

# INFECTION CONTROL GUIDELINES

for the HeartMate® XVE  
Left Ventricular Assist System (LVAS)



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This booklet summarizes approaches to infection control and management used by experienced LVAD implant centers. These guidelines were first created by the REMATCH Trial Surgical Working Group. They were subsequently updated by the Park City Trial Surgical Working Group in February 2004. The information in this booklet is for informational purposes only. No standard of care has yet been established. It is expected that users will adjust and apply this information as necessary to suit the unique healthcare needs of individual patients.

Information contained in this booklet was compiled through the efforts of the REMATCH Trial Surgical Working Group, with significant contributions from the following REMATCH Trial participants:

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These infection control guidelines are for informational purposes only; they are not comprehensive instructions on LVAS patient care. For complete information on the HeartMate™ XVE LVAS, please refer to the *HeartMate XVE LVAS Instructions for Use* (doc. #29128) and *HeartMate XVE LVAS Operating Manual* (doc. #28080).

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## INTRODUCTION

Infection is common among Left Ventricular Assist Device (LVAD) patients, especially in patients with multi-system organ failure who require prolonged stays in the ICU. Treatment is often complicated by the fact that it is sometimes difficult to identify the source of a "device infection." *For example, it may be difficult to determine whether a bloodstream infection is derived from central lines or from an infected LVAD.* However, clinical experience has shown that LVAD infection rates can be minimized by:

- Optimizing implant techniques
- Optimizing wound care
- Using prophylactic antibiotics appropriately
- Avoiding infections in indwelling catheters
- Maximizing patients' nutritional status
- Managing patients' diabetes

This booklet contains a summary of the approaches to infection control that have been used in experienced mechanical circulatory support programs that have low rates of infection among LVAD patients (for both bridge-to-transplant and destination therapy patients).

## Infection Control

### PRE-OPERATIVE CONSIDERATIONS

**Patient selection** is an important factor in successful outcomes. Exercise caution with patients at increased risk of developing device infections, such as patients with:

- Established or suspected infections
- Co-Morbidity factors, such as multi-organ dysfunction or immunosuppression, poorly controlled diabetes, malnutrition, debilitation, etc.
- Risk of prolonged intubation
- Cutaneous lesions at surgical sites

*In preparation for LVAD implant surgery:*

- 1 Remove all devices and transcutaneous or percutaneous lines** (e.g., urinary catheter or non-tunneled central venous catheter).
- 2 Optimize glycemic control** (80-110 mg/dL)<sup>4</sup>; ensure adequate nutrition, and prevent aspiration.
- 3 Rotate peripheral IVs.**
- 4 Examine patient for occult infections** at remote sites, such as teeth, sinus, GI tract, decubiti.
- 5 Administer antimicrobial prophylaxis** (may require modifications based on renal function and/or hepatic dysfunction):
  - a Vancomycin 15mg/kg IV 1 hour pre-op.

## Infection Control

### PRE-OPERATIVE CONSIDERATIONS continued

- b Rifampin 600mg PO 1-2 hours pre-op.
- c Fluconazole 400mg IV 1-2 hours pre-op.
- d Gram-negative coverage tailored to patient flora and institutional susceptibility.
- e Mupirocin (Bactroban®) 2% nasal ointment applied to nares the night before, and morning of, surgery (if nasal culture is positive for *Staphylococcus aureus*).

**NOTE:** All prophylactic antibiotics should be fully infused within 1 hour of incision to maximize their benefits.

#### 6 Prepare Patient for Implant Procedure

- a Bathe or shower patient with an antiseptic agent (such as chlorhexidine or Iodophor) the evening before surgery and then again the morning of surgery.
- b Clip hair at surgical area as close as possible to time of surgery.

#### 7 Observe OR Precautions

- a Wash hands and arms for a minimum of 3 minutes with an antiseptic agent (such as chlorhexidine or Betadine®); wear fresh scrubs, shoe covers and headgear that completely covers all exposed hair. **NOTE:** This step applies to ALL OR personnel.

## Infection Control

### PRE-OPERATIVE CONSIDERATIONS continued

- b Limit OR traffic and opening of OR door. Also limit number of people in OR. Consider posting sign to reinforce restrictions and having RN monitor.
- c Apply sterile field protections with "out-of-reach" rule (i.e., non-scrubbed personnel must stay at least arm's length from all sterile fields). Also maintain barriers to eliminate exposure to field by observers - monitored by circulating RN. **NOTE:** Consider using a laser pointer to direct personnel how to assemble VAD components without reaching over/into sterile field (i.e., point to VAD parts with light beam rather than using hands) .
- d Assure cleanliness of OR, overhead lighting, and equipment.
- e Place pump assembly in low-traffic part of OR while awaiting implant.

## Infection Control

### INTRA-OPERATIVE CONSIDERATIONS

**1 Planning for device and percutaneous tube positioning**, with the goal of minimizing trauma to the percutaneous (perc) tube exit site and maximizing patient comfort. Consider body habitus, angle between costal margins, clothing lines (e.g., waist bands), and impact of changing body positioning (e.g., sitting upright).

**2 Preparing and Draping the Skin**

- a Follow 3-step approach to skin preparation (or equivalent, such as DuraPrep™) using: **1**) antiseptic scrub (e.g., chlorhexidine gluconate), **2**) alcohol (which is then allowed to dry), and **3**) Betadine® gel (which is then allowed to dry).
- b Drape Steri-drapes™ over patient's exposed skin.

**3 Handling the Device**

- a Avoid prematurely opening sterile packaging for pump and related implantables.
- b Use HeartMate Sizer (model pump) for estimating device positioning. Do NOT use the actual device. **NOTE:** The HeartMate Sizer is NOT STERILE and must be sterilized prior to introduction into a sterile field.

## Infection Control

### INTRA-OPERATIVE CONSIDERATIONS continued

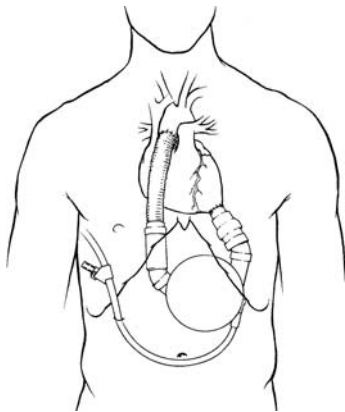
#### 4 Limiting Size of Pump Pocket

For pre-peritoneal placement, the pocket size for the implanted device should be large enough to prevent tension during closure. However, it should not be excessively large. Excessively large pockets create space that may collect blood or other fluids that can become infected.<sup>2</sup>

#### 5 Placing the Percutaneous Tube

- a Orient percutaneous tube so that the external portion is directed superiorly from its exit site in the mid-clavicular line, 4-6cm below the costal margin line, (near-vertical orientation) for males; but more laterally-directed (toward the anterior axillary fold, about 30 degrees off-vertical) for females to avoid interference with the breast. See **Figure 1**.

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**Figure 1** Orientation of percutaneous tube.

## Infection Control

### INTRA-OPERATIVE CONSIDERATIONS continued

- b To prevent the percutaneous tube from rubbing against the costal margin, adjust the distance between the exit site and costal margin based on the thickness of the subcutaneous tissue.
- c Create exit site by excising a skin button that is roughly 85% of the percutaneous tube diameter.

## 6 Tunneling the Percutaneous Tube

- a Tunnel the percutaneous tube from the left side of the XVE LVAD to the right upper quadrant sub-costal region, bearing in mind desired orientation (see *Placing the Percutaneous Tube* (step 5) on previous page).
- b Pass the percutaneous tube through a curvilinear pathway, either superior or inferior to the umbilicus, depending on patient size and anatomy.
- c Percutaneous tube tract should maximize the length passed through the abdominal wall muscle (at least 10-12cm long), entering the muscle within 4-8cm away from the LVAD and exiting the muscle through a cruciate incision in the fascia, immediately deep to the skin exit site.
- d Limit length of percutaneous tube outside of the body to 5-7cm from the connector.

## Infection Control

### INTRA-OPERATIVE CONSIDERATIONS continued

- e Pull percutaneous tube through tract using HeartMate Tunneler (or use chest tube passed through the tunnel) as a guide, assuring proper orientation.
  - f A heavy monofilament retention suture (eg, #1- 0 Prolene) may be used to assist immobilization of the percutaneous tube exit site.  
**NOTE:** Remove retention sutures 4-6 weeks post-op, once good tissue ingrowth is demonstrated by circumferential tissue adherence to the velour of the percutaneous tube and exit site.
- 6 Immobilize LVAD** at 3 or more points, using LVAD eyelets.
- 7 Assure meticulous hemostasis** to avoid hematomas, which can be a culture medium for microorganisms.
- 8 Prior to close, irrigate all surfaces** with antibiotic-normal saline solution (eg, vancomycin 2gm/ltr NS and gentamicin 160mg/ltr NS).  
**NOTE:** Intra-operative bleeding greater than 1.5LPM (assuming 25% of blood volume) or operative time greater than 2.5 times the half-life of the prophylactic agent(s) may require antibiotic re-dosing.<sup>6</sup>

## Infection Control INTRA-OPERATIVE CONSIDERATIONS continued

### 9 Placing Drains

- a Place mediastinal and pleural drains.
- b When using pre-peritoneal pocket placement, consider LVAD pocket drains. *For example, closed system drains with two 24 French soft silastic tubes (one superior to the LVAD and one inferior), connected to closed drainage (i.e., Pleuravac chest tube system on 20cm H<sub>2</sub>O suction).*

### 10 Immobilizing Perc Tube and Dressings

Apply occlusive surgical dressing to immobilize percutaneous tube in proper orientation and to hold dressing in place (no tape if possible), or use a Thoratec Stabilization Belt (**Figure 2**) (see *Perc Tube Immobilization Guidelines, Appendix B*).



**Figure 2** Thoratec Stabilization Belt (see *Figures* at end of booklet for enlarged image)

## Infection Control

### POST-OPERATIVE CONSIDERATIONS

#### 1 Administering Systemic Antibiotics

- a Continue systemic antibiotic prophylaxis for 48 hours:<sup>7</sup>
  - Vancomycin 15mg/kg IV q 12 hours
  - Rifampin 600mg PO for 48 hours
  - Fluconazole 400mg IV q 24 hours for 48 hours
  - Mupirocin (Bactroban<sup>®</sup>) 2% nasal ointment to nares BID for 5 days (if nasal culture is positive for *S. Aureus*)
  - Gram-negative coverage tailored to patient flora and/or institutional susceptibility for 48 hours

**NOTE:** Antibiotic dosages may need to be adjusted for renal or hepatic dysfunction.

- b After chest tubes are removed and drainage from stab wound incisions has stopped, limit antimicrobials to prophylaxis during invasive procedures (e.g., SBE prophylaxis), or when directed at specific infections. **NOTE:** If long-term antibiotics are required, consider antifungal prophylaxis.

#### 2 Monitoring and Assessing Lines

- a Encourage extraordinary attention to aseptic handling of IV and arterial lines, connectors, stopcocks, etc.
- b Remove monitoring lines as soon as possible.
- c Rotate peripheral IVs every 72-96 hours<sup>5</sup>

## Infection Control

### POST-OPERATIVE CONSIDERATIONS continued

#### 3 Removing Drains and Sutures

- a Remove mediastinal and pleural drains as soon as appropriate (eg, <150cc/12 hrs.).
- b Keep LVAD pocket drains in place until drainage subsides (eg, <30-50cc/day), usually within 3 to 7 days post-op or 2-3 days after chest tubes are removed. Once LVAD pocket drains are removed, place dry, sterile dressing over the stab wounds incisions. However, do NOT apply occlusive dressings or Steri-strips™. **NOTE:** Do NOT remove LVAD pocket drains at the same time the chest tubes are removed.
- c Remove sutures used to retain percutaneous tube 4-6 weeks post-op, when perc tube has good tissue ingrowth (i.e., circumferential tissue adherence to the percutaneous tube velour at the exit site), or if sutures become irritating.

#### 4 Insuring Aseptic Technique

Adhere to routine sterile dressing change techniques outlined in **Appendix A**.

#### 5 Immobilizing the Percutaneous Tube

- a Immobilizing the percutaneous tube is essential for promoting tissue ingrowth and minimizing

## Infection Control

### POST-OPERATIVE CONSIDERATIONS continued

tissue injury that can lead to infection.

- b In the immediate post-op period, immobilization is achieved by proper perc tube positioning under an occlusive dressing. Leave this dressing in place for 24 hours post-op (or until saturated), and then replace.
- c A gauze dressing should be secured in place using a Montgomery Strap or a Thoratec Stabilization Belt. The Thoratec Stabilization Belt is especially designed to immobilize the percutaneous tube of HeartMate LVAD and to relieve strain on the percutaneous tube exit site (see *Stabilization Belt Guidelines*, **Appendix B**, for information on using the Thoratec Stabilization Belt). **NOTE:** The exit site must be dressed prior to applying the Thoratec Stabilization Belt, which is supplied non-sterile.
- d Educate patients about the importance of minimizing trauma to the exit site by avoiding undue torque or pressure to the percutaneous tube. **NOTE:** Immobilizing the percutaneous tube is effective only when accompanied by on-going education of staff, patients, and patients' caregivers about the importance of minimizing exit site trauma and percutaneous tube stressors.

## Infection Control

### POST-OPERATIVE CONSIDERATIONS continued

- e Patients should not sleep on their abdomen. Body weight and pressure can cause the percutaneous tube to become occluded or to break.

#### 6 Bathing and Showering

- a For the first 30 days, or until adequate healing at the exit site, sponge bathe the patient, taking precautions to insure that the exit site remains dry and the vent line is protected from fluids.
- b Showers are permitted only after adequate tissue in-growth into the percutaneous tube velour and if there are no symptoms of exit site infection or excess drainage. Safe showering procedures include:
  - Using the HeartMate Shower Kit
  - Keeping the exit site covered with a sterile gauze
  - Protecting the exit site from direct water contact (ie, by covering it with plastic wrap or leaving the abdominal binder in place).
  - Following shower with sterile dressing change.

**NOTE:** See the *HeartMate Shower Kit Instructions for Use* (doc. #26770) for complete instructions and important warnings.

## Infection Control

### POST-OPERATIVE CONSIDERATIONS continued

#### 7 Monitoring and Managing Nutrition

Malnutrition (particularly cachexia) is a risk factor for mortality in patients with chronic heart failure.<sup>3</sup> The precise risk to LVAD patients is not known. However, there are numerous anecdotes of patients who have improved circulation yet who fail to thrive, implying that nutrition is a factor in LVAD patient outcomes.

Therefore, it is prudent to periodically assess a patient's nutritional status and to provide supplemental nutrition (preferably with enteral feeding) as necessary.<sup>2</sup>

#### 8 Controlling Blood Sugar

The serum glucose of diabetic patients should be aggressively managed.

Maintaining a serum glucose level in the range of 100-150mg/dL will decrease the risk of wound infection.<sup>2</sup> **NOTE:** For some patients, adequate serum glucose control may require insulin infusion.

#### 9 Controlling Environmental Factors

Emphasize the importance of cleanliness in patient's home prior to discharge and insure that cleanliness of home environment is verified as part of the pre-discharge planning process.

#### 10 Responding to Pump Pocket Infections

Culture for *Staphylococcus* in patients who have had devices for more than 2 weeks who develop a fever (even low grade) or who complain of not feeling

## Infection Control

### POST-OPERATIVE CONSIDERATIONS continued

well. If the initial culture is positive for *Staphylococcus aureus*, then any indwelling lines should be cultured and removed. If the infection persists despite systemic antibiotics therapy, obtain an ultrasound of the pocket.

Most pockets have some fluid, so this test is of limited benefit, except to exclude potential infection sites. *For example, if there is very little fluid in the pump pocket, pocket infection may be ruled out and you may be prompted to look harder for other infection sites.* However, if there is copious fluid (especially if infection is still present despite antibiotics), exploration of the pocket for cause should be undertaken.

At the time of pocket exploration, polymethylmethacrylate (PMMA) beads that contain powdered antibiotics (eg, vancomycin and tobramycin) may be left in the pocket. However, check serum levels of the antibiotics to ensure that toxic levels do not occur.<sup>2</sup> **NOTE:** Prefabricated PMMA beads are not commercially available in the US. In lieu of PMMA beads, some surgeons use chloramphenicol; although any powdered antibiotic that is relatively heat-stable may be considered.

In the presence of driveline or pump pocket infection, initiate antibiotics tailored to Gram-negative stain once susceptibility testing results are available. The duration of therapy and suppression

## Infection Control

### POST-OPERATIVE CONSIDERATIONS continued

depends upon the extent of the infection. Consult with an infectious disease specialist to optimize antibiotic therapy as necessary.<sup>6</sup>

#### 11 Miscellaneous Medical Factors

- a Manage immune suppression.
- b Intervene promptly in response to symptoms of exit site trauma or evidence of wound deterioration.
  - Wound deterioration is usually caused by excess moisture at the site. Treat by increasing the frequency of dressing changes (BID or TID) for at least 5 days, or until excess moisture problems are resolved.
  - Start antibiotics, such as cephalexin (Keflex™), levofloxacin (Levaquin™), or cefuroxime (Ceftin™).
  - Change wound irrigation solution. *For example, if using vancomycin, switch to 2% chlorhexidine gluconate in 1 liter sterile NS; or, if using chlorhexidine gluconate, switch to 1gm vancomycin in 1 liter of sterile NS.*
- c Examine the patient periodically for signs of fungal infection (e.g., thrush or vaginitis) before the infection becomes systemic. **NOTE:** The Columbia Hospital group of the REMATCH trial correlated the presences of implanted LVADs with a

## Infection Control

### POST-OPERATIVE CONSIDERATIONS continued

higher incidence of fungal infections (as compared with patients awaiting heart transplantation without LVAD support).<sup>2</sup>

- d Administer prophylactic antibiotics as recommended by the American Heart Association (AHA) to help prevent bacterial endocarditis. **NOTE:** LVAD patients are considered at increased risk for infection associated with secondary bacteremias that follow certain diagnostic procedures (eg, colonoscopy) or therapeutic procedures (eg, dental extraction). Therefore, to minimize this risk, LVAD patients should receive prophylactic antibiotics.<sup>8</sup>



# Appendix A

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## Exit Site Dressing Change Guidelines

### **Objective**

To reduce the incidence of infections through routine, sterile dressing changes and regular wound inspections.

### **Sterility**

Aseptic technique must be used at all times for exit site care, regardless of when, where, or by whom the care is provided. All personnel handling the exit site must follow good hand-washing technique (or use Septisol<sup>®</sup> foam) before entering the patient's room to administer exit site care.

### **Dressing Changes**

The person changing the dressing must wear sterile gloves, surgical cap, and mask for every dressing change. Initially, dressing changes are performed by the hospital nursing staff. When the patient is discharged home, dressing changes become the responsibility of the patient and/or patient's caregiver. Patients or caregivers must wear a surgical cap, mask, and sterile gloves during each dressing change. Prior to assuming this responsibility, the patient and caregiver should be trained in proper dressing change technique. The patient and caregiver must be able to demonstrate proper dressing change technique as a condition of patient discharge.

*continued*

# Appendix A

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## Exit Site Dressing Change Guidelines

### **Frequency of Dressing Changes**

- **Immediately Post-Op.** Percutaneous tube exit site dressing should be changed routinely, starting with 24-48 hours post-op (or sooner if dressing is saturated), and once or twice daily thereafter (or more frequently if dressing becomes saturated with drainage).
- **30 days Post-Op** (or until drainage stops). The frequency of dressing changes may be reduced to once daily if all drainage has stopped and if there is no evidence of infection and if good tissue growth is evident.
- **Post Exit Site Trauma, Irritation, or Drainage.** Following trauma to the exit site that results in disruption of tissue ingrowth or in new drainage, increase dressing changes to BID for at least 5 days, or until exit site problems are resolved.

### **Monitoring the Exit Site & Perc Tube**

The exit site should be inspected carefully, in an aseptic fashion, at every dressing change. Observe site for signs of breakdown of the tissue-perc tube junction and for drainage or signs of infection.

Record appearance of site in the nursing notes section of the patient's medical records (if recorded by a nurse) or in the patient's log

*continued*

## Appendix A

### Exit Site Dressing Change Guidelines

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book (if performed by the patient's caregiver).

**NOTE:** Even after the patient's caretaker assumes responsibility for dressing changes and site inspection, the exit site should be routinely inspected by medical staff (e.g., during routine office visits).

At each dressing change, carefully inspect the percutaneous tube for proper positioning. Also monitor for adequate immobilization and stress on the percutaneous tube that may cause tissue-perc tube separation.

Take cultures of the exit site exudate only if purulent or copious drainage occurs, especially in the presence of increased inflammation and erythema. **NOTE:** When deep infection along the percutaneous tube line is suspected, samples are best obtained by aspirating deeply (approximately 3-5cm) using a sterile plastic IV catheter.

If samples from deeper sites cannot be obtained, wipe exit site with alcohol, allow it to dry, and then sample expressed fluid. Repeating cultures to identify recurrent species may improve confidence that an infecting pathogen has been identified.

Take blood cultures only if the patient manifests evidence of systemic infection or before antibiotics for exit site or percutaneous tube infection are started.

# Appendix A

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## Exit Site Dressing Change Guidelines

### **Performing Aseptic Dressing Change**

#### **Necessary Supplies**

LVAD Kit, containing a one-month supply of the following:

- Cap and Mask
- Clean gown (optional)
- Stabilization belt or binder for immobilizing percutaneous tube
- Sterile cotton swabs
- Irrigation solution (eg, vancomycin 1gm in 1000cc NS). If patient is allergic or resistant to vancomycin, use alternatives (eg, NS + ½-strength H<sub>2</sub>O<sub>2</sub>; or NS + 10% povidone-iodine or NS + chlorhexidine gluconate)
- 10-30cc syringe
- 4"X4" gauze sponges and 4"X4" drain sponges
- Small sterile container (specimen cup)

#### **Procedure**

- 1 Wash hands and arms thoroughly with water and antiseptic soap.
- 2 Put on mask, cap, and clean exam gloves.
- 3 Put mask on patient, unless patient is on a respirator.
- 4 Set up sterile field, insuring aseptic technique with all packages.
- 5 Open specimen cup; pour in irrigation solution.

*continued*

# Appendix A

## Exit Site Dressing Change Guidelines

- 6 Unfasten patient's Stabilization Belt or percutaneous tube binder. **NOTE:** Stabilization Belt may be left in place, under patient, for later re-use, unless it is soiled. If the belt is soiled, replace it with clean one (see *Cleaning the Stabilization Belt*, later in this section).
- 7 Place clean towels (or absorbent pads) around periphery of exit site to absorb excess irrigation solution.
- 8 Remove and discard old dressing.
- 9 Examine exit site for signs of infection, such as yellow/green or thick drainage, redness, or tenderness.
- 10 Remove examination gloves and put on sterile gloves, insuring aseptic technique.
- 11 Clean and irrigate exit site with irrigation solution:
  - a Use cotton swabs and 4" X 4" sponges dipped in irrigation solution to remove old deposits and to gently clean edges of the wound. **NOTE:** Avoid excess probing that might break connection between the skin and percutaneous tube.
  - b Gently irrigate site with approximately 20cc irrigation solution.

*continued*

## Appendix A

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### Exit Site Dressing Change Guidelines

- c Gently pat dry with 4" X 4" gauze sponges.
- 12 Re-dress exit site by applying 4" X 4" drain sponges around the percutaneous tube, alternating the direction of the perforated edges to cover and protect the entire exit site with a close fit. **NOTE:** Usually 2-3 sponges are appropriate, unless the amount of drainage is excessive.
  - 13 Re-apply Stabilization Belt and secure the dressing. **NOTE:** Insure that the Stabilization Belt does NOT allow the percutaneous tube to be pulled excessively toward one side or another, or away from the skin edge.
  - 14 Dispose of all materials, except for the bottle of irrigation solution, which is reusable.

## Appendix B

### Perc Tube Immobilization Guidelines

**Objective** To reduce percutaneous tube movement and resulting tissue trauma, which contributes to infection.

#### Putting the Belt on the Patient

- 1 Wrap the *lower* strap of the Stabilization Belt around the patient's waist *below* the percutaneous tube.
- 2 Wrap the *upper* strap around the waist *above* the percutaneous tube. **NOTE:** The percutaneous tube should exit between the two straps (**Figure 3**).



Figure 3

## Appendix B

### Perc Tube Immobilization Guidelines

#### Securing the Perc Tube using Lead Locks

- 1 Apply a lead lock to the belt on the patient's right side. **NOTE:** The wide end of the lead lock should be pointing to the patient's left (**Figure 4**).



Figure 4

- 2 Gently place the percutaneous tube over the center of the lead lock, as shown in **Figure 5**.
- 3 Pick up the narrow end of the lead lock tab; wrap it around the percutaneous tube and insert it through the square slot of the lead lock (**Figure 5**).
- 4 Pull the tab tight and tuck it securely under the percutaneous tube (**Figure 5**).
- 5 Attach the tab to the belt.

*continued*

## Appendix B

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### Perc Tube Immobilization Guidelines



Figure 5

- 6 Readjust the lead lock tab(s) as necessary.  
**NOTE:** Lead locks are made of hook and loop material (similar to Velcro®) and will adhere anywhere along the front of the belt. This allows the belt to be customized for different patients and exit site scenarios. Use as many lead locks as necessary to fasten the percutaneous tube to the Stabilization Belt.

## Appendix B

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### Perc Tube Immobilization Guidelines

#### ***Cleaning the Stabilization Belt***

- Hand wash in cold water with non-bleach detergent. **CAUTION:** Exposure to bleach may cause premature breakdown of belt material. Do NOT expose belt to bleach or to products containing bleach.
- Line dry only. **CAUTION:** Do NOT place belt in clothes dryer to dry. Drying at high temperatures may cause premature break down of belt material.

#### ***Storing the Stabilization Belt***

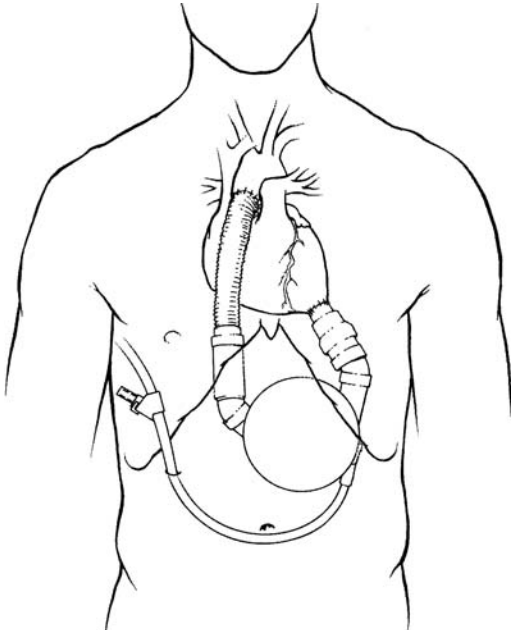
When not in use, store the Stabilization Belt out of direct sunlight.

**NOTE:** See the *Stabilization Belt Instructions for Use* (doc. #1000579) for complete user information, including indications for use, contraindications, warnings, and precautions.

## Figures

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Figure A Orientation of percutaneous tube

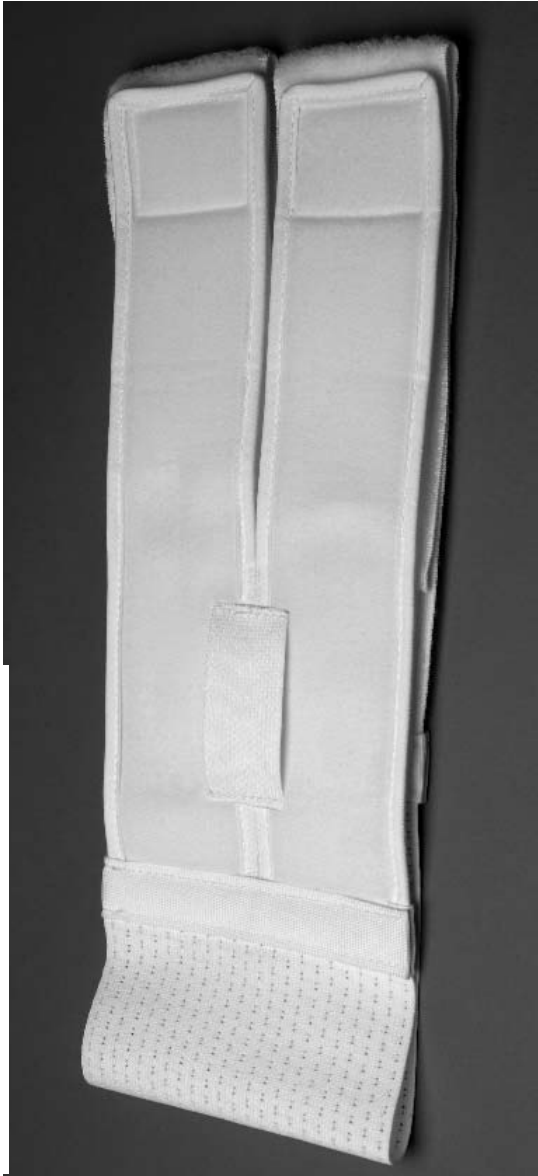


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## Figures

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Figure B Thoratec Stabilization Belt



## Figures

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Figure C Stabilization belt in use



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## Notes

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## Notes