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WET to DRY: Substandard of Care

Seminar

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Wound Care Education Institute
Phone: 1-877-462-9234
Email: coursesupport@relias.com Website: www.wcei.net

OUTLINE

Wet to Dry: Substandard of Care

Numerous studies and health care guidelines have repeatedly deemed wet to dry gauze dressings as a substandard practice, painful, labor intensive and not cost effective. Despite all the findings, wet to dry gauze dressings are still one of the most frequently ordered wound care dressing in the United States. We will review indications and contraindications of wet to dry dressings and offer options and alternatives for clinicians to utilize for wound treatment.

OBJECTIVES:

At the end of this offering, the participants will be able to:

- Identify indications and contra-indications for wet-to-dry dressings
- Choose evidence based wound debridement options based upon wound characteristics

I. Wound Healing

A. Hemostatic Phase[1,2]
   1. Platelet plug (fibrin mesh) stops the bleeding
   2. Secretion of growth factors

B. Inflammatory Phase[1,2]
   1. Phagocytes clean up the wound of foreign debride and bacteria
   2. Neutrophils for the first 1-2 days
   3. Macrophages for the remainder of this phase
   4. Secretion of cytokines and chemotaxic molecules to continue the healing process
   5. Lasts around 1 week
   6. Only phase where any debridement technique, like wet-to-dry dressings, might be indicated

C. Proliferative Phase[1,2]
   1. Fills the wound with granulation (scar) tissue
   2. Angiogenesis
   3. Wound contracture
   4. Wound covered with epithelial cells
   5. Lasts around 1 month

D. Maturation Phase1,2
   1. Remodels tissue to 80% of normal tensile strength
   2. Lasts around 2 years

II. Wound Dressings - Criteria for selection of any dressing

A. Complex process; selection should be sophisticated and as evidence based as possible[3]
   1. No matter where you practice, you will be held to national/international standards of wound care practice.[3,4]

B. Goal: “Heal the wound” as quickly and painlessly as possible
   1. Control or eliminate factors causing the wound and/or delaying wound healing
   2. Provide systemic support

3. Maintain physiologic local wound environment

C. Considerations for Dressing Selection
   1. Utilization of the dressing as a primary or secondary dressing
      a) Primary - therapeutic or protective covering applied directly to wounds or lesions.5
      b) Secondary - materials that serve therapeutic or protective function and are needed to secure a primary dressing5 (e.g., tape, roll gauze, or elastic bandages).
   2. Indications for a particular dressing category
   3. Contraindications for a dressing category
   4. Dressing selection that supports moist wound healing principles
      a. Wet or moist wound treatment significantly reduces the time required for re-epithelialization and leads to reduced inflammation, necrosis, and subsequent scar formation.[6]
   5. Control of:
      a) Exudate
      b) Bioburden (bacteria level of the tissue)
      c) Pain
      d) Bleeding
   6. Frequency of dressing changes
      a) Frequent dressing changes have been associated with evaporative cooling of the wound as it is exposed to the air
      b) Experiments on humans demonstrated that wound temperature drops significantly at dressing changes and mitosis is inhibited (it takes 40 minutes for a freshly cleansed wound to return to pre-dressing change temperature, and three hours for cell mitotic division to restart).[7-12,15]
   7. Temperature of wound bed because of the dressing selected
      a) Dressing materials have different inherent thermal insulating properties that parallel their ability to impede evaporative cooling due to moisture vapor loss
   8. Manufacturer's recommendations for using their product
   9. Use with various forms of adjuvant therapy
   10. Overall cost of dressing utilization, not just the unit cost per dressing
      a) The real cost of a wound dressing considers the sum of:[3,13,14]
         1) Unit price of the dressing
         2) Labor cost of having a health care professional change the dressing
         3) Indirect costs of ancillary supplies and services used in changing the dressing (e.g., gloves and biohazardous waste disposal)
         4) Cost of duration of care (e.g., facility charges and travel costs for home care)
      b) A more expensive dressing that requires less frequent dressing changes and results in shorter healing times could be much less expensive to use than its unit cost suggests.[3,13,14]

III. Wet-to-Dry Dressing

A. General Info
   1. Nonselective mechanical debridement

2. Technique10,11
    a) Application of sterile saline or water moistened woven gauze placed into the wound bed. As the moistened gauze dries out, it adheres to surface tissues. Once the gauze is dry, it is removed from the wound bed which pulls the adhered tissue out of the wound.
    b) Every 4-6 hours
    c) Gauze should be dry upon removal – DO NOT MOISTEN. Firmly pull dried gauze out of wound bed at a right angle.
3. Technique is not standardized
    a) Some practitioners re-moisten gauze upon removal
    b) Utilizing solvents other than NS or water with some of them potentially toxic to the wound tissue
        1) Dakin's (hypochlorite acid)
        2) Betadyne
        3) Acidic acid
        4) Alcohol
        5) Sulfamylon
        6) Hydrogen Peroxide
    c) Frequency of dressing change is variable amongst practitioners

B. Indications for the Utilization of Wet-to-Dry Dressings[10-12,14,18]
1. Non-viable tissue during inflammatory phase of full thickness wound healing
2. Applied on non-viable tissue as a "mechanical" debrider

C. Contraindications for the Utilization of Wet-to-Dry Dressings[10-12,14,18]
1. Application to viable tissue such as granulation tissue and/or epithelizing wound
    a) A retrospective chart review by Cowen & Stechmiller17 examined admission orders for 202 randomly selected Florida home care and health maintenance organization patients from 2002 to 2004. All subjects in the study had open wounds healing by secondary intention (42 partial-thickness and 160 full-thickness wounds).
        1) Wet-to-dry dressings accounted for 42% of wound care orders, followed by enzymatic (7.43%) and dry gauze (6.93%).
        2) Most wounds treated with wet-to-dry dressings were surgical (69%), followed by neuropathic ulcers (10%) and pressure ulcers (5.9%).
        3) Surgical specialists preferred wet-to-dry dressings (73%).
        4) Mechanical debridement was not clinically indicated in more than 78% of wounds treated with wet-to-dry dressings.
        5) Therefore, wet-to-dry dressings were ordered inappropriately 78% of the time, not for its mechanical debridement capabilities in the inflammatory phase, but incorrectly in the proliferative phase where no techniques of debridement should be utilized.
2. Use in the proliferative phase of full thickness wound healing

D. Disadvantages of Wet-to-Dry Dressing
1. Wet-to-dry dressing debridement is not selective and often removes healthy tissue 10-12,14,18
2. Pain with dressing removal

3. Bleeding with dressing removal
4. Capability of bacteria to penetrate up to 64 layers of dry gauze.19
5. Potential for leaving strands of gauze behind in the wound bed
    a) Could act as a residual foreign body which could lead to granuloma formation and/or infection13
    b) Might require surgical drainage and/or removal of the foreign body strand of gauze
6. Local tissue cooling during the evaporative period
    a) Local reflex vasoconstriction and hypoxia resulting in impairment of leukocyte mobility and their overall phagocytic efficiency.
    b) Increase in the affinity of hemoglobin for oxygen.
    c) These disadvantages not only impede healing but also increases the susceptibility for infection.[14,18]
7. Dry dressing removal may serve as an airborne vector for bacteria, potentially contaminating other wounds of the patient, nearby healthcare staff, and/or other patients[11,14,18]
8. Exclusively used during the inflammatory phase of wound healing and inappropriate to use over granulation and epithelization tissues/cells in the proliferative phase
    a) When used incorrectly during the proliferative phase of wound healing this technique could disturb the deposition of collagen, the needed in-growth of blood vessels (angiogenesis), as well as the re-epithelization of the wound. This ultimately slows down the healing of the wound and increases the risk of developing an underlying infection such as a soft tissue infection and/or osteomyelitis.
9. Less cost efficient than other advanced dressings
    a) Unit cost per dressing may be less expensive but there is the added cost of application due to the increased frequency of the dressing changes as well as the added expense for the increased length of treatment time compared with other more efficient techniques.
10. Maceration of the peri-wound skin can occur
11. Overall wet-to-dry dressing utilization is considered “substandard wound care” by various regulatory entities.
    a) Prevention and Treatment of Pressure Ulcers: Clinical Practice Guideline20
        1) “Caution: Avoid use of wet-to-dry gauze dressings.”[20]
        2) “Avoid using gauze dressings for open pressure ulcers that have been cleansed and debrided because they are labor-intensive, cause pain when removed if dry, and lead to desiccation of viable tissue if they dry.” [20]
    b) Department of Health & Human Services (DHHS) Centers for Medicare & Medicaid Services (CMS) Guidance to Surveyors for Long Term Care Facilities[21]
        1) “The use of wet-to-dry dressings or irrigations 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.”[21]
        2) “A facility should be able to show that its treatment protocols are based upon current standards of practice”[21]
    c) WOCN clinical practice guideline for management of wounds in patients with lower-extremity arterial disease[22]
        1) “Mechanical, non-selective debridement is contraindicated in arterial wounds.”[22]

d) Association for the Advancement of Wound Care Guidelines[23]
   1) "Mechanical debridement using wet-to-dry gauze is considered substandard practice."[23]
   2) "Avoid gauze use as a primary PU dressing. It delays healing, increases pain, infection rates and dressing change frequency and is not cost effective"[23]
e) Institute for Clinical Systems Improvement
   1) "Moist wound healing…. a wet-to-dry dressing is not typically considered continuously moist and therefore not recommended"
   2) "Wet-to-dry dressings are indicated for heavily necrotic wounds, and not for wounds with primarily viable tissue."

12. Research yielding the negative effects of Wet-to-Dry Dressings but does not yield the positive effects of this type of wound therapy.
    E. Reasons why wet-to-dry dressings are ordered despite being considered substandard wound care:
    1. Clinician's training utilizing wet-to-dry dressings
    2. Personal clinical experience utilizing wet-to-dry dressings
    3. For inflammatory phase of full thickness wounds healing by secondary intention
    4. Clinical need for a form of mechanical debridement
    5. Perception that the utilization of wet-to-dry dressings are more cost efficient than newer advanced wound care dressings that have a higher unit cost
    6. Unfamiliarity with the negative aspects of using wet-to-dry dressings
    7. Unfamiliarity with the more advanced wound care dressings
    8. Lack of time in learning about the more advanced wound care dressings and techniques
    F. "Evidence Based" vs. "Standard of Care" quandary with selecting or not selecting wet-to- dry dressing techniques

1. "Evidence Based" Medicine = The incorporation of the collective results of research and other sources into the care of the patient to improve the quality and effectiveness of therapy.
2. "Standard of Care" Medicine = Actions that any reasonable and prudent practitioner would take under the same or similar circumstance.
3. Utilization of wet-to-dry dressings: The case could be made "evidence based" medicine ≠ "standard of care" medicine.
   a) The evidence reveals that wet-to-dry dressings are substandard wound care (Evidence Based)
   b) The literature supports that wet-to-dry Dressings are the most frequently ordered dressing (Standard of Care)
4. Is there enough evidence to exclude wet-to-dry mechanical debridement techniques from 21st century wound care?
   a) The evidence supports YES utilizing it in the proliferative phase of wound healing
   b) The evidence supports YES as a mechanical debridement technique in the inflammatory phase
   c) This should be considered an all or none proposition
   d) Wet-to-dry dressing served its purpose in the past and should now be discarded

e) It is a procedure that was utilized ahead of the research and the development of better alternatives
    1) An analogy could be made that cholecystectomies were done in the not-so-distant past as only "opened" procedures. Now, laparoscopic cholecystectomy has been developed, researched, and is considered the "gold standard" for the elective removal of a gallbladder. A surgeon should no longer routinely favor the open cholecystectomy over the laparoscopic approach (a) just because they were trained only on the open procedure, (b) they do not want to spend the time perfecting a different operation that requires a different set of skills, (c) they have successfully removed multiple gall bladders utilizing the open approach for years, and (d) they do not see the need for change. This analogy could be carried over to the continued utilization of substandard wet-to-dry dressings. It is past the time to discard this procedure just like the routine elective open cholecystectomy.

IV. Debridement options without the negative effects of wet-to-dry for the inflammatory phase of wound healing

A. Autolytic Debridement
    1. Selective debridement
    2. Uses the body's own enzymes to dissolve necrotic tissue within the wound
    3. Maintains a moist wound base
    4. Occlusive, semi-occlusive dressings used
    5. If wound dry – Hydrogel
    6. If wound exudative – Alginate, Hydrofiber®
    7. Slowest form of debridement
    8. Not recommended for infected wounds
B. Enzymatic Debridement
    1. Application of collagenase ointment
    2. Selective, not harmful to healthy tissue
    3. Once daily application only
    4. Prescription product only
    5. Collagenase SANTYL® Ointment is the only FDA-approved enzymatic debrider in the USA
    6. Can be used in combination with other methods
    7. Collagenase dissolves the collagen that attaches the avascular tissue to the wound surface
C. Biological Debridement
    1. Selective debridement
    2. Application of live maggots
    3. "Yuck factor" to some
    4. Promotes the growth of fibroblasts
    5. Applied for 1-3 days
    6. Multiple applications are the norm
D. Mechanical Debridement

1. Nonselective debridement
2. External force that is great enough to separate or break adhesive forces of necrotic tissue
3. Whirlpool
4. Irrigation (4-15 PSI)
5. Scrubbing
6. [Wet-to-dry dressing falls under this category]

E. Sharp Debridement
1. Nonselective debridement
2. Sterile technique
3. At bedside, clinic, or in the operating room
4. Consider utilizing as the first technique in questionable underlying infection

V. Dressing options that could be used in the proliferative phase of wound healing instead of wet-to-dry dressings *(from least absorptive to more absorptive)*

A. Hydrogel25-27

1. 90% water in a gel base; useful for adding moisture to wound bed, softening/debriding necrotic tissue, and for maintaining moist wound bed; various formulations available as free flowing gel, sheet, or saturated onto gauze
2. Donates moisture without clinically absorption of exudate
3. Possibly the best options to be placed directly on fascia, tendons, ligaments, muscle, cartilage, bone, or granulation tissue in the wound base
4. May come mixed with various antimicrobial compounds (e.g., silver, hypochlorite acid)
5. Brand name examples:
   a) Amorphous: Amerigel®, Anasept® Antimicrobial Skin and Wound Gel, AquaSite®, Curasol™, Curafil™ Wound Gel, Dermasyn™, Excel™ Gel, IntraSite Gel, Solosite®, NuGel™, Normlgel®, Regenecare®, RadiaPlex®Rx Wound Gel, DuoDerm® Hydroactive Gel
   b) Impregnated gauze: CarraGauze®, Curasol 4x4, Dermagran® Gauze dressing
   c) Gel sheets: Aquasite® Hydrogel Sheet, Cool Magic™ Sheet Hydrogel, Kendall™, Curagel™, Kendall Island, Elasto-gel™, Vigilon, TenderWet®, TheraGauze™

B. Transparent film25-27

1. Dressings made of polyurethane coated with an adhesive; used for protection from friction and bacterial invasion; provides moist wound environment, assists with debridement while allowing for visualization of wound bed, and may be left in place 3-7 days
2. No absorptive capabilities
3. Waterproofs the underlying tissue
4. Contraindicated in infected wounds
5. Utilize instead of tape as part of a dressing application with less chance of epidermal stripping

6. Might be the “ideal” sterile operative taping technique instead of utilizing non- sterile O.R. tape
7. Brand name examples: Bursamed®, DermaView™, Tegaderm™, OpSite™, Kendall™ Transparent-Polyskin™

C. Contact layers[25-27]

1. In general, no absorptive capabilities
2. Meant to protect the wound base from trauma like bleeding, adherence, and/or pain with dressing changes
3. Always serves as a primary dressing
4. Consider utilizing under negative pressure wound therapy (NPWT) to decrease the in-growth of granulation tissue into the system’s foam or AMD gauze
5. May come impregnated with silver
6. Brand name examples: COVRSITE™ Wound Cover Dressing, Mepitel® One, Physiotulle® Wound Contact Layer, Tegapore™, Dermanet®, Mepitel® Soft Silicone Wound Contact Layer, Telfa™ Clear, Adaptic Touch™

D. Collagen dressings[25-27]

1. Intended mainly for proliferative phase of wound healing
2. Not necessarily utilized for their absorptive properties
3. Used to help the appropriate deposition of collagen in the wound bed
4. Concern for religious “sensitivity”
5. As a category, not utilized frequently
6. Examples: BGC Matrix®; BIOSTEP* Collagen Matrix; Catrix® Wound Dressing; CellerateRX® Gel or Powder; ColActive® Plus, Excellagen®; Promogran Prisma™ Matrix; FIBRACOL™ Plus; Puracol® Plus; Stimulen™ Collagen Gel, lotion, powder, or sheets; Triple Helix Collagen Dressing

E. Hydrocolloid [25-27]

1. Wafer dressing containing gel-forming agents in an adhesive compound laminated onto a flexible water resistant outer layer; used to protect wounds from urinary or fecal contamination, protect intact skin, keeps the wound bed moist, assists with debridement of necrotic tissue, and provides insulation; may be left in place 3 – 7 days
2. Totally occlusive dressings
3. Contraindicated in infected wounds
4. May be placed under Unna boot, venous insufficiency wraps, and total contact casts
5. Absorption comparable to foam dressings
6. May be placed about a wound to help obtain a vacuum seal with negative pressure wound therapy
7. Often odor and/or residue with dressing changes
8. Brand name examples: DuoDERM®, DermaFilm® Hydrocolloid Dressing, Excel Hydrocolloid, PrimaCol® Hydrocolloid Dressing, REPLICARE® Hydrocolloid, Tegasorb™, Restore® Hydrocolloid, Comfeel®

F. Foams [25-27]

1. Dressings made from polyurethane foam with small open cells capable of holding fluids; used to control scant to small amount of wound drainage, keeps the wound bed moist,

assists with debridement of necrotic tissue, and provides insulation; may be left in place 3 – 7 days
2. Warmest dressing so has the least amount of temperature vasoconstriction of the dressings
3. Applied with slight compression to treat hypergranulation tissue
4. May be placed under Unna boot, venous insufficiency wraps, and total contact casts
5. May come with various antimicrobials and surfactant (cleansing solution) within the dressing itself
6. May be utilized over infected wounds instead of contraindicated hydrocolloid dressings
7. Absorption variable based upon composition
8. Brand name examples: Allevyn, Curafoam™, Flexzan®, Hydrasorb®, Isolate Hydrophilic Foam Dressing, LYOfoam®, Polymem, Tielle™, Mepilex®, Biatain®, 3M® Heel Foam, Comfeel® Ulcer Dressing

G. Alginates [25-27]

1. Dressings with calcium and sodium fibers made from seaweed that absorb drainage and form a gel in the wound bed; used to control moderate to heavy wound drainage, keeps the wound bed moist and assists with debridement
2. Absorbs more than foams and hydrocolloids
3. Absorbs less than the specialty absorptive dressings
4. Has hemostatic properties and consider its usage as primary dressing on patients undergoing sharp debridement
5. Calcium forms contraindicated in pediatric population
6. Brand name examples:
   a) Algicell®, AlgiSite® M, Curasorb®, Kaltostat®, Kalginate™, Maxsorb® Extra,
   b) Sorbsan®, Tegaderm™ Alginate Dressings, Durafiber* Gelling Fiber, Enluxtra™
   c) Impregnated alginates – Medihoney®, ExcelGinate®AG Dressing, Silverlon® CA, Curasorb® ZN; Algicell® Ag

H. Composite dressings [25-27]

1. Absorptive capability with patients having mild to heavy volume of exudate
2. May be used as a primary or secondary dressing
3. Might be the “ideal” sterile operative dressing
4. Good adherent potential on areas difficult for other dressing to “stick”
5. Some products can absorb greater than Alginates
6. Brand name examples: 3M™ Medipore™ +Pad Soft Cloth Adhesive Wound Dressing, Alldress® Absorbent Composite Dressing, Covaderm Plus®, DermaDress™, DuDress® Film Top Barrier Island Dressing, McKesson Barrier Island Dressing, Mepore® All-in- One Absorbent Surgical Dressing, MPM Multi-Layered Dressing (Sterile), Repel™ Wound Dressing, Telfa® Island Dressing.

I. Wound fillers [25-27]

1. Meant to fill wound cavities
2. Various products available
3. Brand name examples: Gold Dust™, Altrazeal™ Transforming Powder Dressing, Dermagran® Hydrophilic-B Wound Dressing, McKesson Hydrophilic Wound Dressing, Multidex® Gel or Powder, PolyMem WIC® Cavity Filler

J. Specialty absorptive 25-27

1. Absorbs the most exudate and forms a gel
2. Hydrofibers (such as Aquacel®) belong to this group
3. May have antimicrobials impregnated in fibers
4. Brand Name Examples: 3M™ Tegaderm™ Superabsorber Dressing, Biatain® Super Absorbent Dressing, Drawtex®, ENLUXTRA™ Wound Dressing, McKesson Super Absorbent Dressing, Restore® TRIO Absorbent Adhesive Dressing with TRIACT™ Technology, Sorbion sachet® Dressing, XTRASORB® Classic Super Absorbent Dressing

VI. Conclusions from Author

A. Wet-to-dry dressings have been employed by generations of surgeons over many decades.

1. At the time of my general surgical training in the 1970s, it was the main technique taught for healing open wounds by Secondary Intention.
2. I, like many of my colleagues before, at and since that time have healed many wounds "successfully" utilizing this now outdated technique.
3. However, this was at a noticeable expense to our patients that we now are able to recognize.
4. Wound care, even as an "unofficial" subspecialty was not in existence at that time.
5. We did not have all the options, techniques, as well as the knowledge then as we do now.

B. From the teaching and experiencing modern wound care, I conclude:

1. Moist wound healing principles have been accepted since 1962
2. Wet-to-dry dressings are considered substandard wound care for the multiple reasons cited above
3. Multiple options presently do exist that are consistent with the clinical and experimental medicine better than wet-to-dry Dressings
4. If we are considering trying alternative therapy to wet-to-dry dressings, then these alternatives need to be readily available to the clinician to help in their attempt to change their practices
5. It is very hard to adopt new technology in any area of medicine
6. The technique of wet-to-dry dressings should be completely abandoned by the medical profession
7. There is no doubt that change is extremely difficult, but it is probably in the best interest of our patients
8. So, if Wound Care Education Institute can help you along the way of your own personal "learning curve" with these alternative techniques, please feel free to contact us or me directly [dawmd.implexus@sbcglobal.net]

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