Clinical evaluation of UrgoStart Plus dressings in real-life conditions: results of a prospective multicentre study on 961 patients

Aims: This study aimed to evaluate the performances of lipid colloid technology with nano-oligosaccharide factor (TLC-NOSF) dressings with polyabsorbent fibres in an unselected population of patients under real-life conditions.
Methods: A large, prospective, multicentre, observational study with three polyabsorbent TLC-NOSF dressings (UrgoStart Plus Pad, UrgoStart Plus and UrgoStart Plus Border, Laboratoires Urgo, France) was conducted in Germany between January 2019 and June 2020. Main outcomes included wound healing rate, clinical assessment of wound healing progression, local tolerance and acceptance of dressings, and changes in health-related quality of life (HRQoL) of the patients, assessed with the validated Wound-QoL questionnaire.
Results: A total of 961 patients with wounds of various aetiologies (leg ulcers (LU), diabetic foot ulcers (DFU), pressure ulcers (PU) and other types of wounds) were treated with the evaluated dressings in 105 centres for a mean duration of 62 days (standard deviation 37 days). By the last visit, a wound closure or an improvement in wound healing was reported in 92.0% of the treated wounds. The highest wound closure rates were achieved when the dressings were used as first-line treatment: 71.3% in DFUs, 52.9% in LUs, 53.6% in PUs and 61.8% in the other wounds. Improvement of the wound healing process was also associated with an 87.5% relative reduction of sloughy tissue, a decrease of the level of exudate in 68.9% of the wounds, and an improvement in the periwound skin condition in 66.4% of the patients at the final visit. The dressings were 'very well' or 'well' tolerated and 'very well' or 'well' accepted by the large majority of patients. The HRQoL questionnaires were completed both at initial and final visits by 337 patients, representative of the total cohort. Despite the relatively short duration of the wounds, the HRQoL of the patients was already impaired at baseline, with 81.6% of the patients being severely affected in at least one aspect of their HRQoL. By the final visit, significant improvements in each dimension of the patients' HRQoL were reported ($p<0.001$), along with a reduction of the proportion of patients in need of intervention and in the number of actions needed per patient in relation to their HRQoL.
Conclusions: These results are consistent with previous clinical evidence on TLC-NOSF dressings. They confirm the good healing properties and safety profile of these dressings, and that a significant improvement in patient HRQoL is achieved in non-selected patients treated in real-life practice. These data support the use of such dressings as a first-line intervention and until wound healing in the management of chronic wounds, in association with appropriate standard of care.
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Chronic wounds have a major socioeconomic impact on industrial and emerging countries. In Germany, it is estimated that approximately 800,000 patients are affected, and 200,000 new chronic wounds are diagnosed each year.[1] Considering an evaluated cost per patient and per year ranging between €4000 and €40,000,[2,3] the resulting annual cost to the German public health system could exceed several billion euros. With the ageing of the population and the growing incidence of diabetes, the substantial cost and resources allocated to the management of these wounds is expected to increase too.[4]

Chronic wounds are characterised by a prolonged inflammatory phase, high levels of matrix

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metalloproteinases (MMP), a delayed healing process and high recurrence rates.[5–7] Frequently undermined by vascular and immune system deficiencies, and prone to serious complications, these wounds have been correlated with higher risks of local infection, amputation and lower life expectancy.[7–9] For many patients, these wounds are also associated with severe pain, restricted mobility, anxiety and depression, limited activities and social isolation, significantly impairing their health-related quality of life (HRQoL).[10–13]

In order to alleviate that burden, new dressings have been designed to not only cover wounds and absorb exudate, but also to significantly enhance wound healing, thereby improving patients' HRQoL. TLC-NOSF dressings comprise a unique healing matrix (lipid colloid technology, TLC) with nano-oligosaccharide factor (NOSF) with MMP-reducing properties. The cost-effectiveness of these dressings compared with conventional dressings has been demonstrated from a German perspective in the management of leg ulcers (LUs) and diabetic foot ulcers (DFUs),[14,15] with additional cost savings when the TLC-NOSF dressings were used in recent wounds.[16] These cost savings were consistent with the health technology assessments conducted in several other countries, such as the UK,[17] France,[18] Spain[19] and Canada.[20] The superior efficacy of these dressings in enhancing and/or accelerating wound healing, compared with conventional dressings or other antiprotease dressings, has been demonstrated in randomised clinical trials (RCTs) conducted on chronic wounds of various aetiologies.[21–25] Based on the high level of evidence of these RCTs, their consistency with real-life evidence[26] and the findings of recent systematic reviews,[27–29] current guidelines recommend their use in the management of chronic wounds.[17,30] The National Institute for Health and Care Excellence (NICE) recommends the routine adoption of the dressings in the management of DFUs and LUs, and highlights that the evidence from RCTs supports that these dressings lead to important benefits in improving the day-to-day life of people with these chronic wounds.[17] In the meantime, assessment of patient HRQoL is strongly encouraged in daily practice,[31,32] as a patient-centred approach can usefully contribute to the evaluation of therapies, primary care services and appropriate use of resources.[31,33]

A new non-adhesive and superabsorbent version of the TLC-NOSF dressings with polyabsorbent fibres was recently introduced in Germany in order to further facilitate care and ease the selection of dressings that enhance wound healing, as well as appropriately meet the different patient and wound needs. Therefore, an updated evaluation of the dressing range seemed of timely interest. The aim of this observational study was to assess the performance of the newly completed range of TLC-NOSF dressings with polyabsorbent fibres in terms of wound healing, tolerance and acceptance, and to evaluate for the first time, under real-life conditions, the changes in the HRQoL of patients treated with these dressings.

Methods

Study design and patients

This clinical study, conducted in Germany, was designed as a prospective, observational multicentre study. Participating centres were selected to provide a diverse and representative cohort of patients and physicians, featuring a wide variety of medical practices (general practitioners, medical practitioners, internists, surgeons, dermatologists and other specialists) located all over the country. The study design was very similar to the previous real-life study conducted by Dissemond et al. on two of the same evaluated dressings (the border and pad versions), except for the addition of the HRQoL assessment.[34]

Any patient with a chronic wound that the investigator had decided to treat with one of the three evaluated dressings was eligible. Only one wound per patient was assessed in this study. In cases of multiple eligible wounds, the wound considered by the physician as the most suitable to be assessed was selected. Patients were followed up in an outpatient setting or during home visits for a maximum duration of 12 weeks, with a maximum of four documented visits. All decisions with regard to diagnosis and therapy were made by the treating physician and the therapeutic procedure was not influenced by the study. Clinical best practices were assumed, and some differences in care protocols were expected between clinical settings. The participating physicians could discontinue the use of the evaluated dressing and the patient's participation in the study at any point of the follow-up.

Study wound dressing

The three evaluated wound dressings (UrgoStart Plus Pad, UrgoStart Plus and UrgoStart Plus Border; Laboratoires URGO, France) present in contact with the wound a sterile, non-woven pad of cohesive polyabsorbent fibres coated with a soft adherent healing matrix impregnated with NOSF (sucrose octasulfate). UrgoStart Plus Border and UrgoStart Plus also include a superabsorbent layer for greater absorption capacity and a vapour-permeable waterproof outer film with soft adhesive silicone on their superior face, with overflowing edges for an easier application of the UrgoStart Plus Border. All these dressings were CE marked and expected to be used according to the manufacturer's instructions. In their instructions for use, it is recommended to change the dressings every 1–2 days during the wound desloughing stage and, thereafter, as often as required, depending on the exudate volume and clinical status of the wound, but at least once a week.

Outcomes and assessments

At the initial visit, the participating physicians documented the relevant demographic information and medical history of the patient, the wound

characteristics, the previous and current wound treatment, the primary dressing selected and the ease of application and conformability of its first application, and whether a compression therapy was applied.

The HRQoL of the patient was assessed with the validated Wound-QoL-17 questionnaire.[35–44] This questionnaire has been specifically designed to detect the impact of chronic wounds on patient HRQoL, on their physical, psychological and everyday life aspects, as well as overall. Its reliability and good correlation with other HRQoL questionnaires, such as EQ-5D, have also been previously demonstrated in several studies.[35,36,39–43] The one-page questionnaire was printed and handed to the patients who answered the 17 questions, rating their level of HRQoL impairments, due to their wound, on a scale ranging from 0 ('not at all') to 4 ('very much') (Fig 1).

At the interim visits, investigators were asked to assess the wound healing progression since the initial visit, and to continue to document the wound characteristics, primary dressing applied and whether a compression therapy was applied.

Outcomes related to the final assessment visit included:

- Treatment and evaluation duration (in days)
- Overall wound healing progression (wound healed, greatly improved, slightly improved, unchanged, slightly deteriorating or greatly deteriorating)
- Relative reduction of wound area (in %)
- Reduction of the percentage of sloughy tissue on the wound bed
- Change in the exudate level (increased, unchanged, decreased)
- Change in the periwound skin condition (improved, unchanged, deteriorating)
- Change in HRQoL (according to the Wound-QoL manual instructions)
- Frequency of dressing changes and overall acceptability of the dressing (usefulness: 'extremely useful', 'useful', 'hardly useful', 'not useful at all'; pain at dressing change: 'painless', 'with slight brief pain', 'with slight, persistent pain', 'painful', 'very painful'; and patient's acceptance: 'very good: the patient feels the dressing but does not have an uncomfortable sensation', 'good: the dressing sometimes bothers the patient, but does not interfere with the patient's activities of daily living', 'moderate: the dressing is often uncomfortable during the day, interferes with the patient's activities', 'poor: the dressing is often or even always uncomfortable during the day, interferes with the patient's activities and sleep')
- Overall opinion of the physicians on the performances of the evaluated dressings (better, identical or worse) compared with their previous experience with other dressings, in terms of time to reach wound closure, desloughing capacities, absorption capacities, ease of dressing application, handling, conformability, patients' acceptance and pain management.

Throughout the study period, the occurrence of adverse events was documented and the local tolerance of the dressings was assessed by the physicians at the final visit.

Data management

An electronic data entry system with a standardised electronic case report form (eCRF) was used in this clinical study. All physicians received specific access codes to enable them to enter their data. The electronic system performed automatic checks for data completeness and inconsistent data. The data management and quality assurance of the study were carried out by an independent contract research organisation (INPADS GmbH, Germany) in accordance with the recommendations on planning, conducting and analysing post-marketing surveillance studies of the Federal Institute for Drugs and Medical Devices/ Paul-Ehrlich Institut (BfArM/PEI, 2010). The patients

Fig 1. Wound-QoL-17 questionnaire on quality of life with chronic wounds (after Augustin et al.,[37] Blome et al.[35])

Wound-QoL-17 questionnaire on quality of life with chronic wounds

With the following questions, we aim to find out how your chronic wound(s) affect(s) your quality of life.

Please tick one box per line!

	In the last seven days ...	not at all	a little	moderately	quite a lot	very much
1	...my wound hurt	O	O	O	O	O
2	...my wound had a bad smell	O	O	O	O	O
3	...there was a disturbing discharge from the wound	O	O	O	O	O
4	...the wound has affected my sleep	O	O	O	O	O
5	...the treatment of the wound has been a burden to me	O	O	O	O	O
6	...the wound has made me unhappy	O	O	O	O	O
7	...I have felt frustrated because the wound is taking so long to heal	O	O	O	O	O
8	...I have worried about my wound	O	O	O	O	O
9	...I have been afraid of the wound getting worse or of new wounds appearing	O	O	O	O	O
10	...I have been afraid of knocking the wound	O	O	O	O	O
11	...I have had trouble moving about because of the wound	O	O	O	O	O
12	...climbing stairs has been difficult because of the wound	O	O	O	O	O
13	...I have had trouble with day-to-day activities because of the wound	O	O	O	O	O
14	...the wound has limited my leisure activities	O	O	O	O	O
15	...the wound has forced me to limit my activities with others	O	O	O	O	O
16	...I have felt dependent on help from others because of the wound	O	O	O	O	O
17	...the wound has been a financial burden to me	O	O	O	O	O

"Wound-QoL" questionnaire on Health-related Quality of Life in Chronic Wounds | Version English (UK), Augustin et al. 2017, Blome et al. 2014

included in the study were informed of the processed personal and health data by their participating physician, and gave explicit and written consent for processing their data in the study.

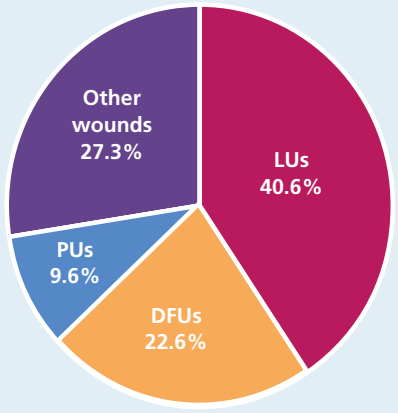
Statistical analysis

The estimation of the cohort size required for this observational study (around 1000 patients to be included) was based on the literature and on experience from previous observational and interventional studies,[26,34,44] in order to allow a pragmatic evaluation of the dressing's performance in a sufficiently diverse cohort of patients and physicians.

The statistical analyses were performed according to the statistical analysis plan, by an independent contract research organisation (INPADS), using SAS 9.1.3 for windows (Statistical Analysis System, SAS Institute, US). Values were reported as mean and standard deviation (SD); median and interquartile range (IQR); or count and percentage. Analyses included all patients for whom the initial visit and the final visit were documented, but adverse events were reported for any patients who were included in the clinical study. Missing values were not replaced. Data for venous LUs, arterial LUs and LUs of mixed origin were pooled into an LU group. All aetiologies other than LUs, DFUs and pressure ulcers (PUs) were grouped into an 'other wounds' group.

Analyses were performed according to a post hoc analysis plan in order to determine the performance of the dressings depending on wound duration, and to characterise the changes in HRQoL according to the Wound-QoL user manual (June 2021, accessible at https://www.wound-qol.com/download). Global score was calculated by averaging the answers to the 17 questions of the questionnaire if at least 75% of the items were answered. Three subscale scores, corresponding to the body, psyche and everyday life-related dimensions, were also computed if no more than one item of the subscale was missing. Higher scores indicate higher levels of HRQoL impairments. The numbers of patients with analysable data were reported for each score. A Wilcoxon signed-rank test or a paired Student t-test was used to compare the global scores and subscores of the test between the initial and final visits. A p-value of <0.05 was determined to be significant. The minimal important difference (MID), indicating a change considered meaningful to the patient, was set at 0.5 as recommended in the questionnaire manual and by Topp et al.[45] The proportion of patients in need of intervention in relation to their HRQoL was calculated a posteriori based on a score ≥3, that is, patients who answered being severely affected (3='quite a lot' or 4='very much') on at least one of the 17 questions, also in accordance with the manual.

Fig 2. Distribution of the treated wounds by aetiology



LUs—leg ulcers; DFUs—diabetic foot ulcers; PUs—pressure ulcers

Ethical approval

The study was conducted in accordance with the Declaration of Helsinki, the German medical devices act, German federal data protection act (Bundesdatenschutzgesetz new, 2018) and European General Data Protection Regulation (Datenschutz-Grundverordnung, 2018). Due to the non-interventional design of this study performed on three CE marked devices used according to the manufacturer's instructions, and in accordance with German legislation, approval by ethics committee or German authorities was not required.

Results

Baseline characteristics of the included patients

Between January 2019 and June 2020, 1021 patients with a wound were treated with the evaluated dressings by 105 participating centres, with a median number of five patients recruited per centre (IQR: 3–10). After discarding six patients due to missing consent on processing their medical data, and 54 due to loss of follow-up (no final visit completed), the data of 961 patients were taken into account in the analyses. Patients were treated and followed on average for 62 days (SD: 37 days). Two interim visits, performed after 20 days (SD: 17 days) and 40 days (SD: 25 days) of treatment, respectively, were also documented for 894 (93.0%) and 846 patients (88.0%), respectively. As reported in Fig 2, a wide diversity of wounds was treated with the evaluated dressings. The most frequent wound type corresponded to LUs (n=390, 40.6%; including 288 venous LUs, 39 arterial LUs and 63 LUs of mixed origin), while DFUs and PUs represented 22.6% (n=217) and 9.6% (n=92) of the cohort, respectively. The remaining wounds (n=262, 27.3%) included various aetiologies: chronic wounds with less frequent occurrence, such as lymphatic ulcers, stagnating wounds with impaired healing or prolonged inflammation stage; recurrent wounds; wounds known to have long healing times; or wounds in patients with healing risk factors.

Table 1. Demographics and medical history of the treated patients (N=961)

	LU (n=390)		DFU (n=217)		PU (n=92)		Other wounds (n=262)	
Demographics	Male	Female	Male	Female	Male	Female	Male	Female
n (%)	206 (52.8)	184 (47.2)	135 (62.2)	82 (37.8)	41 (44.6)	51 (55.4)	138 (52.7)	124 (47.3)
Age (years), mean (SD)	69.0 (13.6)	75.1 (13.9)	69.6 (10.7)	73.8 (13.1)	76.7 (10.9)	78.9 (13.0)	63.1 (20.0)	64.0 (20.4)
BMI (kg/m²), mean (SD)*	30.4 (8.1)	28.4 (7.4)	30.9 (6.8)	31.1 (7.6)	25.4 (4.3)	25.0 (5.1)	28.4 (6.2)	29.2 (8.5)
Medical history, multiple answers possible, n (%)								
Diabetes type 2	117 (30.0)		204 (94.0)		42 (45.7)		47 (28.2)	
Diabetes type 1	25 (6.4)		10 (4.6)		3 (3.3)		9 (3.4)	
Cardiac insufficiency	126 (32.3)		66 (30.4)		39 (42.4)		80 (30.5)	
Limited mobility	132 (33.8)		68 (31.3)		67 (72.8)		71 (27.1)	
Confirmed peripheral neuropathy	53 (13.6)		103 (47.5)		16 (17.4)		18 (6.9)	
Renal insufficiency	65 (16.7)		63 (29.0)		20 (21.7)		36 (13.7)	
Obesity (BMI≥30kg/m²)	73 (18.7)		62 (28.6)		9 (9.8)		59 (22.5)	
Malnutrition	23 (5.9)		7 (3.2)		20 (21.7)		21 (8.0)	
Respiratory insufficiency	49 (12.6)		19 (8.8)		13 (14.1)		36 (13.7)	
Single wounds / multiple wounds, n (%)	305 (78.2) / 85 (21.8)		171 (78.6) / 46 (21.2)		67 (72.8) / 25 (27.2)		206 (78.6) / 56 (21.4)	
First occurrence wounds / recurrent wounds, n (%)	286 (73.3) / 104 (26.7)		162 (74.7) / 55 (25.3)		80 (87.0) / 12 (13.0)		232 (88.5) / 30 (11.5)	

BMI—body mass index; DFU—diabetic foot ulcer; LU—leg ulcer; PU—pressure ulcer; SD—standard deviation. *Mean BMI is given for patients ≥17 years old

Demographics and medical history of the included patients are reported in Table 1. As commonly reported in the literature, the wound type groups showed different distributions of age and sex. More male patients than female had DFUs (62.2% versus 37.8%, respectively), while more female patients than male patients had PUs (55.4% versus 44.6%, respectively). On average, patients with PUs were slightly older (77.9 years old (SD: 12.8 years)) and patients documented as having 'other wounds' were younger (63.5 years old (SD: 20.2 years)) than the other patients. While 28.6% of the patients with a DFU were obese, conversely 21.7% of the patients with a PU had malnutrition.

The proportion of patients with diabetes was particularly high in all subgroups of patients, which tends to support the national and worldwide reports highlighting the increasing prevalence of this pathology. Cardiac, renal, respiratory insufficiencies and limited mobility were also quite prevalent in the different subgroups. The majority of patients had a single wound (n=749, 77.9%) and a first occurrence wound (n=760, 79.1%), but with a marked difference between the subgroups of patients with LUs or DFUs, where recurrent wounds accounted for 26.7% and 25.3% of cases, respectively, and the subgroups of PUs or other wounds, where the proportion of recurrent wounds did not reach 15.0%.

Baseline characteristics of the wounds, previous and current treatments, and local wound care

Treatment with the evaluated TLC-NOSF dressings was initiated after a median wound duration of one month for LUs, DFUs and PUs, and of two weeks for other wounds. When an evaluation of the previous wound healing progression was possible (n=464), the majority of wounds were either considered as stagnating or deteriorating (n=297, 64.0%). Before study inclusion, wounds were most frequently dressed with an absorbent dressing (n=383, 39.9%), contact layer/gauze dressings (n=285, 29.7%) or an antimicrobial dressing (n=110, 11.4%), but 109 wounds (11.3%) had not yet been covered by any another dressing, due to their recent occurrence.

The median wound area of the wounds was 6.3cm² (IQR: 2.4–15.7cm²), ranging between 3.1cm² for DFUs and 9.4cm² for PUs (Table 2). Globally, wound beds were covered by 49% (SD: 32%) of sloughy tissue, 44% (SD: 33%) of granulation tissue and 7% (SD: 17%) of necrotic tissue. Wounds with high or moderate exudate levels (n=641, 66.7%) were more frequent than those with little or no exudate (n=316, 32.9%). The majority of the patients presented with an impaired condition of their periwound skin (n=885, 92.1%) and reported spontaneous pain or pain at touch (n=624, 64.9%).

Most frequently, local care consisted of cleaning the

Table 2. Wound characteristics at baseline (N=961)

	LU (n=390)	DFU (n=217)	PU (n=92)	Other wounds (n=262)
Wound duration				
Median wound duration, in days (interquartile range)	31 (14–92)	29 (10–92)	30 (7–61)	16 (7–35)
Duration ≤1 month, n (%)	210 (53.8)	129 (59.4)	56 (60.9)	191 (72.9)
Duration >1 month, n (%)	178 (45.6)	86 (39.6)	35 (38.0)	68 (26.0)
Missing data, n (%)	2 (0.5)	2 (0.9)	1 (1.1)	3 (1.1)
Wound area				
Median wound area, in cm^2 (interquartile range)	7.1 (3.1–19.6)	3.1 (0.8–9.2)	9.4 (3.9–19.2)	6.9 (2.6–17.4)
Wound bed tissue, %				
Granulation tissue, mean (SD)	37 (32)	44 (31)	43 (33)	53 (35)
Sloughy tissue, mean (SD)	54 (32)	48 (30)	47 (32)	42 (33)
Necrotic tissue, mean (SD)	9 (19)	7 (16)	10 (20)	5 (13)
Missing data, n (%)	0 (0.0)	1 (0.4)	0 (0.0)	0 (0.0)
Level of exudate, n (%)				
High/moderate exudate	294 (75.4)	126 (58.1)	70 (76.1)	151 (57.6)
Little/no exudate	93 (23.8)	91 (41.9)	22 (23.9)	110 (42.0)
Missing data	3 (0.8)	0 (0.0)	0 (0.0)	1 (0.4)
Periwound skin condition, n (%)				
Healthy skin	22 (5.6)	7 (3.2)	1 (1.1)	27 (10.3)
Missing data	9 (2.3)	2 (0.9)	0 (0.0)	8 (3.1)
Pain (spontaneous pain and sensitivity could be reported together by patients), n (%)				
Spontaneous pain	127 (32.6)	48 (22.1)	36 (39.1)	80 (30.5)
Sensitivity (pain at touch)	218 (55.9)	80 (36.9)	61 (66.3)	178 (67.9)
No pain reported	137 (35.1)	116 (53.5)	23 (25.0)	59 (22.5)
Missing data	0 (0.3)	1 (0.5)	0 (0.0)	1 (0.4)

DFU—diabetic foot ulcer; LU—leg ulcer; PU—pressure ulcer

wounds with an antiseptic solution (n=520, 54.1%) and/or a saline solution (n=370, 38.5%). Mechanical wound cleaning, surgical debridement and periwound skin care were also performed in 365 (38.0%), 166 (17.3%) and 144 (15.0%) cases, respectively. At baseline, 161 patients (16.8%) were under systemic antibiotic therapy and 65 (6.8%) were receiving local antibiotic therapy, but mostly patients were not under antibiotic therapy (n=726, 75.5%) (missing data n=9, 0.9%).

At the initial visit, the two most frequent reasons reported for having chosen the evaluated dressings to treat the patient's wound were: 'a dressing suitable for all phases of the wound healing process' (84.7%) and 'a dressing that reduces the time-to-heal' (82.1%), regardless of the dressing version selected. The border and pad versions of the dressing were selected to treat 333 patients (34.7%) each and the non-adhesive version to treat 295 patients (30.7%). All dressings were applied on each wound type, but the border version was more frequently selected for PUs (55.4%). A switch between the versions of the UrgoStart Plus dressing range was also reported in 184 patients (19.1%) at the different visits, without marked modifications on the overall trends but with an increase in the use of the border version in PUs (59.8% at the final visit). At the different visits, compression therapy was worn by 62.2–65.0% of patients with a venous LU.

Wound healing rate and wound healing progression with TLC-NOSF dressings

By the final visit, a wound closure or an improvement in wound healing was reported in 92.0% of the treated wounds (n=884). Wound closure was achieved in 57.6% of DFUs, 45.6% of LUs, 45.7% of PUs and 55.0% of the other wounds. The median times to heal were 59 days (IQR: 38–84 days) with LUs, 56.5 days (IQR: 43–82 days) with DFUs, 56 days (IQR: 35–84 days) with PUs and 46 days (IQR: 32–70 days) with the other wounds.

The highest wound healing rate was achieved in wounds with the shortest duration at initiation of the treatment: 59.9% in wounds that occurred in the previous month versus 36.8% for wounds that had already lasted for more than a month. Similar trends were reported in all wound type subgroups, with the highest difference reported in DFUs (34.1 percentage points) (Fig 3). Wounds still stagnant or deteriorating at the last visit were more frequently reported in the group of older wounds (11.2% versus 3.2% in recent wounds).

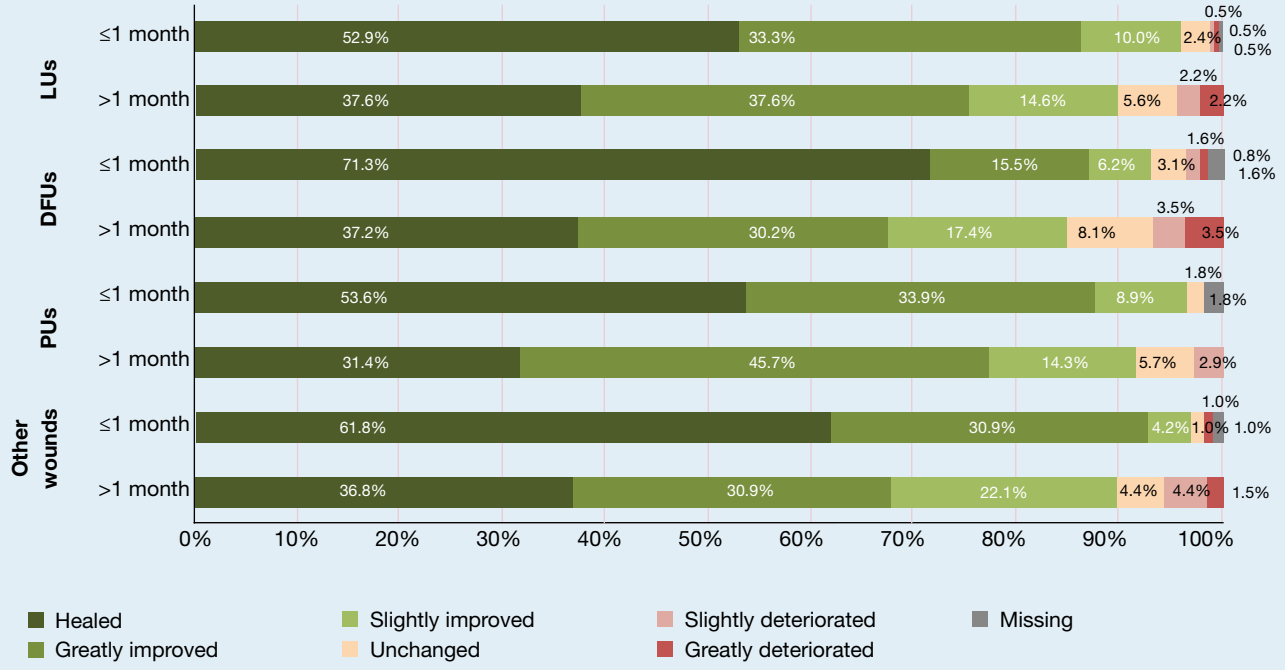
Continued improvement in the wound healing process was confirmed by the reduction in wound area at each visit, and the achievement at the final visit of a relative reduction of wound area of 97.5% (IQR: 66.8–100.0%) in LUs, 100.0% (IQR: 76.0–100.0%) in DFUs, 92.5% (IQR: 64.3–100.0%) in PUs and 100.0% (IQR: 75.0–100.0%) in other wounds.

Dressing performances in terms of sloughy tissue and exudate management

The proportion of sloughy tissue on the wound bed continuously decreased throughout the study period to reach an 87.5% relative reduction of sloughy tissue at the final visit (median value, IQR: 40–100%).

Between the initial and final visits, the levels of exudate decreased in 68.9% (n=662) of the wounds, remained unchanged in 15.6% (n=150) and increased in 2.2% (n=21) (data missing for n=128 wounds (13.3%)). The proportion of wounds with high or moderate levels of exudate decreased from 66.7% (n=641) to 11.6% (n=111), the proportion of malodorous wounds from 30.6% (n=294) to 3.3% (n=32) and the proportion of macerated periwound skin from 36.5% (n=351) to 8.8% (n=85). As a result, by the final visit, the

Fig 3. Wound healing rate and wound healing progression with the TLC-NOSF dressings depending on wound duration at initiation of the treatment



LUs—leg ulcers; DFUs—diabetic foot ulcers; PUs—pressure ulcers

periwound skin condition overall improved in 638 patients (66.4%), remained unchanged in 247 patients (25.7%) and worsened in 39 patients (4.1%) (a comparison was not possible in 3.9% of the cases).

The proportion of patients who reported spontaneous pain and pain at touch at the initial visit also fell by 81.7% and 55.7%, respectively. Similar results were reported regardless of the type of wounds (data not shown).

Local wound infection, adverse events and local tolerance of evaluated dressings

During this observational study, a local wound infection was diagnosed in 30 (3.4%) patients at the first interim visit, 13 (1.5%) patients at the second interim visit and 11 (1.1%) patients at the final visit. None of these events led to a discontinuation of the evaluated dressings.

Slight irritation and skin redness was documented in one patient with a pilonidal sinus wound treated with the pad dressing. This adverse event was judged to be related to the evaluated dressing and improved after a temporary discontinuation of the treatment. No other adverse event was documented with the border or the non-adhesive foam dressings.

The local tolerance of the dressing was assessed by the physicians as 'very good' in 814 (84.7%) patients and 'good' in 133 (13.8%) patients. No case of poor local tolerance was reported, and the data were missing in 14 (1.5%) files.

Acceptability, handling and overall assessment of dressing performances compared with other dressings

Throughout the course of the study, the dressings were changed on average 2.6 (SD: 1.3) times a week, and from 2.4 (SD: 1.1) to 2.7 (SD: 1.3) times a week depending on wound types. The physicians of the 105 centres involved in this study judged the three dressings in the majority of cases to be 'very easy' or 'easy' to apply since their first application (98.7% for UrgoStart Plus, 96.8% for the border and 94.7% for the pad), and 'very conformable' or 'conformable' (95.7% for UrgoStart Plus, 96.8% for the border and 97.1% for the pad).

At the final visit, the vast majority of investigators judged the UrgoStart Plus dressings to be 'extremely useful' or 'useful' (for 94.7% of patients), to be associated with 'no pain' or 'slight, brief pain' (in 94.7% of cases) and 'very well accepted' or 'well accepted' (by 98.5% of patients).

Based on their global experience during this study, and comparing with their previous experience with other dressings, the participating physicians estimated that the evaluated dressings performed better in terms of wound healing efficacy (shorter time to heal (82.2%), desloughing efficacy (84.9%), absorption capacities (67.6%), ease of application (57.5%), handling (55.8%), conformability (56.8%), pain management (58.6%) and patient's acceptance (56.6%)).

Table 3. Wound-QoL-17 global scores and subscores at initial and final visits

	Initial visit	Final visit	Difference	p-value
Global score, n	334	333	333	
Mean (SD)	1.92 (1.00)	0.85 (0.83)	1.07 (1.07)	<0.001
Body subscale score, n	337	336	336	
Mean (SD)	1.89 (1.02)	0.70 (0.80)	1.20 (1.16)	<0.001
Psyche subscale score, n	335	337	335	
Mean (SD)	2.32 (1.15)	1.15 (1.08)	1.17 (1.27)	<0.001
Everyday life subscale score, n	331	330	330	
Mean (SD)	1.77 (1.23)	0.81 (0.97)	0.94 (1.16)	<0.001

SD—standard deviation

Table 4. Wound-QoL-17 global scores depending on wound healing progress

	Initial visit	Final visit	Difference	p-value
Healed (n=165), n	165	164	164	
Mean (SD)	1.94 (1.03)	0.50 (0.64)	1.44 (1.22)	<0.001
Improved (n=151), n	148	148	148	
Mean (SD)	1.88 (0.98)	1.10 (0.82)	0.79 (0.72)	< 0.001
Unchanged or deteriorated (n=21), n	21	21	21	
Mean (SD)	1.94 (0.91)	1.81 (0.85)	0.12 (0.69)	0.420

SD—standard deviation

Health-related quality of life

At the initial visit, the Wound-QoL questionnaire was printed and handed to 687 (71.5%) patients, of whom 365 (37.9%) completed it. By the final visit, 337 (35.1%) patients had completed both the initial and final visit questionnaires. These patients were globally representative of the total cohort with a fair distribution of the different types of wounds: 132 had an LU (39.1%), 69 (20.5%) a DFU, 28 (8.3%) a PU and 108 (32.0%) another type of wound. The demographics, medical history, wound characteristics and healing outcomes of these patients were also very similar to those of the total cohort, as was their duration of follow-up.

At the initial visit, despite most of the included wounds being of relatively short duration (median value 30 days, IQR: 14–70 days) and being a first occurrence (79.8%), the HRQoL of the patients had already noticeably deteriorated, in particular in the psyche dimension (Table 3). A need for intervention, based on a score ≥3 (patients affected 'quite a lot' or 'very much') on at least one of the 17 items of the questionnaire, was registered for 81.6% of the patients, with a median number of six items (IQR: 1–11) with score ≥3 per patient. For each item with a score ≥3, the Wound-QoL manual suggests that the healthcare professional takes additional measures to support and improve the impaired aspects of the patient's HRQoL (for example, to relieve his/her pain, alleviate his/her level of anxiety, to shorten the duration of the wound healing process, to facilitate his/her social life and daily activities, etc).

By the final visit, significant improvements in the patients' HRQoL were found globally, as well as in physical, psychological and everyday life-related dimensions ($p<0.001$).

The changes in HRQoL were closely related to the progress of the wound healing process, with significant HRQoL improvements reported in the group of patients whose wounds healed or improved by the final visit and no changes in the others (Table 4).

A decrease in the Wound-QoL-17 global score of 0.50 or more (minimal important difference, MID) in a group of patients is assumed to indicate a change considered meaningful to the patient.[45] This MID value was reached both in patients with healed wounds and in patients with improved wounds.

The improvement of HRQoL led to a 53.4% reduction in the proportion of patients in need of intervention in relation to their HRQoL (Fig 4) and in the number of measures needed per patient (Fig 5). These reductions in needs were observed in all three HRQoL dimensions, with 82.5%, 66.2% and 75.1% of patients with no more severe impact of their wound on their body, psyche and everyday life, respectively (i.e. no more 'quite a lot' or 'very much' answers) at the final visit, and therefore there was no longer a need to intervene and restore those aspects of a patient's HRQoL that were previously severely impaired.

These significant and clinically relevant improvements in the patients' HRQoL were also noted regardless of the type of wound treated and of the wound duration at the initial visit (data not shown).

Discussion

The results from this clinical study conducted on a large cohort of 961 patients show that the good performance of the TLC-NOSF dressings with polyabsorbent fibres on the wound healing process leads to significant improvement in the HRQoL of patients with chronic wounds treated in real-life conditions.

The non-adhesive superabsorbent format of the dressing was just as well tolerated and accepted as the border and pad formats. As current guidelines recommend selecting dressings while taking into account the specific needs of each patient and wound, the additional flexibility offered by the newly extended range was appreciated by the vast majority of the physicians, who evaluated each dressing as 'extremely useful' or 'useful'.

However, the need to close wounds as quickly as possible remains the fundamental need for any patient

with a chronic wound in order to decrease the risk of complications and facilitate a return to a more normal life. This has been especially true during the COVID-19 pandemic, when primary care physician visits have been disrupted and hospitalisations cancelled or postponed.[46]

The high wound closure rate achieved in this clinical study, and the optimal outcomes obtained in recent wounds, are consistent with the previous clinical evidence on TLC-NOSF dressings,[21–26,34,47–50] and confirm the benefits of these dressings as first-line treatment and until complete wound closure.

Higher closure rate or faster healing with TLC-NOSF dressings when used in more recent wounds have already been demonstrated in RCTs, real-life studies, clinical trials and pooled analysis of observational studies.[21,24–26,35,47] Comparison between clinical trials can be difficult when too many variables differ between them. However, the characteristics of the patients and wounds included in our study are very similar to the previous observational study conducted on the border and pad dressings of the same range.[34] The outcomes of these two studies are strikingly similar regarding the overall clinical assessment of wound healing, in the total cohort as well as in each wound type group, with only a slightly higher wound healing rate in the present study. This could be explained by a higher proportion of more recent wounds included and a period of follow-up one week longer on average.

One major difference between the previous study and the present one is the collection of data on the change of HRQoL of the treated patients. Measuring HRQoL can help raise clinicians' awareness about the specific concerns of patients with chronic wounds and improve patient–clinician communication. It can be useful to assess interventions and wound care strategies, promote high-quality patient care, monitor progress and measure outcomes that are meaningful to the patients.[33]

The Wound-QoL questionnaire used in this study is a validated, reliable and easy-to-use tool, specifically designed to detect the impact of chronic wounds on patients' HRQoL.[35,36] The calculation of three subscores provides a more comprehensive analysis on the overall effect of the wound on the physical (body dimension), psychological (psyche dimension) and functional/social (everyday life-related dimension) aspects of the patients' life. A good correlation has been demonstrated between the results obtained with this questionnaire and that of other questionnaires commonly used in this field (EQ-5D,[35,36,40,41] FLQA-W (Freiburg Life Quality Assessment in Wounds),[43,48] SF-12[39] and pain VAS (visual analogue scale)[35,41–43]), as well as with the progression of the wound healing process.[42,43,45] This condensed questionnaire of 17 questions that fit on one single page is fast to complete (usually less than five minutes),[36,43] very well accepted by patients, and its popularity has grown steeply in the past five years.[35–43,45,46,48,49,51–55] Another major asset of this questionnaire, particularly well-suited to real-life assessments, is its ability to detect small but clinically relevant differences and highlight impairments in even apparently optimal management.

In this study, at the initial visit, patients reported an already substantially impaired HRQoL due to their wounds. In fact, the mean values of the Wound-QoL global score and dimension subscores were among the highest reported in the literature, despite most previous studies being conducted on patients with wounds of longer duration.[37,38,40–43,45,46,49] These results confirm the burden that chronic wounds place on patients'

Fig 4. Patients in need of intervention in relation to their health-related quality of life (HRQoL), according to a score ≥3 on at least one question of the Wound-QoL-17 questionnaire (affected 'quite a lot' or 'very much' by their wound)

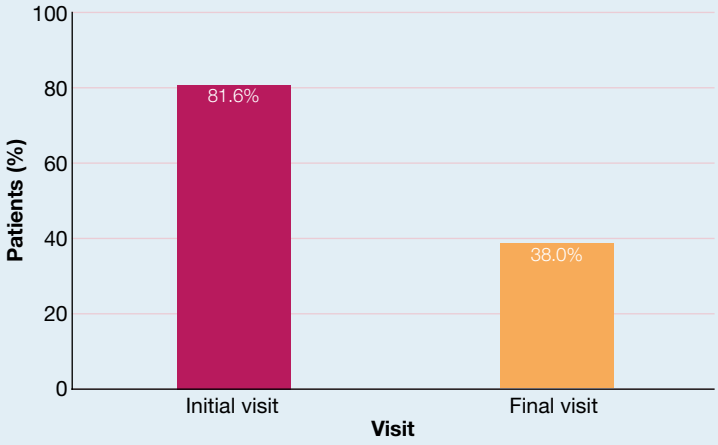
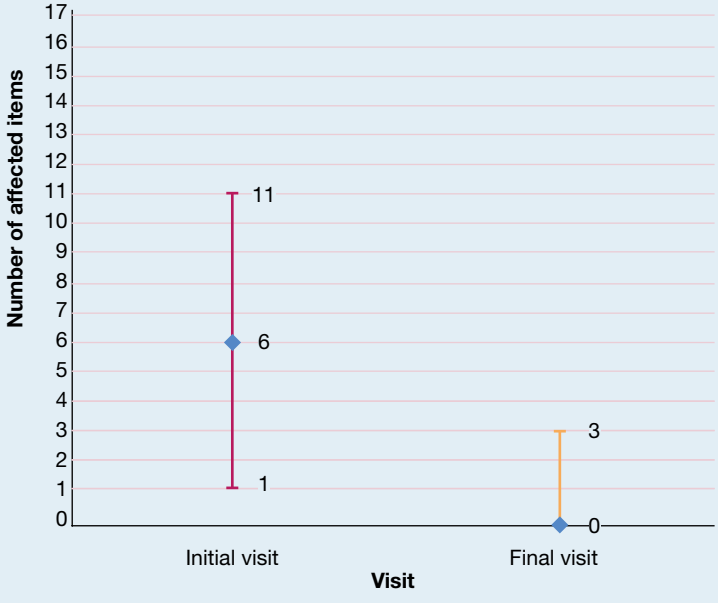


Fig 5. Number of Wound-QoL-17 items with a score ≥3 (affected 'quite a lot' or 'very much' by the wound) per patient at the initial and final visits (median values and interquartile range)



HRQoL,[10–12] but also show that even during the first few weeks after the occurrence of predominantly new wounds, the majority of patients with a chronic wound understand the severity of their situation, are already in pain and are anxious about their healing outcomes. Although 75% of wounds lasted for only two months or less, the Wound-QoL questionnaire was able to detect that these wounds already had a profound impact on each dimension of the patients' HRQoL, especially in the psyche dimension. In fact, two of the most frequent issues reported by the patients as severely affecting them was their frustration with the slow healing process and their fear of a possible deterioration of their wound. This finding of a marked effect on the patient psyche, observed here regardless of the wound duration or the wound type, is consistent with most previous studies.[35,39,40,42,43,45,49]

To our knowledge, this clinical study was the first to assess the changes in HRQoL in patients with chronic wounds treated with TLC-NOSF dressings in real-life conditions. The significant improvements reported by the end of the treatment period, however, are consistent with the findings from previous RCTs conducted in patients with LUs and DFUs treated with TLC-NOSF dressings.[22,24] According to NICE, this evidence was recognised to plausibly lead to benefits in routine practice.[17] Our results support both clinically relevant and significant improvement in the global HRQoL and in each of the three dimensions assessed by the Wound-QoL questionnaire. Body dimension improvement was expected considering the high level of wound closure and healing improvement achieved. The appropriate management of pain, wound exudate and sloughy tissue with the atraumatic polyabsorbent dressings, leading to the reduction of pain, malodorous wounds and disturbing discharge as reported at the final visit, certainly also participated in the improvement of this body dimension. Better improvement in pain and discomfort, but also of anxiety and depression, in patients treated with TLC-NOSF dressing than in patients treated with neutral dressings were previously demonstrated, using the EQ-5D questionnaire in a double-blind RCT conducted on the management of patients with LUs.[22] It can be assumed that in that RCT, as in our real-life study, witnessing the marked improvement in wound healing had helped to relieve patients and rapidly decrease their anxiety and stress about the possibility of wound complications and long-term treatment. Finally, improvement of the physical and psychological dimensions of the HRQoL led to a meaningful improvement in the everyday life of the treated patients. By the end of the study period, the analysis showed in the large majority of patients severely affected at the initial visit: higher mobility (71.4%), less trouble with day-to-day activities (74.6%), less limitation in patients' social interactions (73.1%) and a reduction in feelings of being dependent on help from others (70.8%).

The decrease in the proportion of patients in need of intervention and the number of measures needed per patient reported here indicates an improvement in the HRQoL but could also be accompanied by an additional relief in terms of resource mobilisation and costs for statutory health insurance.

Limitations

A limitation of this clinical study is that HRQoL data were collected for just over one-third of the included patients. However, as these patients and their wounds presented characteristics and outcomes similar to the global cohort, there was no indication that this subgroup of patients was not representative of the global cohort.

The high follow-up rate (92.3%) at the final visit among the patients who completed the questionnaire at baseline and the low number of missing data are also indicative of patients' willingness to share their views on this topic and confirm the appropriateness of the Wound-QoL questionnaire for this purpose. Moreover, with 337 participants agreeing to complete the questionnaire, the size of the data analysed here is one of the largest reported in the literature on the assessment of HRQoL in patients with chronic wounds.[10,12]

Given the level of information collected on patients and their wounds, these new clinical data provide an interesting additional insight into the effect of the management of patients with chronic wounds, representative of what could be observed in the German community under real-life conditions.

Conclusion

The clinical evidence from this observational study, conducted on a cohort of 961 patients, treated in real-life conditions, supports and complements the efficacy and safety profile of the range of UrgoStart Plus dressings. The TLC-NOSF dressings with polyabsorbent fibres enhance the wound healing of chronic wounds and significantly improve the HRQoL of the treated patients, while being very well tolerated and accepted by both clinicians and patients. These results support the use of these dressings, as a first-line intervention and until wound healing, in the local management of chronic wounds. **JWC**

Reflective questions

- How can the health-related quality of life (HRQoL) of patients with chronic wounds be assessed under real-life conditions and when should measures be taken?
- What benefits can be expected by treating patients with the polyabsorbent TLC-NOSF dressings?
- When should TLC-NOSF dressings be initiated for an optimal management of chronic wounds?

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