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REVIEW ARTICLE

Wet-to-Dry Dressings Do Not Provide Moist Wound Healing

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Wet-to-dry;
Moist wound healing;
Wound bed preparation;
Mechanical debridement

Abstract The purpose of this study was to determine if using advanced wound care dressings leads to improved outcomes as compared to wet-to-dry dressings. Based on a review of literature published in the last eight years, with the exception of one landmark article published in 2001, strong support was found that advanced wound care dressings improved outcomes when compared to wet-to-dry dressings. Some of the outcomes compared were healing time, pain, infection rates, and costs; several articles took it a step further stating that the use of wet-to-dry dressings is considered sub-standard practice. The articles provided evidence-based support for the use of moist wound healing.
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The estimated percentage of the population with chronic non-healing wounds is 2%; this may not sound like much of a problem for our health care system, but the cost of treating these wounds exceeds $50 billion per year.[1] In today's health care environment, evidence-based practice has become a standard by which to direct our plan of care, not only to provide the best outcomes but also to promote fiscal responsibility. Dr. Winters' pivotal research, demonstrating that moist wounds healed two to three times faster than those that were allowed to dry out, was done more than fifty years ago.[2–4] Despite the evidence and wide variety of advanced wound care products available, wet-to-dry dressings continue to be commonly used.[2,5–8] It is important to determine whether or not advanced wound care products would lead to better outcomes for wounds healing via secondary intention. Nurses are typically the ones performing wound care and monitoring the progress of the wound; which puts them in the perfect position to advocate for the most effective products.

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Background

Baranoski and Ayello[9] defined a wound as "a disruption of the integrity and function of tissues in the body."[9(p2)] The wound healing process is a complex series of events that can be significantly compromised by comorbid conditions. Wound bed preparation is a systematic approach that manages deficiencies in the wound environment allowing the wound to progress through the phases of the wound healing process. The principles of wound bed preparation are: tissue debridement, inflammation/infection, moisture balance, and edge advancement.[9,10] A wet-to-dry dressing is indicated for mechanical debridement. This is a non-selective form of debridement; meaning it removes not only necrotic tissue, but also healthy granulating tissue. Ovington[2] cited several reasons why this is not ideal; it is painful for the patient, it impedes healing through local tissue cooling, it increases the risk of infection, and it is labor intensive.

Several clinical guidelines as well as the Centers for Medicare and Medicaid Systems regulations have discouraged the use of wet-to-dry dressings. Learning about the wound healing process and the large variety of advanced wound healing products can be an overwhelming task, but it is important that nurses at least obtain a general working

knowledge on this subject. Using evidence-based practice will lead to many improved outcomes for patients who suffer from chronic wounds.

Findings

The databases used for this research review were EBSCO, CINAHL, MEDLINE, and the National Guidelines Clearinghouse. Seven articles were selected from the search which yielded approximately 350 published articles. Keywords used in searching were *wet to dry*, and *moist wound healing*. Inclusion criteria was limited to full-text articles from scholarly journals that compared the use of advanced wound care dressings to wet-to-dry dressings, or made a practice recommendation regarding the use of wet-to-dry dressings. The relevant findings from each of the articles are described below.

Bergstrom et al,[11] performed a retrospective cohort study of 95 long-term care facilities; 882 residents with pressure ulcers were reviewed. This study was unique in that it extensively evaluated resident variables and treatment factors in relation to pressure ulcer healing. Some of the variables that were considered were gender, assistance with activities of daily living, dementia and agitation, continence, support surface, enteral feeding, pressure ulcer size, treatment used, and method of cleansing.[11] Of all the variables included in this study, only two were listed in the conclusion. "In this sample of nursing facility residents, use of moist dressings (Stage II, Stage III and [Stage] IV) and adequate nutritional support (Stage III and [Stage] IV) are strong predictors of PrU healing."[11(p1721)]

The Association for the Advancement of Wound Care (AAWC)[12] developed a comprehensive guideline for the assessment and treatment of pressure ulcers. This guideline had a very direct recommendation regarding debridement; it stated: "Mechanical debridement using wet-to-dry gauze is considered substandard practice."[12(p9)] The recommendations section of the guideline for appropriate pressure ulcer (PU) dressings stated to "Avoid gauze use as a primary PU dressing. It delays healing, increases pain, infection rates, and dressing change frequency, and is not cost effective."[12(p10)] The guideline included a table of studies supporting improved outcomes when comparing gauze to several other dressing categories; alginate, foam, hydrocolloid, hydrofiber, and hydrogel all had multiple studies that demonstrated faster healing than with gauze. Two studies demonstrated that hydrocolloid dressings produced less pain than gauze. Studies demonstrated that fewer infections occurred when foam and hydrocolloid were used instead of gauze. Foam, hydrocolloid, hydrofiber and hydrogel all were lower cost than gauze; hydrocolloid was the most extensively studied of the four dressing types with six different studies, five of which contained a cost analysis.[12]

The Institute for Clinical Systems Improvement (ICSI)[13] developed a guideline for the prevention and treatment of pressure ulcers by performing a literature search of clinical trials, meta-analyses, systematic reviews, regulatory statements and other professional order sets and protocols. This guideline included a section describing moist wound healing. The final sentence of this section stated, "A wet-to-dry dressing is not typically considered continuously moist and, therefore, not recommended."[13(p12)] The section that discussed pain management stated that maintaining a moist wound environment may decrease wound pain; while it did not describe the impact of wet-to-dry dressings directly, the fact that they defined wet-to-dry as not continuously moist can indirectly show the relationship to wound pain.[13]

Lee, Kandula, and Sherber[5] reviewed literature on the history of wound care and recent advances; they also summarized the current clinical practices of the Johns Hopkins Wound Center. The introductory paragraph of this article captured the rationale of this literature review. "Wound care is often performed in a manner that is anecdotal, inconsistent, and lacking in evidence base. In 2004, the direct costs of wound care in the United States exceeded 15 billion dollars. Wet-to-dry gauze dressings remain the most widely used primary dressing material in the United States. While the newer-generation wound dressings are more costly than gauze, they decrease overall costs since they are more effective."[5(p1)] The authors made a very decisive statement, "Wet-to-dry dressings are suboptimal, as they can delay wound healing by removing migrating epithelium and further cause pain by exposing sensitive nerve fibers in the wound bed."[5(p1)]

Dale and Wright[6] encouraged home health agencies to stop allowing providers to treat their patients with wet-to-dry dressings. The article presented a case study of one agency's experience with this process. They described in detail the reason this practice occurred, how it was accomplished, and the outcome of the initiative. The initiative demonstrated substantial improvement in the status of surgical wound status and decreased emergent care for wound deterioration/infection. The background information for this article described several reasons why wet-to-dry dressings are not appropriate. The authors described wet-to-dry dressings as having a goal for mechanical debridement, but are ordered for all types of wounds in all types of settings even when mechanical debridement is not the goal.[6]

Cowan and Stechmiller[3] performed a retrospective descriptive study exploring the use of wet-to-dry dressings ordered for wounds healing by secondary intention. They reviewed 202 randomly selected charts from Florida home care and health maintenance patients from 2002 to 2004. They found that wet-to-dry dressings accounted for 42% of all orders for wound care and of these orders, 78% of the time mechanical debridement was not clinically indicated.[3] Their conclusion stated that "…wet-to-dry dressings (or dry gauze) are prescribed inappropriately in situations where there is little evidence to support their use…."[3(p567)] In describing moist wound healing versus

dry wound beds, the authors reference Winter's[4] pivotal work from 1962 that demonstrated two to three times faster healing when wounds were kept moist as compared to dry.[2–4] This section also contains a direct quote that is so blunt and powerful that it bears repeating….

> There is ample evidence on how to give wounds the opportunity to heal by providing a moist physiological environment for the cells that do the work of healing. Yet practitioners thoughtlessly expose wounded tissue to desert environments that desiccate and kill healing cells. This dried tissue, often with gauze remnants acting as foreign bodies, is more prone to infection and pain and heals more slowly than if it were kept physiologically moist, placing patients at risk of amputation or longer hospital stays. The medical profession eradicated polio and smallpox, but often ignores the most basic evidence on how to heal wounds.[3,14]

In the summary of this article Cowan and Stechmiller[3] pointed out that, "A great knowledge deficit exists among health care professionals related to the use of wet-to-dry dressings versus modern wound modalities for the care of open wounds healing by secondary intention."[3(p572)]

Ovington[2] clearly described several reasons why wet-to-dry dressings should no longer be used. Gauze dressings have a very limited ability to prevent local tissue cooling, which decreases healing and increases the likelihood of infection.[2] The article further described how gauze dressings increase the risk for infection by lacking the ability to provide a physical barrier to bacteria. The author referenced an in vitro study that showed that bacteria were capable of penetrating up to sixty-four layers of dry gauze, and then pointed out that moist gauze provides even less of a barrier to bacterial penetration.[2,15] Ovington[2] indicated that infection rate for wounds treated with moisture retentive dressings was 2.6% as compared to gauze based dressing at 7.1%.[2,16] The article included a case study that compared the cost of wet-to-dry dressings to advanced wound care products; this included costs of supplies, labor, and healing time. "Note that even for a dressing that is more than 10 times the price of gauze ($10 versus $0.75), the weekly materials cost is actually less than gauze due to the frequency of dressing changes."[2(p481)] Ovington[2] summarized that "Gauze dressings are not an optimal wound care modality for the patient, the clinician, or the health care system."[2(p482)] "Properly used, advanced dressings have significant benefits and should become the standard of care for wound management."[2(p483)]

The articles reviewed were rated according to their validity and effectiveness using the Management of Cancer Rating Systems Levels I–IV.[17] Based on the seven articles reviewed, there is strong support. The evidence covered all levels I, II, III and IV with one study containing a combination of levels I–III, two others at level III, and four at level IV. All seven articles were consistent in supporting that the use of advanced wound care dressings led to improved outcomes as compared to wet-to-dry dressings. Based on the evidence from this literature review, this author's recommendation for practice would be that wet-to-dry dressings should not be used in the treatment of wounds healing by secondary intention.

Discussion

The question addressed in this literature review is by no means a new or unprecedented topic; however, the fact that it continues to be a challenge facing clinicians makes it no less relevant than it was 10 or even 20 years ago. It is likely somewhat less prevalent than it was in the past, but despite strong evidence supporting the principles of moist wound healing, wet-to-dry dressings continue to be used in practice.

Although the prevalence of chronic wounds is small when compared to many other medical problems, the financial impact is far greater than the number of cases would suggest. The skin is the largest organ of the human body, yet is frequently overlooked. With the current focus of health care being to decrease costs while improving outcomes, this is one area that is being severely mismanaged.

The findings from the articles used for the review all agreed in one way or another that advanced wound care dressings lead to better outcomes than wet-to-dry dressings. Bergstrom et al[11] concluded that the use of moist dressings was a strong predictor of healing. The Association for the Advancement of Wound Care[12] listed several articles that supported advanced wound care dressings providing faster healing times, less pain, fewer infections, and lower costs compared to gauze. The Institute for Clinical Systems Improvement[13] guideline recommended dressings that provide a continuously moist environment, and then pointed out that wet-to-dry dressings do not maintain a continuously moist environment. Lee, Kandula and Sherber[5] added that wet-to-dry dressings delay healing, increase pain, and are more costly. In addition to demonstrating delayed healing, increased pain, and increased cost, Dale and Wright[6] also cited multiple studies that demonstrated that wet-to-dry dressings prolonged the inflammatory response and increased the risk for infection. The articles by Cowan and Stechmiller[3] and Ovington[2] both reminded readers that pivotal research done in the 1960s demonstrated that moist wounds healed two to three times faster than dry wounds.[4] Ovington[2] went into great detail demonstrating that moist wound healing decreased healing times, decreased infection rates, and decreased costs.

The studies were not without limitations. Bergstrom et al[11] described this most effectively when they acknowledged the complexity of patient and wound characteristics, and reported that most research focused on a single treatment modality without addressing the multitude of possible variables. Cowan and Stechmiller[3] introduced an interesting finding that was not specifically addressed in the other articles. They found that wet-to-dry dressings

were often used in combination with solutions that were known to be cytotoxic. If this were the case in other studies, it could not have been determined if poor outcomes were related to the use of the dressing or the cytotoxic solution.

The articles were authored by experts in the area of wound management, and those interested in reviewing the evidence were most likely not the ones writing orders for wet-to-dry dressings. The American Medical Association does not have a recognized medical specialty for wound care.[9] Cowen and Stechmiller[3] provided a breakdown of wet-to-dry orders by type of physician. The majority of the orders were written by general surgeons, internal medicine physicians, family practice physicians, and vascular surgeons. Physicians at wound care centers represented 9% of the total wound care orders from the study, none of which were for wet-to-dry dressings. The findings from that study support this author's opinion that wound care should be managed by properly educated and certified clinicians.

Recommendations for Nursing Practice

Based on the findings of this literature review, nurses should almost always question wet-to-dry orders. They are only indicated for mechanical debridement, and should not be used when other methods of debridement are readily available. The improved outcomes of advanced wound care dressings compared to wet-to-dry dressings have been significantly researched, yet continue to be used frequently. Further research is needed regarding why wet-to-dry dressings persist and how to most effectively communicate the evidence supporting moist wound healing.

Conclusion

The manner in which wounds healing by secondary intention are treated is often a result of tradition rather than evidence-based practice; there is no doubt that there exists a major gap of knowledge between research and practice. Every article used in this literature review supported the use of advanced wound care dressings for improved outcomes as compared to wet-to-dry dressings. While it is possible that they do exist, the search did not provide any current articles that disputed these findings. In order to provide the best care for patients with wounds healing by secondary intention and to reduce the burden that these wounds pose for the health care system, evidence-based practice needs to replace those old traditions.

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