Effect of a sustained silver-releasing dressing on ulcers with delayed healing: the CONTOP study

- **Objective:** To compare the effect of the sustained silver-releasing foam dressing Contreet Foam (Coloplast A/S) with local best practice (LBP) on delayed healing ulcers using a real-life setting.
- **Method:** A total of 619 patients with ulcers of varying aetiologies were treated for four weeks with either the silver foam dressing or LBP.
- **Results:** Wound area was reduced by 50% with the silver foam and 34% with LBP. Less slough and maceration, a faster reduction in exudate level and more positive wound progress was achieved with the silver foam. In addition, exudate handling, ease of use, odour and pain improved. Less time was spent on dressing changes, and mean wear time was longer for the silver foam (3.1 days) than for LBP (2.1 days). All differences were statistically significant ($p<0.05$). The silver foam dressing outperformed all of the other dressing categories including moist wound healing products and other silver dressings.
- **Conclusion:** This large-scale comparative real-life study shows that the silver foam dressing supports faster healing of delayed healing wounds.
- **Declaration of interest:** The study was financially supported by Coloplast A/S, Humlebaek, Denmark.

silver foam dressing; chronic wounds; randomised comparative trial; outcomes research; real-life study

Controlled clinical trials produce important and useful evidence on the safety and efficacy of treatment procedures and products. However, scientific rigour isolates them from normal practice as the selection of patients for participation is based on rigid inclusion and exclusion criteria. In normal practice patients do not generally fit into strict categories. Furthermore, in wound care a traditional clinical trial investigating a new treatment will typically be restricted to one or a few specific wound types, such as leg ulcers[1] or diabetic foot ulcers.[2] Many patients will be excluded, such as those with conditions that affect wound healing.

While traditional controlled clinical trials can produce valuable evidence for clinical decision-making, there is a lack of outcomes research in wound care.[3] Outcomes research is concerned with everyday medical practice, and large-scale comparative outcomes studies using real-life study settings will allow inclusion of patients seen in everyday clinical practice. Using this approach, it is appropriate to compare the effect of a new treatment with the best treatment practice at each participating centre instead of using a standardised control treatment. Consequently, to obtain clinically and statistically significant data, large patient numbers are required. The results add to the evidence base created by more rigorous clinical trials, and should be viewed within the context of safety studies, traditional controlled clinical trials and economic evaluations. This will allow practitioners to make more informed choices when deciding which new treatments to implement in clinical practice. The Medicines and Health Care Products Regulatory Agency suggested[3] that trials for medical devices should demonstrate that the device works as intended under typical conditions and functions safely and effectively in the real world. Outcomes studies can demonstrate this.

Contreet Foam Outcome Programme (CONTOP) is the first large-scale randomised controlled trial using a real-life setting to investigate the clinical performance of a wound dressing. It investigates the effect of the sustained silver-releasing foam dressing Contreet Foam (Coloplast A/S) on wounds of differing aetiologies with delayed healing. An outcomes approach, as described by Rapier,[4] was used. The results should be evaluated in the light of available clinical[1,2,5] and economic evaluations.[6]

Aim

The objective was to assess the clinical performance, quality of life and cost effectiveness of an antibacterial, sustained silver-releasing, hydroactivated foam dressing versus local best practice (LBP, Box 1) in the treatment of ulcers with delayed healing.

Method

Study design

This was a comparative open prospective parallel and block-randomised evaluation:

- In all, 619 patients were enrolled over an 18-

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Box 1. Treatment groups

Contreet Foam

A soft hydrophilic polyurethane foam containing silver as an integral part of its matrix. The silver ions are present in a form that is readily hydro-activated in the presence of fluid or wound exudate, with sustained silver release for up to seven days.[27,28] Both adhesive and non-adhesive versions of the dressing were used

Local best practice

Dressings used for wounds with delayed healing due to bacteria varied according to local practice. It included a range seen in everyday clinical practice and included foams/alginates (53%), hydrocolloids (12%), gauze (3%), silver dressings (17%), other antimicrobial dressings (9%) and other active dressings (6%)

month period from over 80 specialist wound-care clinics in Germany, UK, Denmark, Italy, Switzerland, Belgium, Slovenia, Brazil and Canada

- Using a computer-generated list in sealed envelopes, patients were randomly assigned to a four-week treatment period of either silver foam or LBP
- Wound management (including compression therapy) was performed in line with local protocols, guidelines and dressing manufacturers' instructions
- All participating clinics used the same clinical guidelines and data-collection forms
- Practitioners undertaking wound care were informed by letter that the treatment should be adhered to during the four-week study period
- Patients attended the wound clinic weekly for treatment evaluation. Dressings were changed between weekly assessments when judged necessary.

Patients

Patients eligible for this evaluation were 18 years or older and not pregnant or lactating. All had chronic wounds that were exhibiting delayed healing and producing moderate to high levels of exudate. Wounds included burns, donor sites, postoperative wounds and other wound types, but were mostly:

- Leg ulcers
- Pressure ulcers (EPUAP grade II and III)[7]
- Diabetic foot ulcers (Wagner grade I–III).[8]

Exudate levels were quantified using Schulze et al.'s definition.[9] Moderately exuding wounds required a dressing change every second day with a conventional dressing, or every third day with a modern absorbent dressing; heavily exuding wounds required daily or more frequent dressing changes with a conventional dressing, or every second day with a modern absorbent dressing.

Wound dimensions were measured using greatest length and width. Ulcer depth had to be <0.5cm. Contreet Cavity was not available at the study start, so deeper wounds were excluded to avoid concomitant use of cavity fillers with the silver foam. Ulcers were characterised by at least one of the following:

- Delayed healing due to bacteria (reports of less than 0.5cm ulcer reduction over the past four weeks, or no change or an increase in the volume or surface area of the ulcer over the past four weeks)
- Wounds at risk of infection (such as diabetic wounds or sacral pressure ulcers)
- Discolouration of the granulation tissue (dusky or dull in colour, or dark, deep red)
- Clinical infection (requiring treatment with systemic antibiotics at the discretion of the physician)
- Malodour.

To obtain data relevant to everyday clinical practice, the selection criteria were relatively unrestricted when compared with traditional clinical studies.

Assessments

At inclusion the patient's history was recorded and the ulcer assessed. At each weekly control visit, ulcer size, odour, appearance of the wound bed, exudate level and number of dressing changes made since the last visit were assessed (Table 1) and the dressing was changed.

At the initial and final visits a health-related quality-of-life assessment was performed. Wound progress, overall ease of dressing application and removal, and ulcer pain during and between dressing changes were rated at the final visit. The dressing's capacity to handle exudate, typical reasons for dressing changes, and the typical time spent on dressing changes were assessed at the final visit (Table 1).

Endpoints were:

- Reduction in relative ulcer area during the treatment period
- Wound bed preparation (reduction in exudate level and change in wound bed tissue composition)
- Health-related quality of life based on assessment of odour, leakage, pain and the generic EQ-5D (EuroQoL) tool[10]
- Cost effectiveness based on the number of dressing changes and time taken for a typical dressing change.

Data management and statistics

From an interim analysis it was established that a sample size of 272 in each group was appropriate. This was based on the assumption of 80% power, a minimum relevant difference in means (MIREDIF) of 17.1 in relative ulcer area, a common standard deviation of 71.0 and use of a t-test for analysis with a 5% significance level.[11] To ensure adequate recruitment and allowing for a dropout rate of 15%, an arbitrary target of 'over 600' was set.

The study personnel at the participating clinics completed the data-collection forms. Double entry and data management were done in a data management system (CDMS) based on SAS version 6.12 with relevant audit trails enabled. The statistical analyses were carried out using SAS version 8.12. Data were analysed after the principle of 'last observation carried forward' (LOCF), which is a conservative approach to compensate for missing data caused

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Table 1. Clinical and dressing performance parameters assessed

When	Parameter	Assessment (method)
Initial assessment	Ulcer duration	Weeks/months/years
Initial assessment and final visit	Condition of peri-ulcer skin	Registration of normal, macerated, eczematous/dry, erythema etc.
Initial assessment and final visit	Health-related quality of life including: mobility; self-care; usual activities; pain/discomfort; anxiety/depression	EQ-5D (EuroQoL) standardised instrument for use as a measure of health outcome. Responses to five questions were scaled from 1 (best) to 3 (worst)
All visits	Ulcer size	Length (cm), width (cm), depth (mm)
All visits	Odour	Four-point rating scale: none, little, moderate, severe
All visits	Appearance of ulcer (wound bed tissue composition)	Registration of percentage of tissue type: red granulation tissue, sloughy tissue, necrotic tissue, fibrin coverings
All visits	Exudate level	Three-point rating scale: low, moderate, high
All visits minus initial assessments	No. of dressing changes since last visit	Actual number
Final visit	Wound progress	Six-point rating scale from 'marked deterioration' to 'healed'
Final visit	Exudate handling	Four-point rating scale: very well, well, moderately, badly
Final visit	Overall ease of dressing application	Four-point rating scale: very easy, easy, difficult, very difficult
Final visit	Overall ease of dressing removal	Four-point rating scale: very easy, easy, difficult, very difficult
Final visit	Pain in study ulcer at dressing changes (throughout the study)	Numerical box scale: 0 (no pain) – 10 (unbearable pain)
Final visit	Pain in study ulcer between dressing changes (throughout the study)	Numerical box scale: 0 (no pain) – 10 (unbearable pain)
Final visit	Typical reason for dressing change	State reason
Final visit	Time spent on typical dressing change	0–10 mins, 10–20 mins, 20–30 mins, >30 mins
Final visit	Wear time	Wear time was calculated as seven days divided by the weighted mean of dressing changes since the last visit

by some subjects leaving the study prematurely. The obtained data were analysed as intention to treat (ITT) using the chi-square test, Wilcoxon signed rank test, Mann-Whitney U test and Student's t-test where appropriate.[12] The accepted level of significance was $p<0.05$; values above 0.05 are stated as non-significant (NS) in the results section. P values between 0.05 and 0.1 are reported as tendencies.

The patient sample (n=619) was subdivided into a series of subsamples (ulcer type and product categories in the LBP group). In some instances, the sample size was low; if there was less than 20 subjects in a subsample, no statistical analysis was undertaken.

Ethics

The study was carried out in accordance with the Declaration of Helsinki. Ethical approval was obtained according to the guidelines from ethical committees. Patients were given verbal and written information about the study and a consent form was signed before recruitment. Patients were also informed of their right to withdraw from the study at any time.

Results

Demographic data

Patient demographics and baseline characteristics are shown in Table 2.

Overall analysis

Results of the overall analysis of all indications and treatments involving all 619 patients are summarised in Table 3 and described in more detail below.

Clinical endpoints

- **Healing and ulcer composition** For all indications a median reduction of 50% in relative ulcer area was observed in the treatment group after four weeks compared with 34% in the LBP group. To include all

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patients in the analysis, the data were statistically analysed for the final visit with LOCF, and the difference between the two groups was statistically significant (silver foam: 47.1%, LBP: 31.8%, p=0.0019). There was a comparable development in wound-bed tissue composition in the two groups over the four weeks. However, a significantly smaller amount of slough was observed in the wound bed after treatment with the silver foam than with LBP (p=0.034) at the final visit. The median wound progress over the study period was 'marked improvement' in both groups. However, at the final visit the silver foam had promoted positive wound progress in 67% of the cases compared with 51% for LBP (p=0.0001).

- **Condition of peri-ulcer skin** This was comparable at the start of the study, but at the final visit there were significantly more patients with normal peri-ulcer skin in the silver foam group (54.7%) than in the LBP group (42.2%, p=0.0021) and significantly fewer patients in the former group had macerated skin (10.9% and 16.7%, p=0.038 respectively).
- **Exudate level** Median exudate level was 'moderate' in both treatment groups at inclusion. At the final visit this had decreased to 'low' in the silver foam group, but was unchanged in the LBP group. This difference was statistically significant (p=0.0055).

Dressing performance

Exudate handling was rated significantly better in the silver foam group than in the LBP group (p<0.0001). For 'ease of use', the median rating for the silver foam was 'very easy' for application and removal, while the median rating for LBP was 'easy' for both parameters (p<0.0001, both parameters).

Quality-of-life parameters

- **Odour, pain and leakage** Median odour was 'none' by week 1 in the silver foam group and week 2 in the LBP group (p<0.0001). The median rating of pain at dressing changes was lower in the silver foam than in the LBP group (p<0.0001 and p=0.0011 respectively). Study personnel reported leakage as the main reason for dressing changes in 14.8% of patients in the silver foam group and 25.8% in the LBP group.
- **EQ-5D** At inclusion median EQ-5D score in both groups was 0.62. At study conclusion it was 0.71 in the silver foam and 0.69 in the LBP group. The five categories (mobility; self-care; usual activities; pain/discomfort; anxiety/depression; Table 1) were weighted, based on data from a representative survey of the UK public. Values for the 243 health states, defined by the EuroQoL classification, were calculated using a regression model[13,14] and ranged from –0.594 (if a score of 3 was obtained for all questions) to 1.0 (if a score of 1 was obtained for all questions).

Cost-effectiveness parameters

The median time spent on a typical dressing change was lower in the silver foam group than in the LBP group (p=0.0003) and mean wear times were 3.1 days and 2.1 days respectively (p<0.0001).

Subsamples: evaluation of results for specific ulcer types

Separate analyses were made for patient subgroups:

- Leg ulcers of mixed arterial and venous aetiology, and of venous origin
- Venous leg ulcers (subgroup of the above category)
- Diabetic foot ulcers
- Pressure ulcers — as there were 19 pressure ulcers in the LBP group (n=24 for silver foam), these data were not analysed statistically.
- **Leg ulcers of mixed arterial and venous aetiology and venous leg ulcers** Results are summarised in Table 4 and are comparable to those from the overall analysis.
- **Venous leg ulcers** Results are comparable to those of the mixed aetiology leg ulcer subgroup. Median reduction in relative wound area was 46.2% in the silver foam group and 26.9% in the LBP group (p=0.0001). There was a tendency for patients in the silver foam group to have a higher EQ-5D score at the final visit (p=0.0878), and when analysed separately there was significantly less 'pain/discomfort' in the silver foam group than in the LBP group (p=0.0426).
- **Diabetic foot ulcers** At the final visit significantly less slough was observed in the wound bed after treatment with silver foam than with LBP (p=0.047). Median wound progress over the study period was 'marked improvement' in the silver foam group and 'some improvement' in the LBP group (NS); exudate handling was better in the silver foam group (p=0.007), which was confirmed by significantly less maceration (p=0.047). Median odour was 'none' by week 1 in the silver foam group and week 2 in the LBP group. For all other parameters, the performance of the two groups was comparable.

Table 2. Demographic data and baseline characteristics

	Silver foam	Local best practice
No. of patients	326	293
Age (years) (mean ± SD)	69.8 ± 13.7	68.8 ± 14.1
Gender % (male/female)	38/62	39/61
Baseline ulcer size (cm^2):		
• Median (range)	20.0 (0.1–700)	12.0 (0.1–400)
• Mean ± SD	52.9 ± 90.0	36.6 ± 64.4
Ulcer types:		
• Venous leg ulcers	46%	50%
• Mixed venous/arterial leg ulcers	21%	17%
• Pressure ulcers	8%	7%
• Diabetic foot ulcers	8%	8%
• Other	17%	18%

Table 3. Results based on all data

Parameter	Silver foam (n=326)	Local best practice (n=293)	P value
Ulcer area reduction (median):			
• Week 4	50.0%	34.0%	NA
• Final visit (LOCF)	47.1%	31.8%	0.0019
Slough (mean):			
• Initial assessment	14.4%	16.1%	
• Final visit	7.0%	8.9%	0.0338
Wound progress (median)	Marked improvement	Marked improvement	0.0001
Normal peri-ulcer skin (mean):			
• Initial assessment	24.3%	24.0%	
• Final visit	54.7%	42.2%	0.0021
Macerated peri-ulcer skin (mean):			
• Initial assessment	25.5%	22.6%	
• Final visit	10.9%	16.7%	0.0383
Exudate level (median):			
• Initial assessment	Moderate	Moderate	
• Final visit	Low	Moderate	0.0055
Exudate handling	Very well	Well	<0.0001
Leakage was main reason for dressing change	14.8%	25.8%	NA
Ease of use:			
• Application	Very easy	Easy	<0.0001
• Removal	Very easy	Easy	<0.0001
Malodour	None by week 1	None by week 2	<0.0001
Pain in study ulcer at dressing change	1	2	<0.0001
Pain in study ulcer between dressing changes	1	2	0.0011
Time spent on typical dressing change	0–10 mins	10–20 mins	0.0003
Mean wear time	3.1 days	2.1 days	<0.0001

NA= not analysed; LOCF = last observation carried forward

• **Pressure ulcers** The picture was very similar to the results in Table 3, with a greater reduction in wound area with the silver foam (58.5% compared with 33.3% for LBP), less maceration, better exudate handling and faster reduction of malodour.

Subsamples: analyses comparing the silver foam with other product groups (all indications) In separate analyses the silver foam was compared with the specific product types used in the LBP group. To include enough subjects in each group for statistics to be meaningful, the indications were not separated. Comparator dressings included:

- Moist wound-healing products
- Other antimicrobial treatments
- Silver dressings (subgroup of the above category containing mainly Aquacel Ag [ConvaTec], Actisorb Silver [Johnson & Johnson] and Acticoat [Smith & Nephew]).

The silver foam dressing was also compared directly with Acticoat, while no other silver dressing in the LBP arm was used on more than 20 patients.

Results of the four analyses are shown in Table 5. For all parameters except slough in the wound bed and maceration, the silver foam performed significantly better than moist wound-healing products. When compared with other antimicrobial treatments, it performed significantly better for all parameters except exudate level at the final visit. This picture was the same when the silver foam was compared with other silver dressings. When it was compared with Acticoat, the median reduction in relative ulcer area was 47.1% and 30.7% respectively. Except for wear time and the EQ-5D parameters, which were similar for the two groups, the silver foam performed significantly better than Acticoat.

Discussion

All indications and products

Using an outcomes approach, the results of this comparative clinical study show that the silver foam dressing performed better for all measured clinical and dressing performance parameters, when compared with LBP, including treatment with other silver dressings. All these differences were statistically significant (Tables 3 and 5).

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Leg ulcers

In general, subsectioning into specific indications gave the same picture as the overall analysis. Results from the leg ulcer subsection (Table 4) are particularly interesting as they are strikingly similar to a previously published comparative study that used a traditional clinical set-up. In that study 129 patients with leg ulcers of venous or mixed origin were randomised to receive either Contreet Foam or Allevyn Hydrocellular (Smith & Nephew) for four weeks.[1] A reduction of 45% in relative ulcer area was observed in the silver foam group and 25% in the non-silver foam group.

Flanagan[15] indicated that percentage area reduction is an important indicator in differentiating between healing and non-healing wounds. A 20–40% reduction in wound area between two to four weeks is likely to be a reliable predictor of healing. It can be suggested that, as the relative wound area reduction was 28.8% in the LBP group after four weeks (Table 4), the wounds were not responding well to treatment; a 45.5% relative wound area reduction in the silver foam group is suggestive of a good response to treatment.

Moist wound-healing products with no active ingredients were the most frequently used comparator. Thus, this real-life study and the traditional RCT[1] are in many aspects very similar and both strongly support a role for the silver foam when compared with standard moist wound-healing in leg ulcers.

Diabetic foot ulcers and pressure ulcers

The results showed that the silver foam dressing had a beneficial effect, thus confirming published results from a smaller non-comparative trial.[2] A beneficial effect on pressure ulcers was indicated, although the sample was too small to perform statistical analysis.

Silver foam versus other products

When the data were subsectioned for product type with no specification of indications, the comparison with moist wound-healing products across indications gave the same picture as described for venous and mixed leg ulcers across LBP products (Table 5). The silver foam also outperformed other antimicrobial treatments, including other silver dressings.

Silver release and exudate handling

The key factor accounting for the better performance of silver foam is likely to be the combination of its sustained silver release and superior exudate handling over a broad range of bacterially challenged wounds. Due to their inflammatory state, chronic wounds often produce copious exudate, particularly if heavily colonised or infected by bacteria.[16] Excessive exudate production can cause maceration and excoriation of surrounding skin and may lead to infection, increased odour and hypersensitivity.[9]

Quality of life

Patient outcomes and quality of life are important parts of outcomes research.[4] In leg ulcer patients, the negative effect on quality of life is due to many interrelated factors including malodour, leakage, skin problems, pain, restricted mobility, lack of sleep and increased frequency of dressing and bandage changes.[17-19] Malodour, in particular, has a big impact on patients' psychological state and social life.[20] One of the main reasons for malodour is multiplication of and colonisation by bacteria.[21] The rapid disappearance of malodour observed in the silver foam group, when compared with LBP, could indicate that the sustained release of silver eliminates bacteria from the wound surface faster than LBP.

Large volumes of uncontrolled exudate may cause leakage from dressings and staining of the patient's clothes. This can cause considerable distress and limit patient activities, which can have a major psychosocial impact on patients and carers.[22] There were fewer dressing changes owing to leakage with the silver foam than with LBP.

A correlation between wound pain and quality of life has been described.[23] Pain can cause immobility and social isolation.[24,25] The significantly lower pain score in the silver foam group suggests it may be better for managing pain both at dressing changes and between dressing changes. In addition, this observation substantiates the claim that the silver released does not cause pain in ulcers.

EQ-5D is a standardised instrument for use as a measure of health outcomes.[10] Although there were differences in several other quality-of-life parameters as described above, no difference was detected between groups in quality-of-life scores using the EQ-5D in the overall analysis. The scores increased from 0.62 to 0.71 (silver foam) and 0.69 (LBP) respectively over the study period. This may be attributed to the treatment, but could also have been influenced by the increased social attention during the study.

The EQ-5D is a generic, multidimensional tool, and may not be sufficiently sensitive to identify ulcer-related changes in quality of life. Another explanation may be that, when all wounds types are included in the analysis, each treatment group is too heterogeneous to reveal any differences between groups.

A recent study on venous leg ulcers reported that completion of an episode of ulceration was associated with improvements in all five dimensions.[26] In the present study there was tendency for the silver foam to have a positive effect on the overall EQ-5D score in the leg ulcer patients within four weeks, while 'pain/discomfort' was significantly better in the silver foam group at the final visit than in the LBP group. While all five dimensions seem to be sensitive to changes in quality of life over a longer period,[26] future studies may confirm if some of the dimensions may be more sensitive to short-term changes than others

Table 4. Results for leg ulcers of mixed arterial and venous aetiology, and of venous origin

Parameter	Silver foam (n=218)	Local best practice (n=197)	P value
Ulcer area reduction (median):			
• Final visit (LOCF)	45.5%	28.8%	0.0001
Slough (mean):			
• Initial assessment	14.3%	16.0%	
• Final visit	7.9%	7.8%	NS
Wound progress (median)	Marked improvement	Some improvement	<0.0001
Normal peri-ulcer skin (mean):			
• Initial assessment	18.0%	17.4%	
• Final visit	50.9%	37.9%	0.0082
Macerated peri-ulcer skin (mean):			
• Initial assessment	28.6%	22.1%	
• Final visit	12.0%	13.8%	NS
Exudate level (median):			
• Final visit	Low	Moderate	0.003
Exudate handling	Very well	Well	<0.0001
Leakage was main reason for dressing change	14.6%	26.0%	NA
Ease of use:			
• Application	Very easy	Easy	<0.0001
• Removal	Very easy	Easy	<0.0001
Malodour	None by week 2	None by week 2	0.0007
Pain in study ulcer at dressing change	1	2	<0.0001
Pain in study ulcer between dressing changes	1	2	0.0003
Time spent on typical dressing change	0–10 mins	10–20 mins	<0.0001
Mean wear time	3.5 days	2.1 days	<0.0001

NA = not analysed; NS = not significant; LOCF = last observation carried forward

Cost effectiveness

Another component in outcomes research is health economics, relating to the cost effectiveness of a treatment in normal clinical practice.[4] In this study the difference in wear time between the silver foam and LBP was one full day, and time spent on dressing changes was shorter, saving nurses' and patients' time and reducing the amount of dressings needed over a given treatment period.

Taken together with the excellent healing rates, this suggests the silver foam dressing is a cost-effective treatment alternative. The data confirm the results of a health economic analysis by Scanlon et al.[6]

Study limitations

• **Local best practice** The silver foam was evaluated against LBP (where dressings ranged from gauze to moist wound-healing products and antimicrobial treatments) on wounds of varying aetiologies. To compensate for this heterogeneity, a large patient number was required. The reason for using this set-up is that wound care is not standardised or consistent in clinical practice. It is important to investigate what treatment outcomes are in everyday clinical practice and to evaluate the results in the light of clinical trials and economic evaluations of the treatment in question. Previous studies have shown the silver foam to be clinically effective[1] and cost effective,[6] findings that are confirmed in this study of wounds in real-life settings.

• **Subsampling** We decided to test the product subgroups separately against the whole silver foam group instead of matching the groups. Therefore, the silver foam group is larger than the comparator groups. However, it would be very difficult to match the groups in terms of patient number, age, indications and other factors because so many centres were involved and some only included a few patients. For example, if a centre used an Acticoat dressing on one patient, should a matching patient treated with the silver foam dressing be included from the same centre? If so, how should the patients be matched — by matching age and ulcer (if possible) or by random selection?

We felt there would be less bias if we tested against the whole silver foam group. In addition, the statistical analysis gained strength from the larger number of patients overall.

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Table 5. Results for the silver foam dressing and the other product groups

Parameter	Silver foam (n=326)	Moist wound-healing products (n=190)	P value	Antimicrobial treatment (n=75)	P value	Silver dressings (n=38)*	P value	Acticoat (n=20)**	P value
Ulcer area reduction (median):									
• Final visit (LOCF)	47.1%	30.6%	0.0224	31.2%	0.0099	25.0%	0.028	30.7%	NS (0.13)
Slough (mean):									
• Initial assessment	14.4%	15.1%		20.2%		21.5%		23.7%	
• Final visit	7.0%	8.2%	NS	12.7%	0.0045	18.2%	0.0005	26.8%	0.0004
Wound progress (median)	Marked improvement	Marked improvement	0.0015	Some improvement	0.0009	Some improvement	0.0014	Some improvement	0.0015
Normal peri-ulcer skin (mean):									
• Initial assessment	24.3%	22.6%		28.4%		39.5%		30.0%	
• Final visit	54.7%	42.8%	0.0097	40.3%	0.027	37.1%	0.048	27.8%	0.0260
Macerated peri-ulcer skin (mean):									
• Initial assessment	25.5%	25.3%		17.6%		15.8%		15.0%	
• Final visit	10.9%	15.5%	NS	19.4%	0.049	22.9%	0.040	38.9%	0.0005
Exudate level (median):									
• Final visit	Low	Moderate	0.0041	Moderate	NS	Moderate	NS	Moderate	0.0122
Exudate handling (median)	Very well	Well	<0.0001	Well	<0.0001	Well	<0.0001	Well	<0.0001
Leakage was main reason for dressing change (mean)	14.8%	27.7%	NA	22.5%	NA	20.0%	NA	16.7%	NA
Ease of use (median):									
• Application	Very easy	Easy	<0.0001	Easy	<0.0001	Easy	<0.0001	Easy	<0.0001
• Removal	Very easy	Easy	<0.0001	Easy	<0.0001	Easy	<0.0001	Easy	<0.0001
Malodour	None by week 1	None by week 2	<0.0001	None by week 3	0.0079	None by week 3	0.025	Little throughout study period	0.0013
Pain in study ulcer at dressing change	1	2	<0.0001	2	<0.0001	2	0.027	2	NS
Pain in study ulcer between dressing changes	1	1	NS (0.066)	2	0.0026	2	0.055	3	NS
Time spent on typical dressing change	0–10 mins	10–20 mins	0.0267	10–20 mins	0.0010	10–20 mins	0.0006	10–20 mins	0.0019
Mean wear time	3.1 days	2.3 days	<0.0001	1.9 days	<0.0001	2.6 days	0.092	3.1 days	NS

NA= not analysed; LOCF = last observation carried forward; NS = not significant; * Subgroup of antimicrobial treatment group; ** Subgroup of silver dressings group

Conclusion

The results show the silver foam dressing supports faster healing of delayed healing wounds of various aetiologies. It performed better for all measured clinical, quality-of-life and dressing performance parameters compared with LBP. Data from this real-life study showed that Contreet Foam supports faster healing of chronic wounds with signs of local infection, when compared with LBP, including moist wound-healing products and other silver dressings. ■