

# The management of wound odour and exudate using a multi-purpose dressing – a case series

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## ABSTRACT

**Background and aim** The care of chronic wounds (CWs) is complex and their management is multifaceted. To manage the clinical manifestations, the performance of a multi-purpose dressing in the management of odour, exudate, pain and healing in patients with CWs attending a wound outpatient clinic was assessed.

**Method** A case series using descriptive statistics was conducted with 22 consecutive patients with an existing odorous CW attending a wound outpatient clinic. Participants were treated with a multi-purpose dressing.

**Results** All participants had a complete reduction of their wound odour between the first and the second dressing application ( $p < 0.001$ ). Maceration was reduced or completely eliminated in all exudative wounds (81.8%). All cases decreased in wound size during the study time (mean percentage 45.5%; SD 15.3). Pain was reduced in 55% and unchanged in 45% of wounds.

**Conclusion and implication for practice** Multi-purpose dressings provide a reduction of wound odour, wound area, as well as maceration area. In addition, the dressing has a more moderate impact on pain reduction.

**Keywords** chronic wound, odour, exudate, pain, maceration, multi-purpose dressing

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## KEY MESSAGES

- To manage the clinical manifestations, the performance of a multi-purpose dressing in terms of management of odour, exudate, pain and healing in patients with chronic wounds (CWs) admitted in wound outpatient clinics was assessed.
- A total of 22 case studies from within wound care outpatients where a multi-purpose dressing was used for exudate and odour management were collated.
- A multi-purpose dressing provides a reduction of wound odour, wound area, as well as maceration area.

## INTRODUCTION

Chronic wounds (CWs) affect approximately 2.21 individuals per 1,000 in the population and are often incorrectly treated.<sup>1</sup> The prevalence of chronic diseases is expected to increase in the upcoming years due to the ageing population. The most common CWs include venous, arterial or diabetic ulcers. CWs impose significant humanistic and economic burdens, both at an individual level (e.g., affecting quality of life)<sup>2,3</sup> and at a societal level (e.g., increasing healthcare costs).<sup>4,5</sup> The humanistic burden primarily relates to the quality of life and encompasses both physical and psychological dimensions.<sup>3</sup>

The care of CWs has become a specialty in its own due to their complex, chronic nature. The therapeutic approach

to managing such wounds is multifaceted, targeting the management of risk factors and clinical manifestations such as odour or exudate. Wound odour and exudate are reported as some of the most distressing symptoms, leading to psychological discomfort and embarrassment among patients, their families and clinicians.<sup>6</sup> Unpleasant odours are caused by tissue degradation and bacterial colonisation, involving volatile agents that contain molecules capable of easy evaporation.<sup>7</sup> In wounds, such agents include organic acids as well as cadaverine and putrescine.<sup>8</sup> Malodour and its effects on individuals has been widely investigated and reported as feelings of disgust, likened to the smell of rotting meat, or as a source of stress.<sup>9</sup> Odour management is, therefore, important but challenging. A recently published systematic review by Gethin et al.<sup>7</sup> has shown that activated charcoal can be used for odour reduction.

Exudate production in a wound that is progressing normally reduces over time.<sup>10</sup> However, in CWs, it is believed to prolong the inflammatory phase and be detrimental to healing.<sup>11</sup> Overproduction may result in dressing leakage which can be unpleasant for patients. To absorb high volumes of exudate, superabsorbent dressings are used.<sup>12</sup> A randomised controlled trial demonstrated that, when applying such dressing, there is faster wound area reduction (0.45cm<sup>2</sup> per day vs. 0.2cm<sup>2</sup> per day), longer wear time (9.5 days vs. 8.1 days), and more

pronounced maceration reduction ( $-2.07\text{cm}^2$ ) compared to standard care ( $-0.71\text{cm}^2$ ).<sup>13</sup> A study from Germany confirmed these results, showing that the application of superabsorbent dressings on exudating leg ulcers can lead to an improved healing rate of 2.57% (benefit ratio 1.08).<sup>14</sup>

However, it is important to choose a wound dressing that addresses both odour and wound exudate. Therefore, we conducted a case series to assess the performance of a multi-purpose dressing which is frequently used in clinical practice. This assessment was carried out on 22 patients with CWs in an outpatient setting over the course of dressing application.

## METHOD

### Study design

For this study a case series design was chosen. In a case series, observations are made on a series of individuals, usually all receiving the same intervention, before and after an intervention but with no control group.<sup>15</sup> This current study evaluated the effectiveness of a multi-purpose dressing in managing odour, exudate, pain and wound area evolution in patients with CWs admitted to one wound care outpatient clinic in Western Switzerland.

### Treatment material

The treatment for which these case studies have been assigned is a multi-purpose dressing that is indicated for hard-to-heal and low-to-heavy exuding wounds, as well as for infected or vulnerable-to-infection wounds. This dressing is a hydrophilic, spun-bonded non-woven dressing composed of polypropylene, web treatment and additives (pigments). It has an air-formed, non-woven composite of pulp (cellulose) and cross-linked acrylate polymer with a knitted activated charcoal cloth (Curea P1 Duo Active). Polyacrylate wound dressings/pads are a relatively recent addition to the clinician's toolbox. These dressings are highly effective for exudate management as their substantial absorbency and fluid retention can be adjusted to the need. The dressing used for this case series additionally contains a layer of activated charcoal and has the ability to sequester and inhibit bacteria and matrix metalloproteinases (MMPs) as well as to bind toxins in the core.

### Case series

A total of 22 case studies from within a wound care outpatient clinic where a multi-purpose dressing was used for odour and exudate management were collated. Consecutive patients admitted to the participating clinic were screened for participation. Inclusion criteria were patients with a full thickness exuding odorous CW that had been present for greater than 4 weeks, being 18 years or older, and proficient in French language. Ethical approval was granted by the ethics committee of the Canton of Geneva, Switzerland (2018-01589).

The study nurses performed data entry between November 2018 to March 2020 using electronic support (EvaSys GmbH, Germany) and measured wound areas using a 3D wound imaging device.<sup>16</sup> The dressing application period was defined as the time from the start of treatment until the dressing was no longer clinically indicated, i.e., when the wound no longer produced excessive exudate. Data were collected at baseline and at the end of the dressing application period, including type of wound, area ( $\text{cm}^2$ ), odour (Visual Analog Scale (VAS) 0–100) as perceived by the study nurses, pain (VAS 0–10) as reported by the participants, and peri-wound

skin maceration ( $\text{cm}^2$ ). Socioeconomic and health data were collected at baseline only.

Wound and patient characteristics were reported using descriptive statistics. Continuous variables are presented as means and standard deviations (SD) or medians and interquartile ranges (IQR) as appropriate. Categorical variables are expressed as counts and percentages. Odour, maceration, pain and wound area reductions were assessed over the dressing application period using classical tests of hypotheses for paired data. Statistical tests were two-sided, and p-values below 0.05 were considered statistically significant and conducted using STATA, version 17 (StataCorp LLC, 2021).

## RESULTS

### Characteristics of study population

A total of 22 case studies meeting the eligibility criteria were available for analysis. The mean age was 82.1 years (SD 10.2), with slightly more females (59.1%,  $n=13$ ). All cases manifested diagnosed malodorous venous ulcers (54.6%,  $n=12$ ), mixed ulcers (22.7%,  $n=5$ ), or diabetic foot ulcers (22.7%,  $n=5$ ), all of them being exudating. Participants' mean BMI was 25.8 (SD 3.0) and the most frequent comorbidity was cardiovascular disease (95.5%,  $n=21$ ), followed by diabetes (22.7%,  $n=5$ ) or a combination of both (18.2%,  $n=4$ ) (Table 1).

### Wound odour evolution

The mean level of odour was 17.7 (SD 8.6; 95% CI [13.9–21.5]; range 10–40) at the start of the study, as perceived by the study nurses. The multi-purpose dressing was used for periods ranging from 3–23 days (median 7.5; IQR 4–10). All participants experienced a complete disappearance of their wound odour ( $p<0.001$ ) (Table 2).

### Exudate evolution

Among all participants, 81.8% ( $n=18$ ) presented with exudative wounds accompanied by peri-wound skin maceration at the start of the study. In these exudative wounds, the mean maceration area extended to  $3.6\text{cm}^2$

Table 1. Characteristics of study population ( $n=22$ )

Demographics	mean (SD)	n (%)
<b>Age</b>	82.1 (10.2)	–
<b>Sex</b>		
Female	–	13 (59.1)
Male	–	9 (40.9)
<b>Status</b>		
Single	–	1 (4.5)
Married	–	10 (45.5)
Divorced	–	1 (4.5)
Widowed	–	10 (45.5)
<b>BMI</b>	25.8 (3.0)	–
<b>Comorbidities</b>		
Diabetes	–	5 (22.7)
Cardiovascular disease	–	21 (95.5)
<b>Wound type</b>		
Diabetic foot ulcer	–	5 (22.7)
Venous ulcer	–	12 (54.6)
Ulcus cruris mixtum	–	5 (22.7)

Table 2. Individual participants' wound characteristics

Participants (n=22)			Initial consult				Last consult			
Age	Wound type	Dressing application period (days)	Wound area (cm <sup>2</sup> )	Wound odour (VAS 0-100)	Pain (VAS 0-10)	Maceration (cm <sup>2</sup> )	Wound area (cm <sup>2</sup> )	Wound odour (VAS 0-100)	Pain (VAS 0-10)	Maceration (cm <sup>2</sup> )
83	Venous leg ulcer	21	6.4	10	8	0	5.8	0	5	0
74	Venous leg ulcer	12	3.5	30	3	0	1.5	0	3	0
93	Diabetic foot ulcer	7	4.6	20	4	3	1.4	0	3	0
84	Diabetic foot ulcer	4	2.5	10	2	3	1.5	0	1	1
75	Venous leg ulcer	7	3.4	20	3	4	1.1	0	3	2
93	Venous leg ulcer	4	4.3	20	2	3	3.1	0	2	1
84	Ulcus Cruris mixtum	10	3.5	10	3	2	2.1	0	3	1
76	Venous leg ulcer	4	5.3	10	3	3	3.3	0	3	1
75	Venous leg ulcer	23	4.4	10	4	2	3.2	0	2	0
93	Diabetic foot ulcer	4	3.5	10	2	0	2.5	0	2	0
84	Ulcus Cruris mixtum	4	6.4	10	2	0	2.2	0	2	0
93	Ulcus Cruris mixtum	9	2.4	15	1	4	1.5	0	1	0
84	Ulcus Cruris mixtum	13	4.9	20	3	3	2.9	0	1	3
76	Venous leg ulcer	8	6.5	10	4	2	3.1	0	3	0
90	Venous leg ulcer	7	4.3	20	2	7	2.2	0	0	2
51	Venous leg ulcer	9	4.7	20	2	5	2.1	0	0	0
72	Diabetic foot ulcer	10	2.8	30	0	4	1.3	0	0	4
93	Venous leg ulcer	3	5.4	40	0	4	2.1	0	0	0
85	Venous leg ulcer	7	4.8	30	3	4	2.2	0	0	0
78	Venous leg ulcer	8	6.3	15	5	4	3	0	1	4
77	Ulcus Cruris mixtum	11	3.5	10	5	5	2.5	0	3	0
94	Diabetic foot ulcer	3	4.1	20	4	3	2.2	0	4	3
Median (IQR) / mean (SD)			4.43 (1.25)	17.7 (8.6)	3.3 (1.6)	3.6 (1.2)	2.40 (1.00)	0	2.1 (1.4)	1.2 (1.4)
CI 95%			3.88-4.99	13.9-21.5	2.5-4.0	3.0-4.2	1.95-2.85	-	1.5-2.7	0.5-1.9

(SD 1.2; 95% CI [3.0–4.2]; range 2–7). After the application of the multi-purpose dressing, maceration was reduced to a mean area of 1.2cm<sup>2</sup> (SD 1.4; 95% CI [0.5–1.9]; range 0–4) ( $p < 0.001$ ). The mean percentage of maceration area reduction was 65.1% (SD 40%; median 69.0%; IQR [50–100%]). Complete reduction of maceration was observed in 44.4% (8/18) of cases.

### Pain evolution

At baseline, 90.9% ( $n=20$ ) of the participants reported having pain, with a mean level of 3.3 (SD 1.6; 95% CI [2.5–4.0]). After the dressing application, the perceived pain decreased to a mean level of 2.1 (SD 1.4; 95% CI [1.5–2.7]) ( $p=0.001$ ) (Table 2). In 25% of the participants experiencing pain (5/20), pain was reduced by at least two-thirds after a mean dressing application period of 8.8 days (SD 2.5; range 7–13). It reduced completely in 15.0% of participants (3/20), while it remained unchanged in another 45% (9/20).

### Wound area evolution

The mean wound area was 4.43cm<sup>2</sup> (SD 1.25; 95% CI [3.88–4.99]) at the start of the study and 2.40cm<sup>2</sup> (SD 1.00; 95% CI [1.95–2.85]) at the end of the study ( $p < 0.001$ ). All wounds showed an area reduction between the two visits, with a mean percentage decrease of 45.5% (SD 15.3; range 9.4–69.6%), but none of them completely healed during the study period.

## DISCUSSION

This case series study, involving 22 participants, was designed to assess the performance of a multi-purpose dressing in managing odour, exudate, pain and wound area reduction. The examined wound dressing was a superabsorbent dressing with an integrated activated charcoal layer. Our study population was comparable to those of other studies on CWs.<sup>17,18</sup> The results demonstrate that this dressing had an effect in controlling odour. Evidence underscores the importance of odour control, as it can cause psychological distress and embarrassment for patients and their families.<sup>9</sup> Healthcare professionals face the challenge of controlling odour and providing appropriate wound care to improve the patients' quality of life. In addition to managing odour, the assessment of exudate management was carried out. Our results demonstrate that when applying a multi-purpose dressing, the maceration area was reduced by an average of 65.1%. Therefore, managing exudate is crucial in preventing maceration.<sup>11</sup>

Wound-related pain is multidimensional in nature, encompassing persistent pain between dressing changes and intermittent pain that is often exacerbated during dressing changes.<sup>19</sup> It is therefore important to prevent pain during dressing changes because traumatic removal can cause pain and re-injury to the wound. This multi-purpose dressing includes a highly permeable non-woven layer helping to decrease pain. All cases showed a wound area reduction which we attribute to the creation of a moisture-balanced environment which limits maceration and promotes healing.

Additionally, odour and exudate containment may reduce dressing changes, resulting in an improved quality of life for patients. In our study, nearly all wounds (92.6%) showed an area reduction between the two visits, with a mean percentage of decrease of 46.5%. This can lead back because providing a moisture-balanced environment, limiting

maceration of the wound bed and promotes wound healing. Thus, the use of a multi-purpose dressing in CWs could impinge on a person's independence. During the entire study period no undesirable effects were observed.

### Limitations

This case series had a number of limitations arising principally from including a heterogeneous sample and patients with various wound aetiologies. In addition, the inclusion criteria were large and therefore introduces further limitations in terms of generalisability. The inclusion of patients with non-healing wounds of the same aetiology would have provided opportunities for further comparative analysis.

## CONCLUSION

The use of a case series helps generate valuable information regarding the use of wound dressings for patients with CWs. This case series evaluation supports the versatility of a multi-purpose dressing in achieving treatment goals, including the control of malodour, absorption of excessive exudate, pain reduction, and progress toward healing. Using a multi-purpose dressing may improve the patients' quality of life due to resolution of malodour and containment of exudate which tend to make them very self-conscious and embarrassed.

## CONFLICT OF INTEREST

The authors declare no conflicts of interest.

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