GUEST EDITORIAL

Why “Wet to Dry”?

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Prior to the 1960s, clinicians commonly believed the perfect wound healing environment was dry and dressings simply plugged and concealed ulcers. However, research in recent decades has confirmed that a moist wound environment where dressings have the opportunity to interact with the wound helped promote healing and reduced the risk of pain and infection while increasing outcomes.

Let's begin with a quick quiz:

The following is true about wet-to-dry dressings:

- They are appropriate only for mechanical debridement.
- They can cause pain and suffering to the patient.
- Each dressing change and wound bed disturbance causes hypoxia, vasoconstriction, cooling, and destruction.
- Removal of the dried dressing from the wound disperses significant bacteria into the air.
- All of the above.

If you answered “All of the above,” you are correct. Why, then, are the majority of wounds dressed with this archaic, barbaric treatment modality? Let's uncover the issues surrounding moist gauze and wet-to-dry “therapy,” the worst oxymoron in our wound care vocabulary.

Historical Use of Gauze

Through World War I, the task of changing dressings was in the domain of physicians and medical students. In the 1930s, caring for wounds was passed over to experienced nurses and became recognized as part of a nurses' scope of practice. For the next 40 to 50 years, the mainstays of wound coverings and fillers were gauze, cotton wool

pads, impregnated gauze, absorbent cotton, and adhesive pads. The 1960s saw the start of a change in dressings and the philosophy of their use. However, the practice of using moist saline-soaked gauze and wet-to-dry saline gauze is still widely utilized. This is an outdated tradition that persists despite mounting evidence against it.

Gauze Dressings

Gauze dressings can be dry woven or nonwoven materials, sponges, and wraps with varying degrees of absorbency, based on design. Fabric composition may include cotton, polyester, or rayon. They are available sterile or nonsterile, in bulk, and with or without adhesive border. The gauze may be impregnated with other products, such as hydrogel (to hydrate) or sodium chloride (to absorb and draw).

Wet-to-Dry and Moist Gauze

In the United States, wet-to-dry and gauze dressings are still the most commonly used primary dressing substance.¹ Reasons for the persistence of gauze and saline as wound management mainstays include lack of knowledge on the part of physicians and other clinicians of advanced dressings and how they work, confusion due to the plethora of advanced products, and the incorrect view that advanced dressings come at a high price. The most common reason is the perception that gauze is a “one size fits all” modality that is readily available and inexpensive. In addition, these dressings have been used throughout history since the practice is propagated in medical schools and surgical training.² There is also evidence that they are used inappropriately.² Recent journal articles and texts, as well as expert opinion,

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support the principle of moist wound healing, but in practice the use of gauze, predominantly as a wet-to-dry dressing, does not guarantee a moist wound environment.³

Wet-to-dry dressings are described in the literature as a means of mechanical debridement.⁴ Debridement is the mainstay of wound bed preparation since devitalized material harbors bacteria, delays healing, and increases the risk of infection.⁵ However, it is the opinion of this author and others that wet-to-dry or moist gauze does not constitute advanced wound care or advanced therapy. Granted, wet-to-dry gauze is a form of nonselective debridement; however, it is painful if the patient is sensate and can produce numerous negative outcomes. Gauze dressings are not the best wound care choice for the patient, the caregiver, or the health care system and facility. Gauze dressings do not support optimal granulation and healing and are more labor intensive than advanced dressings such as polyacrylates, transparent films, hydrocolloids, alginates, hydrogels, and foams. Therefore, these archaic regimes should be abandoned since they are not considered standard of care. The previous Agency for Healthcare Research and Quality (AHRQ), formerly the Agency for Health Care Policy and Research (AHCPR), in its Clinical Practice Guidelines for Treatment of Pressure Ulcers,⁶ supported the use of wet-to-dry dressings for debridement only by maintaining that their use is backed by expert opinion (rated as C on their hierarchy of evidence).⁷

Changing Philosophy

Early preclinical and clinical research in the 1960s started to define the idea of moist wound healing and the benefit in optimizing wound healing. Preserving an optimally moist wound bed, homeostatic temperature, and occlusion have been shown to produce better outcomes than practices that allow wounds to dry out.⁷⁻¹⁹ The theory that moist wound care provides for better outcomes began to receive serious consideration in the late 1970s and 1980s. Prior to this time, drying of the wound was accepted and accomplished by several mechanisms: the use of povidone iodine as a drying agent, heat lamps, wet-to-dry dressings, and exposure of the open wound to air.¹⁰ Transparent film dressings and hydrocolloids were the first widely used products that addressed moisture retention. Throughout the 1980s and early 1990s, there was an explosion in the realm of dressing products. Alginates, hydrogels, and foams appeared on the market in a wide variety of dressings and topicals. Antimicrobials were beginning to become more sophisticated by providing time-released delivery systems that allowed longer wear time and cost savings. The concept of passive dressings began to change. Dressings were becoming active in their role of changing the wound milieu in the healing process. The advent of growth factors and other biosynthetics such as collagen began the movement to interactive dressings.

Today, research and development are being focused on the cellular level. New understanding of interactions of the

cellular components within the chronic wound environment and of ways interactive dressings can alter the wound environment is putting dressing technology on the cutting edge. What is next may be limited only by our understanding of how the body changes from normal healing of an acute wound to healing of a chronic wound, our technological ability to create products, and our imagination about how to get there.

Guidelines

The Centers for Medicare and Medicaid Services Guidance to Surveyors in long-term care states that the use of wet-to-dry dressing may be appropriate in limited circumstances, but repeated use may damage healthy granulation tissue in healing ulcers and may lead to excessive bleeding and increased resident pain.^{11,12} In addition, the American Medical Director's Pressure Ulcer Guidelines state that wet-to-dry dressings are not recommended because they adhere to vital tissue as well as eschar, removing tissue nonselectively when the dry dressing is removed, and tend to be painful.¹³

Evidence

Some problematic issues with wet-to-dry dressings include an increased chance of external contamination and infection, as well as cross-contamination because gauze dressings do not present any physical barrier to the entry of bacteria, which can travel through 64 layers of gauze.¹⁴ Frequent (3 or 4 times daily) dressing changes lead to a drop in wound temperature, causing vasoconstriction and decrease in blood perfusion. This further drastically impairs the ability of oxygen to clear bacteria from the wound, leading to an increase in tissue infectability. Each time the dressing is changed, cooling and destruction of the wound microenvironment lead to hypoxia, which impairs leukocyte mobility and phagocytic efficiency.¹⁵ Wet-to-dry dressings do little to impede fluid evaporation and do not provide moist wound healing unless kept continuously wet. Wet-to-dry dressings also prolong the inflammatory phase of wound healing, counterproductive to all efforts at wound closure.¹⁶

Wet-to-dry dressings are cost prohibitive secondary to caregiver time and frequency of change, as licensed nurses' salaries and benefits tend to be one of the highest expenses for a facility. Wet-to-dry is a painful and traumatic dressing that can cause substantial patient discomfort and wound bed disturbance as well as poor patient compliance or adherence.¹⁷ Furthermore, wet-to-dry is a nonselective form of mechanical debridement that causes tissue destruction and injury at each dressing change, which ultimately delays healing.

As saline evaporates, it becomes hypertonic, and fluid from the wound is then drawn into the dressing, promoting desiccation of the tissue. As the wound dries, cell migration and proliferation are impeded.¹⁸ Then, the dried dressing removal disperses significant amounts of bacteria into the air.¹⁹

Table 1 Comparison of Wet-to-Dry and Saline and Gauze Dressings and Advanced Alternative Polyacrylate Moist Wound and Debridement Dressing

Polyacrylate Debriding Wound Dressing (Tenderwet Active [®])	Wet-to-Dry (Saline and Gauze)
Absorbs planktonic bacteria and disrupts biofilm ³¹ as well as MMPs. ²⁷	Increases the chances of external contamination and infection, as well as cross-contamination. Bacteria can travel through 64 layers of gauze. ¹⁶
Maintains wound temperature for 24 hours.	Frequent (3 and 4 times daily) dressing changes lead to a drop in wound temperature, causing vasoconstriction and decrease in blood perfusion, further drastically impairing the ability of oxygen to clear bacteria from the wound, leading to an increase in tissue infectability.
Preserves wound moisture and promotes moist wound healing. ²⁸	Does little to impede fluid evaporation and does not provide moist wound healing unless kept continuously wet.
Multiple literature and research sources to prove efficacy.	“Traditional” dressing that is frequently used, despite evidence to the contrary.
Cost-effective. ²⁹	Cost prohibitive secondary to caregiver time and frequency of change, etc.
Pain-free advanced dressing modality. ³⁰	Painful and barbaric dressing, causing substantial patient discomfort and wound bed disturbance.
Effective selective mechanical debridement (mean rate of 38%). ³¹	Nonselective mechanical debridement, causing tissue destruction and injury at each dressing change, delaying healing.
Helps to contain wound debris and bacteria.	Dried dressing removal disperses significant amount of bacteria into the air. ³²
Anti-inflammatory dressing action.	Prolonged inflammatory phase of wound healing. ¹⁸
Ease of patient compliance/adherence to routine. ³³	Poor patient compliance/adherence. ¹⁹
Isotonic (Ringer’s solution) homeostatic dressing from application to removal, promoting moist wound healing throughout.	As saline evaporates, becomes hypertonic, and fluid from the wound is then drawn into the dressing, promoting desiccation of the tissue. As the wound dries, cell migration and proliferation are impeded. ²⁰

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Armstrong and Price discovered that many physicians would prescribe various gauze dressings, including wet-to-dry, rather than advanced modalities such as alginates, foams, hydrocolloids, and hydrogels. The research entailed a questionnaire sent to 127 general surgeons and achieved a response rate greater than 50%. Gauze dressings were overwhelmingly prescribed over the alternatives for all wounds except for venous leg ulcers. Almost half the respondents selected wet-to-dry dressings as their choice for open surgical wounds that are left open to heal by secondary intention. The data also showed that although 75% of the respondents had access to the advanced therapies, they did not use them.²⁰

Ovington describes gauze as the most widely used wound care dressing and says it may be erroneously considered a standard of care.² Her article comments that wet-to-dry and wet-to-moist are frequently used in clinical practice in a fashion that makes them interchangeable. She describes hampered healing due to local tissue cooling, disruption of angiogenesis by dressing removal, and increased infection risk from frequent dressing changes, strike through, and prolonged

inflammation as good reasons to abandon this “traditional” dressing technique.² Ovington also offers a cost-effectiveness argument for change. She illustrates the costs of saline and gauze compared with an advanced dressing (Tielle, Johnson & Johnson Wound Management, Somerville, NJ) over a 4-week period, performed by a home health nurse.² The largest contribution to cost is nursing time; even with the patient and/or family doing some of the care, the cost is decreased with the advanced dressing secondary to fewer dressing changes and better outcomes (less time to closure).

In Capasso and Munro’s research, wet-to-dry dressings were compared to hydrogel dressings in the home care setting. Although wound healing rates were similar between the two groups, the cost of wound care was substantially higher in the wet-to-dry group because of more frequent dressing changes and an increase in labor intensiveness and more frequent home visits.²¹

Colwell, Foremen, and Trotter conclude that a semi-occlusive dressing that had higher hard dollar costs and required less frequent dressing changes provides for faster

Figure 1 TenderWet's 24-Hour Rinsing Effect.

healing outcomes and is less expensive to use than wet-to-dry. This is contrary to the belief that wet-to-dry dressings are cost-effective.²²

In an international survey study, the European Wound Management Association illustrated that gauze is most likely to cause pain and be the most adherent product in wound care and no longer recommended as best practice. Newer products such as hydrogels, hydrofibers, alginates, and soft silicones are least likely to cause pain and were recommended as a result.²³

Another investigator, Coyne, examined the cost-benefit of wet-to-dry compared with another advanced dressing, polyacrylate moist wound dressing (TenderWet®, Medline Industries, Advanced Skin and Wound Care, Mundelein, IL), in a nationwide, 65-location home care agency (TLC/Staff Builders) and was able to realize a 26% savings annually, and pointed out that wet-to-dry treatments cause pain, slower healing, and an increased infection rate.²⁴ There are other important considerations in the choice of a dressing, such as clinical outcome, quality-of-life issues, discomfort, disruption of daily routines, and how the patient can cope with daily activities, that can all be addressed by modern products.²⁵ A comparison of wet-to-dry gauze with an advanced alternative, polyacrylate moist wound and debriding dressings, is summarized in the Table 1.

Polyacrylate Moist Wound and Debridement Dressings

This activated absorbent polyacrylate polymer core dressing absorbs large protein molecules (necrotic tissue and bacteria) while irrigating with Ringer's solution, a physiological fluid, creating a "rinsing effect" (see Figure 1). The interactive dressing supports both moist wound healing and autolytic debridement, gently removing dead tissue from

the wound bed while creating an ideal healing environment. Polyacrylates debride at a mean rate of 38%.³⁴ Research has shown that polyacrylate gel absorbents debride just as well as collagenase does.³⁶ Recent research has also shown that the product may be effective in reducing wound bioburden by interfering with biofilm as well as absorbing planktonic or free-floating bacteria.³⁵

As the old adage goes, "What we permit is what we promote!" Question this outdated tradition, challenge the old establishment, demand a more comfortable experience on behalf of your patients, refuse to participate in outdated customs, promote advanced wound caring and patient advocacy TODAY. Why "wet-to-dry," I ask. No longer can we sit idle and complacent when options and evidence are readily available that have shown positive cost and clinical outcome. Help me abolish this archaic wound treatment once and for all. Repeat after me, "Wet-to-dry needs to die!"

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