LETTER TO THE EDITOR

Optimising healing — a retrospective analysis of multi-purpose dressing efficacy in exudating pressure injuries

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Dear Editors,

Pressure injuries (PIs), also referred to as pressure ulcers, bedsores, or decubitus ulcers, are a major global health issue affecting approximately one in ten adult patients admitted to hospitals worldwide, with prevalence rates varying across regions: 14.5% in Europe, 13.6% in North America, 12.7% in South America, 3% in Asia, 12.6% in the Middle East, and 9% in Australia.[1] In intensive care units (ICUs), the occurrence of PIs is notably higher, reaching 16.6%.[2] PIs develop when prolonged pressure, especially over bony prominences, or shear forces, cause damage to the skin and underlying tissue.[3] Commonly affected areas include the coccyx, heels, hips, shoulders, and elbows.[4]

The development of PIs is largely attributed to three key factors[5]:

- sustained pressure on bony prominences leading to tissue ischemia and necrosis
- shear and friction, particularly in bedridden patients, resulting in capillary damage and local hypoxia
- prolonged moisture exposure, causing tissue maceration and breakdown

Despite their prevalence, PIs are often inadequately managed, leading to extended suffering and complications. These ulcers significantly impact patients' quality of life, causing persistent physical discomfort, emotional distress, and a heavy financial burden on healthcare systems.[1] A comprehensive approach is necessary to address these challenges, improving both patient outcomes and healthcare efficiency.

Effective PI management requires targeting both the underlying causes and symptoms, particularly exudate. Exudate management is a critical concern in PI treatment as it causes physical discomfort, emotional stress, and increases the risk of infection.[6] While exudate production typically decreases during wound healing, chronic wounds like PIs often exhibit persistently high exudate levels, prolonging the inflammatory phase and delaying healing. Excessive exudate can cause dressing leakage, increase patient discomfort, and raise infection risks. Additionally, persistent exudate provides a suitable environment for bacterial growth, complicating wound care and further delaying healing.

To address these challenges, superabsorbent dressings have been increasingly used due to their effectiveness in managing large volumes of exudate.[7] These dressings contain polymers capable of absorbing and retaining substantial amounts of fluid, which reduces the risk of skin maceration and creates an optimal moisture balance for tissue regeneration. A randomised controlled trial demonstrated that superabsorbent dressings accelerated healing in venous leg and diabetic foot ulcers, extended dressing wear time, and reduced maceration compared to standard dressings.[8] Systematic reviews support these findings, showing improved healing rates in exudative ulcers.[7] Superabsorbent dressings have also been associated with reduced wound pain and fewer dressing changes, improving patient comfort and reducing

healthcare costs. Choosing the appropriate wound dressing, especially in cases of high exudate, is essential to creating a favorable healing environment and minimising complications.

This study represents the first case series utilising a multi-purpose dressing in patients with PIs, conducted as a retrospective analysis to assess the dressing's real-world effectiveness and safety in managing exudate in a practical, resource-efficient manner, using existing patient records from a German outpatient clinic. The study focused on 66 patients with chronic wounds and aimed to assess the dressing's effectiveness in managing odour and exudate. Preventative measures, including regular repositioning and skin care, were implemented alongside the dressing application. We monitored patient outcomes during the dressing application period to evaluate its efficacy in enhancing patient comfort and promoting wound healing.

The study utilised a case series design, allowing for the observation of patients undergoing the same intervention without a control group. The intervention involved a multi-purpose dressing constructed from a hydrophilic, spun-bonded nonwoven polypropylene material combined with an air-formed composite of pulp and cross-linked acrylate polymer. This advanced structure endows the dressing with high absorbency and efficient exudate management capabilities, alongside its ability to inhibit bacterial activity and matrix metalloproteinases (MMPs). The absorbent technology central to this dressing, sodium polyacrylate (SAP, CAS 9003-04-7), originally developed in the late 1970s to early 1980s for diapers, was introduced into wound care applications around 2000. SAP has the theoretical capacity to absorb up to 100 times its weight in water through hydrogen-bond formation, allowing it to bind not only polar molecules but also hydrated surfaces (such as bacterial cells) and complex molecules (such as MMPs and endotoxins) via bivalent cations.

With its extensive history in both hygiene and wound care applications, SAP has demonstrated a strong safety profile. Toxicological studies indicate no significant risk of intoxication under typical usage scenarios, with severe toxicity only observed at high oral doses (approximately 10g/kg, which would be about 750g in an average adult). Additionally, SAP polymers exhibit chemical stability and are not resorbed under physiological conditions.

The minimal risk associated with SAP, combined with its efficacy in binding exudate, proteins, and bacteria, makes it an ideal material for enhancing traditional wound dressings. By integrating SAP into standard dressings, healthcare providers can continue to use familiar care protocols while benefiting from 'modern' wound care innovations, thus supporting high-quality patient outcomes. Compared to other conventional wound care materials, such as polyurethane foams or hydrocolloids, SAP dressings offer superior advantages in wound management, reinforcing their value in clinical applications.

Sixty-six patients met the inclusion criteria, which required them to have full-thickness, exuding PIs. The study received ethical approval, and patient data were collected at baseline, four weeks, and eight weeks post-treatment using the hospital's wound documentation system and digital planimetry software. Key variables tracked included wound area, wound type, and peri-wound skin maceration. Statistical analyses were conducted using STATA, version 17, and descriptive statistics were employed to present the data.

The study population had a mean age of 69.6 years, with a slight male predominance (57.6%). Most patients (34.8%) had Stage 3 PIs, with the sacrum being the most common ulcer site (60%). Foam dressings were the most frequently used treatment before the study (72.7%).

The most significant finding of the study was a marked reduction in wound area. The mean wound area decreased from 3.89cm² at baseline to 1.71cm² at week four and 0.67cm² by week eight, a statistically significant reduction ($p<0.001$), shown in Table 1. This suggests that the multi-purpose dressing played a critical role in promoting wound healing by maintaining optimal moisture balance and reducing the risk of infection. Additionally, patients experienced fewer dressing changes due to the dressing's ability to control exudate more effectively, improving their overall quality of life and comfort during the treatment period. This is consistent with other studies that highlight the importance of advanced dressings in accelerating healing in

Table 1. Overview of results

Variable	Value
Mean age	69.6 years (range :65-86 years)
Gender	Male: 57.6% (n=38) Female: 42.4% (n=28)
Pressure injury (staging)	Stage 1: 15.2% (n=10) Stage 2: 25% (n=16) Stage 3: 34.8% (n=23) Stage 4: 25% (n=16)
Location	Sacrum: 60% (n=40) Heal: 20% (n=13) Hip: 10% (n=7) Other: 10% (n=7)
Most commonly used dressing before using a multi-purpose dressing	Foam dressing: (72.7% (n=48) Gauze dressing 15% (n=10) Hydrocolloid dressing: 12.3 (n=8)
Wound area at baseline	At baseline: 3.89cm² (range: 0.04 – 218cm²) At 4 weeks: 1.71 cm² (range: 0.00 – 167.9cm²) At 8 weeks: 0.67cm ² (range: 0.00 – 117.18cm²)

chronic wounds.[8] Exudate management was also a crucial aspect, as 81.8% of participants had exudative wounds. The multi-purpose dressing effectively reduced exudate and peri-wound maceration, further facilitating wound healing and reducing the need for dressing changes, thereby improving patient comfort and convenience. In conclusion, this retrospective case series demonstrated that using a multi-purpose dressing improved healing compared to baseline, and reduced dressing changes. PIs, especially those with Stage 3 PIs. The substantial reduction in wound area, combined with effective exudate control, highlights the dressing's efficacy in creating a favorable healing environment. These findings emphasise the critical role of advanced wound care technologies in optimising treatment outcomes for PI patients, particularly those with high exudate levels.

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Conflict of interest
The authors declare no conflicts of interest

Ethics statement
This retrospective study was conducted at the Center for Ventilation and Intensive Care (ZBI Group), Berlin, Germany, with institutional ethics committee approval. Informed consent was waived as all patient data were anonymised, ensuring confidentiality. The study adhered to the Declaration of Helsinki and local regulations.

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Author contribution
The authors confirm contribution to the paper as follows: study conception and design: SK and SP; data collection: SK; analysis and interpretation of results: SK and SP; draft manuscript preparation: SP. All authors reviewed the results and approved the final version of the manuscript.

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