modalities (Enoch and Price, 2004). Of the other prognostic indicators, wound infection was considered relevant in 73% of respondents for VLUs, and 84% for DFUs. This response is understandable in that infection is closely linked with chronic inflammation and the perpetuation of local pathology due to the wounds being stuck in the inflammatory stage of healing, and the

persistence of metalloproteinases in the wound bed, leading to uncontrolled destruction of extracellular matrix (Agren, 1994; Enoch and Harding, 2003). Corresponding responses for levels of wound exudate were 68 and 66%, with the majority of respondents in this group indicating medium to high levels being indicative of hard-to-heal wounds. High levels of exudate have been reported to be an indicator of wound infection (Kingsley, 2001; Cutting and Harding, 1994; Cutting and White, 2005).

The prognostic value of a lack of response to treatment was recognised in 90% (VLU) and 93% (DFU) of respondents. This has been demonstrated by Phillips et al (2000) who concluded that 'ulcers that are large, long-standing, and slow to heal after three weeks of optimal therapy are unlikely to heal rapidly, and might benefit from alternative therapies'. This view is also supported by Sheehan et al (2003) whose data on DFUs showed that wound area changes over a four-week period are predictive of complete healing over a 12-week period. On this basis, an early identification of patients who will not respond to standard care may justify the use of advanced treatments (Sheehan et al, 2003).

A high proportion of respondents monitor hard-to-heal ulcers on a regular basis, with the greatest percentage of those that do monitor these lesions assessing the wound weekly. For example, 74 and 79% monitored VLUs and DFUs, respectively, on a weekly basis, compared with only 19 and 15% assessing the ulcers monthly. Clearly, anticipating a delay in wound healing will provide a basis for the earlier initiation of treatment changes, and, in the author's opinion, those practitioners failing to identify and monitor hard-to-heal ulcers regularly should consider reviewing their practice (White, 2010).

Asked whether participants believed it possible to predict whether an ulcer will be hard to heal, over 95% of respondents felt that it was. Additionally, more than 55% felt that an early detection method would influence their clinical practice. Regarding the use of

Table 1
The use of wound size as a prognostic indicator of hard-to-heal ulcers

VLU		DFU	
Wound size	Percentage responders	Wound size	Percentage responders
>2cm ²	32.1	>2cm ²	62.9
>5cm ²	41.5	>5cm ²	27.6
>10cm ²	26.4	>10cm ²	9.5

Table 2
The use of wound duration as a prognostic indicator of hard-to-heal ulcers

Wound duration	VLU (% respondents)	DFU (% respondents)
>1 month	22.0	29.6
>2 months	21.7	21.6
>3 months	28.8	25.9
>6 months	18.2	17.2
>12 months	9.3	5.7

tools to identify hard-to-heal ulcers, the majority of practitioners do not employ them, with 65 and 63% of respondents answering 'no' in the case of VLU and DFUs respectively. With this in mind, there appears to be an educational need to raise awareness of predictive tools and the variety of prognostic models briefly alluded to above (Flanagan, 2003; Sheehan et al, 2003; Margolis, 2004). The use of biological indicators of chronicity, such as high protease levels and high bacterial load, with emphasis on specific microorganisms causing infection, should be used in the development of diagnostic tests for the early identification of hard-to-heal ulcers and considered for incorporation into wound assessment systems (Moore et al, 2007).

Approximately 48% reported average healing times to be between three and six months for both VLUs and DFUs. These findings are in accordance with the literature for DFUs, with one study reporting an average healing time of 78 days (3.7 months) (Zimny et al, 2002). It can be assumed that these are with standard treatment of non-chronic wounds, since Margolis (2000), from a meta-analysis of studies involving patients with hard-to-heal DFUs, have indicated an average healing rate of 24% at 12 weeks and 31% at 20 weeks with 'standard treatment' measures. Hence, after 20 weeks of 'good wound care', defined as sharp debridement and offloading (Redekop et al, 2004), approximately 70% of chronic DFUs remained unhealed (Margolis et al, 1999; Smiell et al, 1999).

In terms of standard therapy for hard-to-heal wounds, 625 respondents considered compression therapy to be the 'gold standard' for VLUs. Other standard therapies for VLUs were cited as:

- ▶ Moist wound healing dressings (n=506), which is to be expected since optimal moisture control is a prerequisite for good wound management (Bishop et al, 2003)
- ▶ Regular debridement (n=384), which is essential for new tissue growth (Wolcott et al, 2009)
- ▶ The use of antimicrobial dressings

(n=365) (Best Practice Statement, 2011)

- ▶ Systemic antibiotics (n=140)
- ▶ Off-loading (n=109), which is surprising since this has no clinical value in the treatment of VLUs.

The presence of opportunistic pathogens has been implicated as an important factor in the development of non-healing wounds. Bacteria are a source of exogenous proteases that contribute to the prolongation of the inflammatory stage of healing and the development of chronicity (European Wound Management Association [EWMA], 2008). However, practitioners need to be able to distinguish between wounds requiring treatment to control bioburden with antimicrobials, and those that do not. Antimicrobial dressings should be reserved for critically colonised and locally infected wounds — and systemic antibiotics for spreading infections (Kingsley, 2001). The use of antimicrobial dressings reported here might not be in line with these guidelines.

As expected, the highest number of respondents considered off-loading to be part of the 'gold standard' treatment for DFUs. Surprisingly, 55 responders advocated compression therapy. Many listed regular debridement as standard treatment (n=524), this was to be expected in respect of the fact that wound bed preparation is considered to be of great importance in the chronic wound treatment regimen. Additionally, 438 respondents reported the use of antimicrobial dressings. Nearly twice as many respondents considered systemic antibiotics as standard treatment for DFUs (n=230), compared with those considering it standard for VLUs (n=140). This may be indicative of (perceived) higher levels of infection in DFUs, but no details of this were asked for in the survey.

Considering their current caseload, 87% of respondents reported up to 30% of VLUs as failing to heal and 81% reported the same for DFUs, reflecting the findings of Barwell et al (2004). The economic burden of caring for patients with unhealed wounds is considerable

and is expected to increase with respect to the ageing population and number of patients with diabetes and vascular disease (Edmonds et al, 1996; Jeffcoate and Harding, 2003; Boulton et al, 2005; Rathur and Boulton, 2007). In view of this, advanced treatments are under development or currently marketed for the treatment of recalcitrant VLUs and DFUs. As reported in the literature, these have achieved varying levels of success, including: the extracellular matrix protein amelogenin (Xelma; Molnycke Healthcare) which has been shown to be effective in the treatment of hard-to-heal VLUs in both clinical trials (Vowden et al, 2006; Vowden et al, 2007; Romanelli et al, 2008a) and case studies (Huldt-Nystrom et al, 2008; Romanelli et al, 2008b). Also Promogran (J&J) which is marketed for the treatment of both VLUs and DFUs (Ghatnekar et al, 2002; Veves et al, 2002; Vin et al, 2002), becaplermin (Regranex; Ortho-McNeil-Janssen) which has shown its main benefits in the treatment of DFUs (Steed, 1995; Ghatnekar et al, 2001; Steed, 2006; Akbari et al, 2007), negative pressure wound therapy (NPWT) (McCallon et al, 2000; Eginton et al, 2003; Armstrong and Lavery, 2005; Akbari et al, 2007; Blume et al, 2008), and bioengineered tissues such as Apligraf (Organogenesis Inc) (Redekop et al, 2003) and Dermagraft (Advanced Tissue Sciences) (Allenet et al, 2000).

The majority of respondents reported the number of ulcers not responding to their standard therapy as 'unchanged' (65 and 66% for VLUs and DFUs respectively), with only 13 and 16% reporting it as increasing in the VLU and DFU categories respectively. Generally, between 70 and 80% of respondents were dissatisfied with the outcomes achieved in the treatment of hard-to-heal ulcers. When asked what they do in cases where their patients' ulcers fail to heal, despite being treated with their standard therapy, respondents considered a change of treatment, but also involved a multidisciplinary team, reassessed the wound, and referred to specialists. The main reasons for ulcers not responding to standard therapy were cited as underlying pathologies (n=585), and wound infection (n=496).

Nutritional deficiencies also featured high on the list (n=473). Malnutrition is recognised, along with diabetes, chemotherapy, pain, and psychosocial issues, as one of the systemic factors that can adversely affect wound healing (Boyd et al, 2004; Gohel et al, 2005). Gohel et al (2005) speculate that because all limbs with venous disease do not progress to ulceration, other factors such as poor nutrition, reduced mobility and co-existing illness are necessary for this progression, and are of greater importance than previously thought (Gohel et al, 2005). Chronic inflammation was also listed highly as a reason for lack of response to treatment (n=445), followed by high matrix metalloproteinase (MMP) levels (n=257). The latter contribute to chronic wound inflammation due to their destructive effect on essential growth factors and extracellular matrix proteins, thus suspending the wound in the inflammatory stage of the healing process (Moore et al, 2007).

Regarding the factors influencing practitioners when treating hard-to-heal ulcers, respondents cited high on the list (for both VLUs and DFUs) 'patient compliance with treatment', 'time to healing', 'ulcer pain', 'patient quality of life', 'presence of necrosis and slough', and 'nature and level of exudate'. Patient compliance was perceived as the greatest influence when making treatment decisions, although the reason for this is not clear. It is therefore possible that non-compliance may influence the decisions regarding the use of more expensive treatments. However, cost of treatments was relatively low down among practitioners' concerns, suggesting that the reasons for the high value placed on patient compliance should be followed up in future questionnaires.

Pain is a characteristic feature of many wounds (Enoch and Price, 2004) and can induce psychological stress and adversely affect wound healing (Soon and Acton, 2006; Acton 2007). With respect to factors influencing practitioner's treatment decisions, the use of therapies to minimise ulcer pain is to be expected. This can be

controlled by analgesia and the use of advanced dressings (White, 2008a, b). Pain experienced during dressing changes has been highlighted as one of the most frequent causes of such stress (Soon and Acton, 2006), and dressings with Safetac® soft silicone adhesive technology have been shown to significantly reduce pain during wear, at dressing removal, and after dressing change, when compared with advanced dressings using traditional adhesives (White, 2008a).

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With respect to their awareness of advanced treatments, respondents appeared to be well informed, with NPWT figuring highest on the list of responses for both VLUs and DFUs, followed by surgery, and the use of pharmacological agents. Awareness of protease modulators, skin substitutes, and growth factors appeared to be lower. However, in response to the survey, a high percentage of respondents indicated that they have no specific treatments reserved for hard-to-heal ulcers. In those cases where they did, a high percentage of respondents indicated that they were only partly satisfied with the clinical outcome.

Over half of the respondents in the VLU (54%) and DFU (56%) groups did not have protocols or guidelines for the treatment of hard-to-heal ulcers. For those respondents that did follow a treatment protocol (43 and 42% for VLUs and DFUs, respectively), the use of antimicrobial and pharmacological agents featured high on the list, followed by NPWT and surgery. The

use of growth factors and protease modulators was relatively low down on the list of available treatments, perhaps suggesting that practitioners need to be better informed about these advanced treatments, or are unable to access them owing to local availability issues rather than national availability issues.

Of the practitioners reporting on whom they needed to convince with respect to introducing an advanced treatment, the highest proportion (38%) cited a consultant physician, or family physician (24%), while 22% appeared to have autonomy in this respect. The respondents indicated that clinical nurse specialists and pharmacists had little influence with respect to decisions regarding the introduction of advanced treatments.

A high proportion of respondents felt that patient quality of life differs depending on whether they have a healing or non-healing ulcer, with approximately 88% of respondents believing this to be the case for both VLUs and DFUs. Regarding the factors affecting the quality of life of patients with hard-to-heal ulcers, wound pain (n=548) was the highest factor cited for patients with VLUs. This was followed by wound malodour (n=500) and wound exudate (n=501). Although lower on the list of cited factors, wound pain was still cited highly (n=436) for patients with DFUs, after ulcer-related psychological effects (n=496), and wound malodour (n=469). Wound exudate was the second to lowest factor cited as affecting quality of life with respect to DFU patients (n=393). With regard to wound pain in patients with DFUs, neuropathic pain does occur and causes significant morbidity and impairment in quality of life (Benbow et al, 1998; Jude and Schaper, 2007).

Although a high proportion of respondents (82%) declared that they had received educational support dealing with hard-to-heal ulcers, 18% had not, signifying that education needs to be addressed.

Practitioners' views regarding the treatment of hard-to-heal ulcers reveal

that the highest number of respondents see them as 'challenging' (n=608), 'distressing for the patient' (540), 'frustrating' (n=311), 'costly to treat' (n=308), and, 'demanding on resources' (n=285).

Conclusions

There appears to be a reasonable awareness of prognostic indicators and the problems associated with hard-to-heal ulcers. There is also evidence of remarkable consistency between clinicians in the different countries surveyed. However, much still needs to be done in relation to using prognostic tools in diagnosis and advanced therapies in treatment regimens of hard-to-heal wounds.

The overall findings from the survey were that:

- ▶ 75% of the responders deal with hard-to-heal wounds regularly
- ▶ A high proportion of ulcers do not respond to standard therapy
- ▶ Only about 40% of responders use protocols/guidelines for hard-to-heal ulcers (diabetic and venous)
- ▶ Only 25 and 20% of responders are satisfied with current treatment outcomes for hard-to-heal VLU and DFUs respectively
- ▶ Important prognostic indicators identified for hard-to-heal wounds are: lack of response to treatment, size, wound duration, presence of necrosis, and, wound infection
- ▶ Patient compliance and clinical awareness are seen as the greatest challenges when dealing with hard-to-heal wounds. **WUK**

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Key points

- ▶▶ The majority of clinicians involved in wound care regularly deal with hard-to-heal wounds.
- ▶▶ A high proportion of 'chronic' wounds are reported not to respond to standard therapy.
- ▶▶ A minority of wound care clinicians regularly use protocols and guidelines for hard-to-heal wounds.
- ▶▶ A minority of wound care clinicians are satisfied with the currently available treatments available for hard-to-heal wounds.
- ▶▶ Patient compliance and clinical awareness are seen as the greatest challenges when dealing with hard-to-heal wounds.

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