

## Wound Dressings

by Aileen Santos, MD

### Occlusive/Moisture Retentive Dressings

Type and Formulations	Composition	Applications	Advantages	Disadvantages	Usage	Common Trade Names*
<b>Films</b>	Transparent sheets of polyurethane or copolyester  - Non-absorbent - Semi-permeable - Self-adhesive	Wounds with minimal exudate, including:  Superficial burns  Ulcers  Second intention healing (e.g. donor sites for skin grafts)  Protective cover for IV catheter sites	Provides a moist healing environment  Promotes autolytic debridement  Translucency allows visualization and monitoring of wound  Semi-permeability allows for entry of oxygen and prevents accumulation of water vapor  Protective barrier against microbes  Flexible  Self-adhesive	Difficult to use as they fold on themselves easily  Requires frequent dressing changes  Non-absorbent properties — may lead to excess accumulation of exudates and maceration of wound edges	Can be left in place for up to 7 days but often requires change a few times a week	Tegaderm™ Biocclusive® Blisterfilm™ Carrafil™ Kendall™ Polyskin™ II Mepore Film® OmniDerm® Opsite™
<b>Foam</b>	Composed of polyurethane or silicone center with a semi-occlusive outer layer  - Semi-occlusive - Semi-permeable - Highly absorbent	Chronic wounds:  Diabetic, venous stasis, sacral ulcers  Burns  Wounds with moderate-heavy exudate	Absorbent inner layer helps clear exudates while maintaining a moist wound bed  Semi-permeable outer layer allows water vapor to escape while preventing bacterial invasion  Conforms to wound shape and body contour (good for ulcers above bony prominences)  Cushions to prevent trauma  Thermal insulation  Atraumatic upon removal	Opacity prevents visual monitoring  Can be drying to wounds with little to no exudate (avoid in dry wounds)  Bulky  May macerate surrounding skin  Requires secondary dressing	Should be changed as often as the dressing becomes soaked with exudate  Daily to once or twice weekly	Allevyn® Aquacel Foam® Biatain® Biopatch® Flexzan® Kendall™ Curafoam™ Kendall™ Hydrasorb® Lyfoam® Mepilex® Polymem®
<b>Hydrogels</b>  Sheet Amorphous Gel Impregnated gauze	Hydrophilic polymer usually consists of cross-linked starch polymers comprised of up to 80-90% water base  - Semi-transparent	Pressure ulcers  Partial and full thickness wounds (including chemical peels, dermabrasion, donor sites)  Vascular ulcers  Coumadin necrosis  Calciphylaxis	Useful for dry wounds (rehydrates and maintains a moist environment)  Softens and loosens slough and necrotic wound debris (facilitates autolytic debridement)  Cooling effect on the wound (can decrease perceived pain)  Does not adhere to wound  Permeable to gas and water vapor  Promote granulation and epithelialization	Absorptive capacity is limited – not suitable for highly exudative wounds  Frequent dressing changes  Absorption is slow – not suitable for bleeding wounds  Requires secondary dressing  Poor bacterial barrier	Change at least every 1 to 3 days – depending on the hydration needs of the wound	2nd Skin® Carrasyn® Clearsite™ Elasto-Gel™ FlexiGel™ Hypergel® Kendall™ Curafil™ Kendall™ Curagel™ Nu-gel™ Tegagel™
<b>Hydrocolloid</b>  Sheet Paste Powder	<i>Inner layer:</i>  Self-adhesive, gel forming, composed of hydrophilic colloid particles, such as carboxymethylcellulose (CMC), pectin, gelatin, or elastomer  Upon contact with exudates, absorbs water and forms gels  <i>Outer layer:</i>  Usually consists of polyurethane  Seals and protects the wound from bacteria, foreign debris and shearing	Wounds with low to moderate exudates  Partial and full thickness wounds  Granular and necrotic wounds  Minor burns  Pressure ulcers	Low moisture vapor transmission  Provides a moist healing environment  Prevents contamination  Promotes autolytic debridement, enhances angiogenesis, granulation tissue formation and healing  Sheet form is self-adhesive and waterproof (patients can bathe and swim freely)  Bulky- provides physical protection to wound	Avoid in infected wounds  Sheets are opaque  Caution with peri-wound skin as adhesive may cause damage upon removal  Gel formed can be thick, yellow, and malodorous - do not mistake for infection  Due to debriding abilities, they may initially cause the size of the wound to increase  Low absorptive capacity	Does not require secondary dressing  Can remain in place for up to 7 days or until drainage is noted beneath dressing  Usually needs to be changed daily at the beginning of treatment  As the amount of exudate reduces, frequency of dressing changes decreases – every 3-7 days	Duoderm® Comfeel® Cutinova® Hydrocol II® NuDerm® Replicare™ Tegasorb™



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## Wound Dressings (cont.)

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Occlusive/Moisture Retentive Dressings (cont.)						
Type and Formulations	Composition	Applications	Advantages	Disadvantages	Usage	Common Trade Names*
<b>Alginates</b>  Sheet Ribbon Rope	Soft non-woven fibers of a cellulose-like polysaccharide derived from the calcium salts of seaweed  Covered in calcium/sodium salts  Sodium ions in wound exudate are exchanged for calcium ions in dressing to form a hydrophilic gel	Best choice for highly exudative/drainage wounds  Pressure/vascular ulcers  Surgical incisions  Pyoderma gangrenosum  Wound dehiscence  Sinus tracts  Skin graft donor sites  Exposed tendons  Infected wounds  Bleeding wounds	Gel is highly absorbent  Absorbs 15-20x their weight in fluid  Fewer dressing changes  Prevents microbial contamination  Autolytic debridement  Calcium released from the dressing is thought to have hemostatic properties that promote the clotting cascade	Contraindicated for dry wounds (no hydration qualities)  May dry and adhere to the wound base if not changed at least weekly (use hydration to facilitate removal)  Yellow-brown color and malodorous smell may be confused with pus  Needs secondary dressing  Avoid in deep or narrow sinuses — removal may be difficult	Sheet form: beneficial for superficial wounds  Ribbon or rope: useful for packing sinuses and cavities  Infected wounds: Change daily  Clean wounds: May be kept for up to 7 days or until the gel loses its viscosity	Algisite™ Algosteril® Kendall™ Curasorb™ Kalginate® Kaltostat® Melgisorb® SeaSorb® Sorbsan®
<b>Hydrofibers</b>  Sheet Ribbon Rope	Composed of sodium carboxymethylcellulose fibers  Interacts with exudate to form gel  Structurally similar to alginates	Very similar to alginates  Highly exudative wounds  Bleeding wounds  Infected wounds	Comfortable  Retains moisture  Promotes autolytic debridement  Easy to remove  Amenable to heavily exudative or infected wounds  3 times as absorbent as alginates  Reduces MMP's	Requires secondary dressing	Change at least every 3-7 days or until saturated  Irrigate the wound with saline to remove the gel	Aquacel™
<b>Hydroconductive dressings</b>	Utilizes two types of absorbent cross-action structures that facilitate the movement large volumes of exudates, bacteria, MMP's and debris through the dressing	Highly exudative wounds	Move fluid in a horizontal and vertical vector into the dressing  Holds up to 30-50x its own weight  Debridement component helps to lift and loosen adherent slough tissues (easy removal)  Does not shed fibers or break apart  Versatile - can be tailored to fit different sizes and shapes	Cost  Needs secondary dressing	Change every 1-3 days, as necessary  Once exudate is reduced, may be changed less frequently  Irrigate with saline for removal	Levafiber™ Drawtex®
<b>Hyaluronic acid</b>  Sheets Ribbons Foam Cream	Dermal matrix/scaffold of hyaluronan (upon contact with exudate forms a soft hydrophilic gel)  Silicone membrane (when present) provides barrier function	Partial- and full-thickness wounds  Venous ulcers  Diabetic ulcers  Second degree burns  Tunneled/undermined wounds  Surgical wounds	High capacity to retain water  Provides moist environment  Biodegradable  Accelerates granulation tissue formation and re-epithelialization  Painless removal  Matrix acts as a scaffold for cellular invasion and capillary growth	Cost	Depends on formulation and level of exudate	Hyalofill® Hyalomatrix® Hyiodine®
Antimicrobial Dressings						
Type and Formulations	Composition	Applications	Advantages	Disadvantages	Usage	Common Trade Names*
<b>Honey</b>  Ointment Impregnated tulle Alginate Sheet Hydrogel Hydrocolloid	Manuka honey	Light to moderately exudative wounds, such as: -Diabetic foot ulcers -Venous ulcers -Arterial ulcers -Partial or full thickness pressure ulcer -1st and 2nd degree burns -Traumatic and surgical wounds	Prevents biofilm formation  Broad-spectrum antibiotic activity  Promotes autolytic debridement  Anti-inflammatory  High osmolality contributes to the antibacterial effect	Avoid in patients with history of allergy to either honey or bee venom  Monitor blood sugar levels in diabetic patients	Depends on preparation	Manuka Fill® Surgihoney™ TheraHoney® Medihoney® Activon® Algivon® Actilite®

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### Antimicrobial Dressings (cont.)

Type and Formulations	Composition	Applications	Advantages	Disadvantages	Usage	Common Trade Names*
<b>Iodine-containing dressings</b>  Gel Sheet Solution Foam	Povidone-iodine: anti-septic impregnated into gauze  Cadexomer-iodine polymer: compound of dextran beads that slowly releases iodine over time, decreasing cytotoxic effects; gel produced in process absorbs exudate	Infected wounds	Broad-spectrum antimicrobial: virus, fungi, bacteria  Good penetration of biofilms	Caution in patients with iodine allergy, thyroid disease, and/or pregnant or lactating  Povidone-iodine can be toxic to keratinocytes – delays wound healing  Antimicrobial action may be neutralized by inorganic and organic agents  Stinging and local irritation	Depends on level of exudate: Lightly exudative: change every 1-3 days  Heavily exudative: change daily  Newer dressings: change in color will indicate loss of antiseptic effect	Povidone-iodine: -Iodine® -Betadine®  Cadexomer-iodine: -Iodoflex™ -Iodosorb™
<b>Silver Dressings</b>  Cream Alginates Collagens Hydrofiber Sheets Films Hydrogels Foams Hydrocolloids	Silver particles impregnated in different types of formulations  Newer formulations consist of high-density polyethylene mesh impregnated with nanocrystalline silver	Superficially infected wounds	Broad antimicrobial spectrum, including MRSA and VRE  Unlikely to induce resistance  Variety of products available for different wound situations  Active or ionic silver is released at different rates and durations depending on delivery system chosen  Infrequent application required  Increases levels of MMP	Insufficient evidence to recommend the use of silver containing dressings or topical agents for treatment of infected or contaminated wounds  Levels of absorption are not well-defined  Skin pigmentation  Allergic reactions  May delay re-epithelialization process  Silver sulfadiazine cream may produce pro-inflammatory pseudo-eschar (delay healing)	Varies by level of saturation and exudate: Lightly exudative wounds can remain in place for up to 7 days	Acticoat™ Actisorb® Silver 220 Contreet® Foam Contreet® Hydrocolloid Aquacel® Ag Algicel® Alginate Silverlon®

### Biologic/Biosynthetic – Skin Substitutes

Type	Composition	Indications	Advantages	Disadvantages	
<b>Epidermal</b>	Autograft	Keratinocytes expanded from skin biopsy	Burns Leg ulcers	Coverage of large area from small skin biopsy Permanent wound coverage Acceptable cosmetic results	3 weeks for graft cultivation Graft fragility, blistering Susceptibility to infection Unstable without dermal substitute Expensive Minimal shelf-life
	Allograft	Allogeneic keratinocytes cultured from neonatal foreskin	Venous leg ulcers Acute and chronic wounds Diabetic ulcers	No biopsy necessary Immediate availability Longer shelf-life	Possibility of disease transmission Expensive Not commercially available
<b>Dermal (acellular)</b>	Allograft	Cadaveric decellularized dermis or neonatal foreskin	Surgical wounds Burns Chronic ulcers	Allows ultra-thin STSG Decreased pain	Allograft procurement Virus screening
	Xenograft	Composed of bovine or porcine collagen plus extracellular matrix components	Donor sites Diabetic ulcers Pressure ulcers Neuropathic ulcers Post-surgical wounds	Immediate availability Reduces pain Long shelf-life Translucent Elastic Allows for ultra-thin STSG Less scarring than STSG alone	Expensive Possible allergic reaction Usually needs multiple applications May have higher infection rates
<b>Dermal (cellular)</b>	Allograft	Neonatal foreskin fibroblast in polyglactin suture	Burns Diabetic foot ulcers Epidermolysis bullosa	Immediate availability	Expensive Multiple applications
<b>Composite</b>	Allograft and xenograft	Engineered neonatal foreskin keratinocytes and fibroblasts plus bovine collagen type I	Venous ulcers Diabetic ulcers Burns	Immediate availability Easy handling Does not require subsequent skin grafting Single application may be sufficient	Limited viability Expensive

VRE – Vancomycin-Resistant Enterococci

MRSA- Methicillin-Resistant Staphylococcus Aureus

MMP- Matrix Metalloproteinases

STSG- Split thickness skin graft

\*Trade names remain property of their respective manufacturers.

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