Advanced Wound Care Technology

Orthobiologics
Wounds are generally classified based on:
- Degree of wound severity
  - Partial thickness
  - Full thickness
- Chronicity of the wound
  - Acute
  - Chronic

Partial and Full Thickness Wounds

Partial Thickness
- Involves only the epidermis; may extend into the dermis but not through it

Full Thickness
- Extends through the dermis into the tissue beneath and may expose adipose tissue, muscle, or bone
- Requires advanced wound care

What to Expect From Partial or Full Thickness Wounds

Exudate types will vary
- Acute wounds
  More sanguineous (bloody) exudate in acute wounds
- Healed wounds
  Serous (clear) color exudate as the wound heals

Exudate amounts will vary
- High exudate
  Greater exudate in acute wounds
- Low exudate
  Decreased exudate as wound heals
Acute Wounds

Acute wounds occur suddenly, rather than developing over time.

Surgical Wounds
Cut precisely with clean wound edges; closed with stitches, staples, adhesive, or left open to heal

Traumatic Wounds
Vary from superficial abrasions to deep wounds with extensive tissue damage

- Abrasion
- Blister
- Puncture
- Laceration
- Burn
Chronic Wounds

- Any wound that does not heal in a timely fashion (usually within 2-3 months)
- Healing has slowed or stopped
- The wound is no longer getting smaller and shallower
- A wound that appears healthy, red, and moist can still be chronic

Types of Chronic Wounds

**Ulcers**
Most common type of chronic wound

**Ischemic**
Inadequate blood supply prevents oxygen and nutrients required to heal

**Infectious**
May be bacterial, fungal, or viral

Types of Ulcers

**Pressure Ulcers**
- Known as "bedsores"
- Skin breakdown caused by prolonged pressure and/or friction
- Develop over bony prominences (ankle, heel, hip, sacrum)

**Venous Ulcers**
- Known as "stasis" ulcers
- Account for >50% of lower limb ulcers
- Associated with DVT, varicose veins, valve insufficiency

**Diabetic Ulcers**
- Complication in poorly controlled diabetes
- Skin breakdown associated with neuropathy, compromised circulation, immune function

**Arterial Ulcers**
- Associated with atherosclerosis, thrombosis, hypertension
Basic Terminology

Wound Tissue

**Keratinocytes**
- Major cell component found in the epidermis
- Involved in wound healing from start to finish
- Communication between keratinocytes and other wound healing cells is critical for successful wound closure
- To close the wound, keratinocytes begin at the edges and migrate toward the center of the wound

**Granulation Tissue**
- Soft, red, fleshy tissue that fills in the wound and appears during the healing process
- Consists of new capillaries surrounded by collagen
- Appears reddened from a rich blood supply

**Epithelial Tissue**
- Tissue that develops when the epidermis regenerates over the wound surface
- Keratinocytes migrate from the wound edges, where they multiply until they meet in the middle and close the wound
- Appears silver or light in color
- Initially, only a few layers thick and very vulnerable to damage
Necrotic Slough
- Dead wound tissue
- Usually characterized by string-like, moist, necrotic debris
- Can be yellow, gray, green, or brown in color

Necrotic Eschar
- Nonviable/dead wound tissue
- Characterized by dry, leathery, black tissue

Note: Both of these types of tissue must be removed before a wound can heal.

Exudate Types

Sanguineous
Red and thin, with fresh blood

Serosanguineous
Pink to light red; thin and watery

Serous
Clear or light yellow; thin and watery

Purulent
Creamy yellow, green, white, or tan; thick and opaque
Challenges to Wound Healing

**Maceration**
- Exposure of peri-wound skin to excessive moisture
- White in color

**Dehiscence**
- Reopened surgical site or incision

**Hypergranulation Tissue**
- Overgrowth of granulation tissue
- Usually caused by excessive moisture and/or bacteria
- Epithelial cells can’t climb the “hill” created by hypergranulation tissue to close the wound
- Must be resolved prior to wound closure

**Epibole**
- Rolled wound edges usually seen with chronic wounds
- Epithelial cells grow down on themselves and *think* the wound has healed
- Rolled edges must be removed before the wound can heal properly
Amnion™ Matrix - Thin

Amnion thin matrix is derived from the amnion membrane layer of the placenta. This semitransparent tissue can be applied directly to the surgical site for use in a number of soft-tissue applications. Amnion-derived tissues contain endogenous growth factors and cytokines1-4 that maintain the natural properties of amnion. Amnion matrix is an anatomical barrier that helps provide mechanical protection5 while supporting tissue with nutrient-rich growth factors.

Amnion Matrix - Thick

This thicker membrane is derived from the umbilical cord. This resilient graft is thick enough to hold a stitch when hydrated. Amnion-derived tissues contain endogenous growth factors and cytokines1-4 that maintain the natural properties of amnion. Amnion matrix is an anatomical barrier that helps provide mechanical protection5 while supporting tissue with nutrient-rich growth factors.

References
Biovance® Human Amniotic Membrane Allograft
Biovance human amniotic membrane allograft is derived from the placenta of healthy, full-term pregnancies. Unlike other placenta-derived allografts, Biovance allografts are completely decellularized and devoid of cells, hormones, growth factors, cytokines, and other substances. Biovance allograft acts as a barrier membrane during the wound regeneration process and supports tissue growth. It contains key extracellular matrix proteins that allow for the migration of host cells to permeate the graft.

CentaFlex™ Human Placental Matrix
CentaFlex decellularized human placental matrix allograft is derived from human umbilical cord. CentaFlex placental matrix has the strength to support repairs, without the trade-off of an overly thick tissue. It serves as a cell-friendly structure to allow noninflammatory cell attachment, proliferation, and growth.

Interfyl® Human Connective Tissue Matrix
Interfyl connective tissue matrix is used to fill irregular spaces or soft-tissue deficits resulting from wounds, trauma, or surgery. Derived from the placenta of a healthy, full-term pregnancy, Interfyl connective tissue matrix is suited for a variety of surgical applications when there is a need to replace or supplement damaged or inadequate integumental tissue. Interfyl connective tissue matrix is minimally manipulated and retains the fundamental structure and functional characteristics of connective tissue. It is available in particulate and flowable formulations.

JumpStart® Antimicrobial Wound Dressing
JumpStart dressings are provided on an ultra-thin, lightweight, polyester substrate and contain laser-cut fenestrations to allow easy passage of wound exudate into the absorbent layer or a secondary dressing. The flexible design easily contours to the body. JumpStart dressings may be applied directly over sutures, staples, Steri-Strips™ wound closure strips, amnion membrane, and liquid skin adhesives. The dot-matrix pattern of embedded microcell batteries generates microcurrents on the dressing surface in the presence of a conductive medium, such as sterile saline, water-based gel, or wound exudate.

Biovance, CentaFlex, and Interfyl are registered trademarks of Celularity Inc.
1. Thoroughly clean and disinfect the skin surrounding the sore or wound.

2. Probe the wound with a metal instrument to determine its depth and look for foreign material or objects in the ulcer.

3. Excise the hyperkeratotic, infected, and nonviable tissue and wash out the ulcer.

4. Position the Amnion™ matrix, CentaFlex™ matrix, or Biovance® allograft to cover the wound, followed by the JumpStart® dressing as supportive medical therapy.
Arthrex Amnion™ Matrix, Biovance® Amniotic Membrane Allograft, and CentaFlex™ Placental Matrix

Introduction

Arthrex Amnion matrix, Biovance allograft, and CentaFlex matrix can be used as anatomical wraps, acting as a natural structural barrier. In general orthopedic, arthroplasty, hand and wrist, and foot and ankle procedures, these products have been used as protective barriers to provide essential mechanical protection.

- Shoulder
- Knee
- Wound covering
- Hand and wrist
- Tendons, including Achilles
- Nerves

Rotator Cuff Repair

Achilles Tendon Repair

ACL Reconstruction
After repair, isolate the tendon so that it is easily visualized.

For a tendon in the ankle, the placental tissue may be placed along the superior aspect of the tendon.

Work the placental tissue around the tendon prior to suturing.

Wrap tendon with the Amnion™ matrix, Biovance® allograft, or CentaFlex™ matrix.

Make a cerclage stitch at each end of the graft.

Finalize with a running stitch along the construct.
Interfyl® Human Connective Tissue Matrix

Introduction

Interfyl connective tissue matrix is intended to replace or supplement damaged or inadequate integumental tissue. Indications include, but are not limited to, augmentation of deficient/inadequate soft tissue and treatment of deep dermal wounds, surgical wounds, soft-tissue voids as a result of tunneling wounds, fistula tracts, and dermal undermining, including those with exposed vital structures (bone, tendon, ligament, or nerve).

Interfyl Flowable Matrix Mixing Guide

1. Fill the empty syringe with equal parts sterile saline or other sterile non-viscous fluid. The 1:1 product-to-liquid ratio will achieve a toothpaste-like consistency.

2. Remove the needle from the syringe and attach the provided double female luer lock connection. Set syringe aside.

3. Do not remove the cap on the Interfyl connective tissue matrix product syringe. Pull back on the plunger slightly to create space, and hold. Tap the syringe until the product particles are loosened.

Note: Based on physician preference and/or clinical application, the consistency can be altered by adding more or less liquid.
Connect the two syringes with the luer lock.

Holding the connected syringes vertically (with the syringe containing the sterile fluid on top), push down on the plunger to release sterile fluid into the Interfyl® product syringe.

Holding the two connected syringes horizontally, push both plungers back and forth a minimum of 15 times to create a homogeneous mix.

Note: If desired, an 18-ga needle can be used when more sterile fluid is added.

**Interfyl® Particulate Matrix Mixing Guide**

Interfyl particulate connective tissue matrix packages (both 50 mg and 100 mg) contain one product vial. The product is supplied in a double-pouch configuration; the inner pouch and its contents are sterile. Always handle Interfyl matrix using aseptic technique. Once opened, use within 2 hours.

After proper preparation of the treatment area site, open product package and remove inner pouch containing the product vial. Unscrew the cap to open the vial.

The product may be used dry. Placement of the product can be achieved by either tapping or sprinkling the contents out directly from the vial or by using nontraumatic forceps to pick up the particulate for placement at the desired area.

Sterile saline or other sterile fluid may be added to the particulate for a wet application. To achieve a paste-like consistency, add 0.6 mL sterile fluid for the 100 mg vial or 0.3 mL sterile fluid for the 50 mg vial.

The consistency can be altered by adding more or less liquid. The resulting wet particulate may be placed as desired.

**Note:** NOT to be used as an injectable.
JumpStart® Antimicrobial Wound Dressings

Product Features

JumpStart dressings are provided on an ultra-thin, lightweight, polyester substrate and contain laser-cut fenestrations to allow easy passage of wound exudate into the absorbent layer or a secondary dressing. The flexible design easily contours to the body. JumpStart dressings may be applied directly over sutures, staples, Steri-Strips wound closure strips, and liquid skin adhesives. The dot-matrix pattern of embedded microcell batteries generates microcurrents on the dressing surface in the presence of a conductive medium, such as sterile saline, water-based gel, or wound exudate.

JumpStart Wound Dressings

**JumpStart Contact-Layer Dressing**

1. JumpStart antimicrobial wound contact-layer powered by V.Dox™ technology
2. Polyester substrate with embedded microcell batteries made of elemental silver and elemental zinc
3. Fenestrations allow wound drainage to pass through dressing to absorbent layer

**JumpStart Composite Dressing**

1. JumpStart antimicrobial wound contact-layer powered by V.Dox technology
2. Polyester substrate with embedded microcell batteries made of elemental silver and elemental zinc
3. Fenestrations allow wound drainage to pass through dressing to absorbent layer
A New Generation of Wound Care Solutions

**Inspired by the body.**
The skin naturally creates and uses electrical energy to promote healing. Electric fields in the skin create surface energy potential, known as transepithelial potential (TEP). When skin is wounded, a change in electric potential occurs, driving the cell migration and wound healing process.

**Powered by electricity.**
Powered by patented V.Dox™ technology, JumpStart® antimicrobial wound dressings employ moisture-activated microcell batteries that wirelessly generate microcurrents designed to mimic the skin’s electrical energy.

**Energized by results.**
JumpStart dressings reduce the risk of infection by killing a broad spectrum of bacteria without antibiotics while supporting the body’s natural healing process.

### JumpStart Dressing Indications for Use

<table>
<thead>
<tr>
<th></th>
<th>JumpStart Contact Layer Dressing</th>
<th>JumpStart Composite High-Performance Adhesive</th>
<th>JumpStart Composite OrthoElite™ Line</th>
<th>JumpStart FlexEFit™ Universal Fit Dressing</th>
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<tbody>
<tr>
<td><strong>Chronic Wounds</strong></td>
<td></td>
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<tr>
<td>Ulcers (diabetic foot, venous leg, pressure)</td>
<td>✔</td>
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<td></td>
<td></td>
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<tr>
<td>Dehisced incision, infected, other</td>
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<tr>
<td><strong>Acute Wounds</strong></td>
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<tr>
<td>Surgical incisions</td>
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<tr>
<td>Traumatic</td>
<td>✔</td>
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<td>✔</td>
</tr>
<tr>
<td>First- and second-degree burns</td>
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Address All Your Wound Needs

<table>
<thead>
<tr>
<th>Product Image</th>
<th>Product Description</th>
<th>Item Number</th>
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<tbody>
<tr>
<td>Foot, Ankle, and Shoulder Dressing</td>
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<tr>
<td>Direct Anterior Hip Arthroplasty Dressing</td>
<td>ABS-4052</td>
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<tr>
<td>Hip and Knee Arthroplasty Dressing</td>
<td>ABS-4050</td>
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<tr>
<td>Partial- and Full-Thickness Dressing</td>
<td>ABS-4053</td>
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<tr>
<td>Total Shoulder Arthroplasty Dressing</td>
<td>ABS-4057</td>
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<tr>
<td>Medial/Lateral Elbow Dressing</td>
<td>ABS-4058</td>
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<tr>
<td>2.5-in Diameter Scope Site Dressing</td>
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<tr>
<td>4-in Diameter Scope Site Dressing</td>
<td>ABS-4056</td>
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JumpStart® Contact-Layer Dressing Sizes

12 in x 12 in
Single Layer Dressing Application

**Moisten** dotted side of dressing with sterile saline, water, or water-based hydrogel.

**Apply**, dots down, onto wound surface.

**Cover** with secondary dressing(s) appropriate for drainage levels.

Knee Dressing Application

1. **Orient** the dressing to anatomy.
2. **Remove** center liner and **moisten** pad.
3. **Apply**, dots down, onto wound surface, with knee in slight flexion (“30”).
4. **Remove** both shin liners and **secure** to skin.
5. **Remove** both thigh liners, overlap, and **secure** to skin.

Composite Dressing Application

**Remove** center liner and **moisten** dotted pad with sterile saline, water, or water-based hydrogel.

**Apply**, dots down, onto wound surface.

**Remove** remaining liners and **smooth** adhesive down over skin.

**Note**: If dressing a joint, apply while joint is in slight flexion.
Hydrate dotted side of dressing with sterile saline, water, or water-based hydrogel.

Note: If desired, trim to size and shape prior to moistening (include 1 cm to 2 cm overlap of wound edge).

Apply, dots down, onto wound surface.

Note: Completely line deep wound and extend 1 cm to 2 cm beyond wound edges.

Fill "dead space" with gauze.

Note: If desired, moisten gauze to keep JumpStart® dressing moist.

Cover with secondary dressing(s) appropriate for drainage levels.
What to Expect From an Open Wound Dressing Change

- Improved wound bed appearance
- In some cases, dressing appearance may be deceptive (discoloration and staining may be present). While this may be interpreted as increasing colonization or infection, it may also be normal and disappear after soiled dressing removal and mild wound cleansing.
- If dressing sticks to wound, moisten prior to removal. Gently peel back to reduce risk of wound bed disruption.

What if drainage increases at dressing change?
- Drainage may increase initially on partial and full thickness wounds
- Change absorbent layer and outer covering as needed to accommodate drainage level
- If heavily and/or continuously exuding, consult treating clinician

What if the wound is dry at dressing change?
- Use hydrogel or hydrogel and saline when wound is not lending adequate moisture
- Adequately moistened dressings don’t normally stick to wound beds. However, if dressing adheres, moisten top of dressing with saline and gently peel back to avoid wound bed disruption.

Dressing Use for Surgical Incisions

Follow surgeon’s normal dressing change protocol as it pertains to frequency and duration of treatment.

<table>
<thead>
<tr>
<th>Dressing Protocol</th>
<th>Number of Dressings Needed</th>
<th>Typical Wear Time</th>
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<tbody>
<tr>
<td>If surgeon removes dressing to inspect incision before discharge</td>
<td>Two</td>
<td>1 to 2 days for 1st dressing</td>
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<tr>
<td></td>
<td></td>
<td>7 to 10 days for 2nd dressing</td>
</tr>
<tr>
<td>If surgeon only inspects incision at first post-op visit</td>
<td>One</td>
<td>7 to 10 days</td>
</tr>
</tbody>
</table>

What to Expect From a Surgical Incision Dressing Change

- Minimal drainage on the JumpStart® dressing
- Will typically only exude for first 48 to 72 hours

If the JumpStart dressing adheres to the incision site, moisten dressing with saline and gently peel back to avoid tissue disruption.
## Ordering Information
### Arthrex Wound Care Solutions

### Arthrex Amnion™ Matrix

<table>
<thead>
<tr>
<th>Product Description</th>
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<td>Amnion Matrix - Thin</td>
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<td>2 cm × 2 cm</td>
<td>ABS-4100-022</td>
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<td>2 cm × 3 cm</td>
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<td>3 cm × 3 cm</td>
<td>ABS-4100-033</td>
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<td>4 cm × 4 cm</td>
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<td>4 cm × 6 cm</td>
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<td>4 cm × 8 cm</td>
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<td>7 cm × 7 cm</td>
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<table>
<thead>
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<th>Amnion Matrix - Thick</th>
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<tr>
<td>2 cm × 2 cm</td>
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<td>3 cm × 4 cm</td>
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<td>3 cm × 8 cm</td>
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<td>5 mm × 40 mm</td>
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### Biovance® Human Amniotic Membrane Allograft

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<td>1 cm × 2 cm</td>
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<td>5 cm × 5 cm</td>
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<tr>
<td>6 cm × 6 cm</td>
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### CentaFlex® Human Placental Matrix

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<td>HPM-0036</td>
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<td>3 cm × 8 cm</td>
<td>HPM-0038</td>
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<td>4 cm × 0.5 cm</td>
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### Interfyl® Human Connective Tissue Matrix

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<tr>
<td>0.3 ml Flowable Matrix</td>
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<td>0.6 ml Flowable Matrix</td>
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<td>1.0 ml Flowable Matrix</td>
<td>HCTM-010</td>
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<td>1.5 ml Flowable Matrix</td>
<td>HCTM-015</td>
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<td>50 mg Particulate Matrix</td>
<td>HCTM-050</td>
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<td>100 mg Particulate Matrix</td>
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### JumpStart® Antimicrobial Wound Dressing

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<tr>
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<tbody>
<tr>
<td>JumpStart Contact-Layer Dressing</td>
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<td>1 in × 1 in (fenestrated)</td>
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<td>2 in × 2 in</td>
<td>ABS-4002</td>
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<td>3 in × 3 in</td>
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<td>1.5 in × 8 in</td>
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<td>1.5 in × 10 in</td>
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<td>ABS-4008</td>
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<tr>
<td>12 in × 12 in</td>
<td>ABS-4012</td>
</tr>
<tr>
<td>2 in × 5 in</td>
<td>ABS-4025</td>
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</table>

| JumpStart Composite Dressing |             |
| 6 in × 11.5 in          | ABS-4050    |
| 5 in × 6 in             | ABS-4051    |
| 4.5 in × 10 in          | ABS-4052    |
| 4 in × 4 in             | ABS-4053    |
| 2.5-in Diameter         | ABS-4054    |
| 4-in Diameter           | ABS-4056    |
| 4.4 in × 9.6 in         | ABS-4057    |
| 4.2 in × 7.5 in         | ABS-4058    |

| JumpStart Pin Site Dressing Kit |             |
| JumpStart Antimicrobial Wound Dressing, qty. 5 | ABS-4059 |
| Absorbent Disk, qty. 5 | |
| Holding Clip, qty. 5 (compatible with 4 mm, 5 mm, and 6 mm pins) | |

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