Superabsorbent Dressings: Revolutionizing Wound Care

Catherine T. Milne MSN, APRN, ANP/ACNS-BC, CWOCN-AP, WOCNF

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Ms. Milne is an Advanced Practice WOC Nurse providing care to patients across the continuum in acute care, long-term care, home health and outpatient settings. Employed by Connecticut Clinical Nursing Associates, she also provides consulting to organizations wishing to improve wound outcomes, conducts clinical research, lectures nationally and internationally, is the Co-Editor of the text Wound, Ostomy, Continence Secrets and provides clinical support to Wound Reference.com. She currently serves as the Co-chair of the Post-Acute Care Symposium. Additionally, she serves as a Nurse Board Member of the Association for the Advancement of Wound Care and an Associate Clinical Professor at the Yale School of Nursing. Ms. Milne is a paid consultant for Solventum.

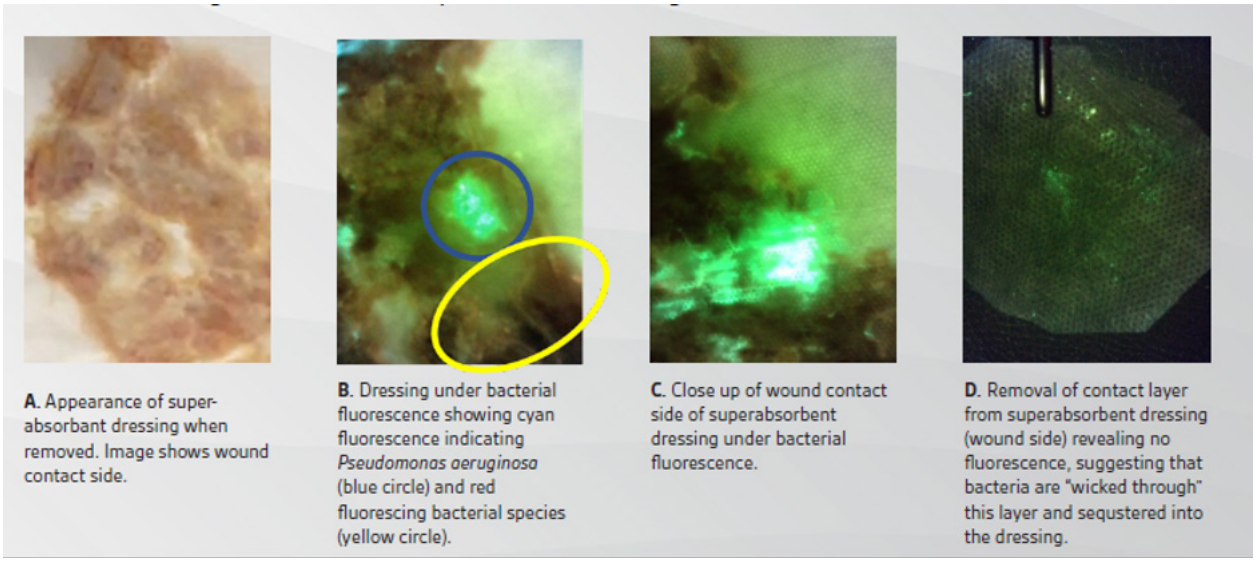
In the field of wound care, one of the most critical challenges is effectively managing exudate—the fluid that leaks from wounds during the healing process. Wound exudate consists of water, electrolytes, dead host cells, bacteria, and elevated levels of matrix metalloproteases. The latter two components contribute to poor wound health, local and systemic infection, and elevated levels of inflammation. Achieving moisture balance, with a wound bed that is not too wet or too dry, is crucial for cell migration and tissue regeneration.

When exudate is excessive, it can lead to infection, delay tissue healing, compromise tissue integrity, and cause pain and social isolation for patients. Over the years, medical science has developed various dressing materials to address this challenge, among which superabsorbent dressings (SADs) have emerged as a game-changer. Under-utilized in most healthcare settings, these dressings are designed to absorb large amounts of exudate while maintaining a moist wound environment conducive to healing. Compared to foam dressings, SADs offer unique properties, benefits, and clinical applications.

SADs are indicated for managing highly exuding acute and chronic wounds, such as diabetic foot ulcers, pressure injuries, venous leg ulcers, and surgical wounds. These dressings are contraindicated for dry or minimally exuding wounds, wounds with heavy bleeding, or third-degree burns. Typically designed as flat dressings, SADs are meant to be placed over the wound's surface and are not appropriate for insertion into wound tunnels or sinus tracts.

PROPERTIES OF SADS

SADs are characterized by their remarkable capacity to absorb and retain large volumes of wound exudate, often many times their own weight. Their construction typically focuses on an inner absorptive layer and an outer protective covering. The inner core contains materials that have the ability to swell and absorb moisture without leaking or disintegrating (**Figure 1A-C**). The interior is surrounded by a barrier layer to prevent the exudate from seeping onto the surrounding skin, thereby reducing the risk of maceration and further loss of tissue integrity (**Figure 1D**).



A. Appearance of super-absorbant dressing when removed. Image shows wound contact side.

B. Dressing under bacterial fluorescence showing cyan fluorescence indicating *Pseudomonas aeruginosa* (blue circle) and red fluorescing bacterial species (yellow circle).

C. Close up of wound contact side of superabsorbent dressing under bacterial fluorescence.

D. Removal of contact layer from superabsorbent dressing (wound side) revealing no fluorescence, suggesting that bacteria are "wicked through" this layer and sequestered into the dressing.

Figure 1. The Role of the Wicking Layer in Removing Wound Surface Exudate[1]

Some SADs include added features to enhance clinical utility. For example, a specially designed wicking layer positioned between the outer shell and the absorbent core enables exudate to be vertically drawn into the dressing. This mechanism prevents exudate from seeping over the edge of the wound causing maceration. In addition, the upward movement of the fluid off of the wound allows for an even distribution and subsequent gelling of the drainage throughout the entire dressing.

Wound contact layers in SADs also vary in both physical materials and the manner in which they adhere to the core. It is imperative that this contact layer be soft and non-adherent to minimize pain during dressing changes. The SAD should be designed to accommodate passthrough of exudates with different consistencies from the wound bed to the absorbent core. If these dressings are not well constructed or glued, they can split at the seams, possibly releasing their congealed, odorous contents out onto the patient. Heat-sealed edges have shown promise in meeting these requirements.

In addition to absorbing exudate, SADs also transmit moisture vapor away from the wound. This is usually not an issue in non-adherent dressing designs where the outermost layer is often similar to the contact layer. However, other wound types, including sacral or heel pressure injuries, as well as a variety of surgical wounds, require dressings with an adhesive border. In these situations, it is preferable to use an adhesive that conforms to various anatomical contours of the patient and remains secure as the dressing swells with exudate, while allowing a simultaneous transmission of moisture vapor. **Figure 2** depicts a common SAD and its features.

However, not all SADs have the ability to bind the exudate. Their performance can vary depending on the amounts and types of materials used in the manufacturing process. Some SADs may allow the drainage to return to the wound and its surrounding skin when subjected to pressure. This is particularly relevant for patients with chronic wounds, where sources of pressure may not always be appreciated. For example, compression therapy, commonly used to manage venous insufficiency through wraps or garments, can exert pressure on the wound. In addition, temporary, but intense forces on the buttocks or spine during transfers with a mechanical lift from a chair to a bed can impact dressing performance. These compressive forces can limit the fluid-handling capacity of some SADs.[2,3]

BENEFITS OF SADS

The value of SADs lies in their ability to manage wound drainage. They are widely used across the continuum of care to manage acute, chronic wounds and those that are hard to heal.

Unfortunately, many clinicians are unfamiliar with the differences between traditional foam dressings and SADs. Compared to foam dressings, SADs offer better fluid management, which can lead to fewer dressing changes and a reduction in medical waste. **Table 1** compares these two dressing types.

CLINICAL APPLICATIONS

SAD can be utilized in the management of moderate to highly exuding wounds. This includes chronic wounds such as leg ulcers, pressure injury, and diabetic foot ulcers. Additionally, SADs are increasingly being adopted in acute wound management. Their versatility and high absorbency make them suitable for a variety of clinical scenarios, from traumatic injuries to surgical incisions.

TIPS FOR APPLYING SADS:

- Always cleanse the wound before applying.
- Select a dressing size that extends beyond the wound margins.
- If the dressing does not have an adhesive border, secure it with a secondary dressing or bandage.
- Change the dressing according to exudate levels or manufacturer recommendations (often every 1–3 days), though most can be left in place for up to seven days.
- Do not cut dressing.

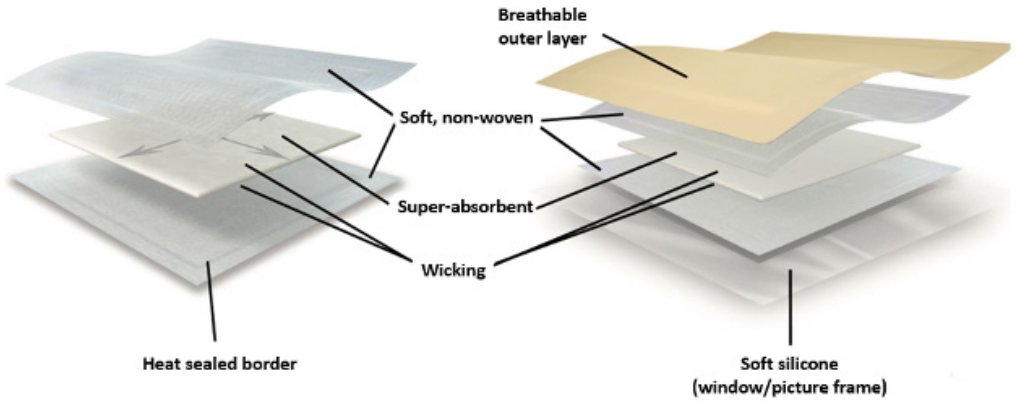


Figure 2. Superabsorbent Dressing Features. Used with Permission from Solventum.

Table 1. Comparison of Superabsorbent Dressings and Traditional Foam Dressings

Feature	Superabsorbent Dressings	Foam Dressings
Absorption Capacity	Very High	Moderate to High
Ideal Wound Type	Heavily Exuding wounds	Moderately Exuding Wounds
Exudate Retention	Excellent, locks in fluid even under pressure	Good, but may leak under pressure
Structure	Multi-layer with superabsorbent polymer core	Usually polyurethane foam with semi-permeable backing
Moisture Control	Excellent -minimizes risk of maceration	Good, can oversaturate if exudate is excessive
Use Under Compression	Yes, ideal for use with compression therapy	Limited, may not retain exudate well under compression
Conformability	Less flexible, bulkier	Softer and more conformable
Comfort	Less cushioning	Offers cushioning, good for pressure relief
Odor Control	Often better (due to exudate lock-in)	Moderate
Frequency of Dressing Change	Less frequent, depends on exudate levels	Every 1-3 days, as needed

The author utilized ChatGPT (OpenAI, 2023) to assist in outlining the differences between superabsorbent dressings and foam dressings for wounds and organize this information into a table format. The author edited, refined, and verified the table output to ensure its accuracy and alignment with clinical practice.

CONCLUSION

SADs represent a significant advancement in wound care, offering solutions for managing excessive levels of exudate while promoting an optimal healing environment. Their high absorbency, non-adherent properties, and patient comfort benefits make these dressings indispensable tools in modern wound care. Their versatility in treating both chronic and acute wounds continue to make them a crucial component of wound management strategies, improving patient outcomes and quality of life. As research into wound care materials advances, the potential for further innovations in SAD technology is immense, paving the way for even more effective treatment options.

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NOTE: Specific indications, contraindications, warnings, precautions and safety information exist for these products and therapies. Please consult a clinician and product instructions for use prior to application. Rx only.

Images courtesy of Catherine Milne, Connecticut Clinical Nursing Associates