

## Gaining Proficiency In Emergency Procedures

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Improving patient outcome and comfort can often be just one procedure away. Unfortunately, many clinicians deprive their patients of these therapeutic aids for fear of complications. As with any skill, practice and preparation are the only way to master these procedures. Below are suggested approaches to walk you through these vital procedures, helping you on your way to achieve gold!

### Nasogastric Catheter Placement

#### *Indications:*

- Enteral support following prolonged (or expected) anorexia (3-5+ days)
- Gastric decompression in patients at risk of aspiration pneumonia
- Gastric decompression in patients with perioperative or illness related ileus
- Fluid delivery in patients with high risk of pulmonary edema/congestive heart failure

Material Needed
<ul style="list-style-type: none"><li>• Proparacaine (Alcaine™) topical anesthetic (ophthalmic local anesthetic)</li><li>• 2% lidocaine aqueous lube or sterile lubrication</li><li>• MILA™ weighted feeding tube of appropriate size (5-6 Fr cats/small dogs, dogs &gt; 10kg 8-10 Fr)</li><li>• 20 g needle &amp; 2-0 suture material or similar sterile suture (alternatively tissue glue or skin staples)</li><li>• 3-5 cc syringe with 0.9% NaCl</li><li>• E-collar</li></ul>

#### Placement:

- Instill one drop of proparacaine into each nostril (in case tube placement in one is difficult).
- Pre-measure feeding tube and mark it with a sharpie at the last rib for a NG tube.
- Lubricate tube with 2% lidocaine jelly.
- Holding the muzzle firmly with your non dominant hand, push the nose slightly upwards, while gently feeding the catheter in a *ventromedial direction* to ensure placement into the ventral nasal meatus. Once in the oropharynx, the neck is flexed to facilitate entry into the esophagus. Continue to advance to the pre-measured mark. Do not push if any resistance is noted.
- Proper catheter placement must be confirmed prior to securing in place or enteral nutrient delivery. Catheter placement should be confirmed by aspirating from the tube and ensuring either negative pressure or gastric contents is observed. If only negative pressure is obtained, then 3-5mls of sterile 0.9% NaCl should be administered into the catheter while observing if the animal has a cough reflex which would indicate placement in the airway.

- Using a 20g needle pierce the skin near the lateral aspect of the nasal planum/hair junction. Pass the suture material through the needle and tie a knot to rest against the skin. Place 4-6 throws (2-3 square knots) around the catheter to secure it in place. Without occluding the catheter, ensure the knots are tightly secured around the tube.
- Repeat the above step to secure the catheter to the bridge of the muzzle or between the eyes and again on the top of the head. Alternatively, either a small amount of tissue glue or skin staples can be used to secure catheter in place
- Once secured in place, a lateral thoracic radiograph must be obtained to guarantee proper placement prior to any fluid or nutritional supplementation.
- Make note of the final position (sharpie mark or measurements) of the catheter at the exit of the nostril to allow monitoring for tube migration.
- Place Elizabethan collar on animal to keep patient from removing tube. If on CRI of nutrition through tube secure line to a collar to prevent pulling on suture/staples.

**Post Placement Care:**

- Record catheter size, date of placement and final distance/measurement on the reverse side of the ICU flowsheet.
- Confirm catheter position at least twice daily (once/shift) and ensure catheter does not slip through sutures
- Ensure patient is comfortable-sedate or instill additional proparacaine drops into nostril as needed.
- Clean any nasal discharge with a damp gauze as needed
- Fill no more than an 8hr volume of liquid diet at any one time. Replace buretrol and lines every 24hrs to reduce risk of contamination/bacterial overgrowth

**Esophagostomy Tube Placement**

*Indications:*

- Enteral support for prolonged anorexia
- Enteral support following orofacial surgery or trauma
- Fluid and enteral support in patients with kidney injury

Material Needed
<ul style="list-style-type: none"> <li>• MILA™ Esophagostomy tube of appropriate size (12-14 Fr-cats/small dogs, dogs &gt; 10kg 18, 20 or 30 Fr)</li> <li>• Clippers</li> <li>• 3-step surgical scrub</li> <li>• Opioid analgesia (eg. hydromorphone)</li> <li>• Induction agent</li> <li>• Endotracheal tube</li> <li>• Anesthetic machine or alternative O<sub>2</sub> source</li> <li>• Doppler monitor</li> <li>• Scalpel blade</li> </ul>

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| <ul style="list-style-type: none"> <li>• Clippers and surgical prep solutions</li> <li>• Curved hemostats</li> <li>• Forceps and needle drivers</li> <li>• 2-0 non-absorbable suture material</li> <li>• Sterile lubricant</li> <li>• Bandage material</li> </ul> |
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*Placement:*

- Premedicate, induce and intubate the patient in preparation for procedure
- Place in right lateral recumbency. Provide oxygen support
- Attach doppler for audible continuous monitoring
- Clip and aseptically prepare the left cervical area from the angle of the jaw to the thoracic inlet
- Premeasure the Etube from insertion site to approx 9<sup>th</sup> ICS
- Pass the curved hemostats through the oropharynx into the esophagus. Push upwards to isolate the esophagus from the jugular vein (ventral to esophagus)
- While maintaining upwards pressure make a small incision through the skin mid-cervical down to the esophagus
- Grasp with the hemostats the lubricated distal end of the Etube and pull it out of the mouth. Release the Etube
- Fold the distal end back into the oropharynx and down the esophagus using your index finger
- Carefully pull the proximal end of the Etube while pushing the distal end of the Etube into the esophagus until the proximal end of the Etube flips cranially (runs forward along back of the ear). Stop at the premeasure mark on the Etube
- Place a purse-string suture around the Etube insertion site
- Take a lateral thoracic radiograph to ensure the distal end of the Etube is caudal to the heart base in the distal esophagus
- Tie-off the purse-string and complete a finger-trap suture along the Etube to secure it in place
- Apply a soft padded bandage over the insertion site and around the neck. Attach the proximal end of the Etube to the bandage

**Thoracocentesis**

*Indications:*

- Drainage of fluid or air within pleural space

Material Needed
<ul style="list-style-type: none"> <li>• Clippers</li> <li>• 3-step surgical scrub</li> <li>• MILA™ 1212F over the needle catheter or MILA™ Teflon over-the needle catheters</li> <li>• MILA™ automatic 3-way/centesis adaptor</li> <li>• 2% lidocaine for local block +/- sedation</li> </ul>

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| <ul style="list-style-type: none"> <li>• Scalpel blade</li> <li>• 35-60 mL syringe</li> <li>• Extension set</li> <li>• Oxygen supplementation (flow by)</li> <li>• Sterile gloves</li> <li>• Tubes for collection of fluid &amp; sample submission (if pleural effusion)</li> </ul> |
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*Placement:*

- Place patient in sternal recumbency and provide flow-by oxygen and sedation if necessary
- Clip and aseptically prepare from the 6<sup>th</sup> to 10<sup>th</sup> rib. If air is present, shave a more dorsal site (upper 2/3<sup>rd</sup>), and a more ventral site (dorsal to the costochondral junction) if fluid is present
- A local block can be administered at the insertion site. Infuse down to the pleural lining on the cranial aspect of the rib to avoid the neurovascular bundle
- Wash your hands
- Open sterile gloves and prior to gloving, open and place MILA™ catheter, syringe, extension set and MILA™ automatic 3-way/centesis adaptor onto your sterile surface. Glove up and assemble materials aseptically
- Palpate the cranial aspect of the 7<sup>th</sup> or 8<sup>th</sup> rib at the level of your insertion point. Slowly insert the needle with the bevel of the needle or catheter facing downwards. Once the pleural space is penetrated direct your needle downwards, parallel to the chest wall
- Gently aspirate (fluid or air) while stabilizing the needle until negative pressure is reached. Re-direction of the needle may be required to empty other pockets of air or fluid present in the chest
- Submit fluid for culture and cytology as directed

*Post Procedure Care:*

- Continuously monitor patient for acute worsening secondary to iatrogenic pneumothorax or reexpansion pulmonary edema

**Thoracostomy Tube Placement**

*Indications:*

- Continuous or repeated drainage of fluid or air within pleural space

Material Needed
<ul style="list-style-type: none"> <li>• Clippers</li> <li>• 3-step surgical scrub</li> <li>• MILA™ Chest tube (eg. Guidewire, Silicone or with trocar)</li> <li>• MILA™ automatic 3-way/centesis adaptor</li> <li>• 2% lidocaine for local block</li> <li>• Sterile syringe and needle</li> <li>• Scalpel blade, mayo scissors and curve hemostats</li> </ul>

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| <ul style="list-style-type: none"> <li>• 60 cc syringe</li> <li>• Extension set</li> <li>• Sterile drape(s)</li> </ul> |
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*Placement:*

- Place patient in lateral recumbency and provide flow-by oxygen and sedation if necessary. General anesthesia required for blunt dissection or silicone tubes.
- Clip and aseptically prepare from the 4<sup>th</sup> to 12<sup>th</sup> rib to ensure a strict aseptic technique is maintained during placement
- Wash your hands
- Open sterile gloves and prior to gloving, open and place appropriate MILA™ chest tube, syringe, extension set and MILA™ automatic 3-way/centesis adaptor onto your sterile surface. Glove up and assemble materials aseptically
- Using either an eye drape or 4 quadrant drapes isolate a sterile field.
- Palpate the cranial aspect of the 7<sup>th</sup> or 8<sup>th</sup> rib near the upper 1/3 quadrant. Perform a local block at the desired insertion site. Infuse down to the pleural lining on the cranial aspect of the rib to avoid the neurovascular bundle
- MILA™ guidewire insertion:
  - Slowly insert the over-the needle catheter into the pleural space
  - Remove the stylet and insert the guidewire into the pleural space
  - Without removing the guidewire slide the catheter off the guidewire
  - Slide the 14 g chest tube over the guidewire into the pleural space
  - Once fully inserted remove the guidewire and cap with oneway valve adapter to prevent further air entry
  - Aspirate fluid or air from pleural space prior to securing the catheter if the patient is unstable
  - Secure the catheter to the skin using both suture wings provided
  - Cover the insertion site with a sterile biooclusive dressing (eg. OpSite™)
- MILA™ silicone or trocar insertion:
  - Have an assistant pull the skin forward (fluid) or backwards (air) two ICS
  - Make a small stab incision through the skin at the insertion site
  - Bluntly dissect down to the pleural space with a pair of Mayo scissors
  - Grasp the end of the silicone tube with the curved hemostats and penetrate the pleural space. Once into the pleural space feed the silicone catheter into the desired location
  - Silicone tubes with a trocar can be inserted into the pleural space after the stab incision is made
  - Release the skin to create a tunnel to reduce fluid and air leakage
  - Aspirate fluid or air from pleural space prior to securing the catheter if the patient is unstable
  - Secure the catheter to the skin using a purse-string and finger trap method. Blindly place a 2<sup>nd</sup> suture around the tube closer to the insertion site into the chest
  - Cover the insertion site with a sterile biooclusive dressing (eg. OpSite™)

- Gently aspirate (fluid or air) again once fully secured to fully evacuate the pleural space
- Submit fluid for culture and cytology as directed

*Post Procedure Care:*

- Continuously monitor patient for acute worsening secondary to iatrogenic pneumothorax or hemothorax

**Pericardiocentesis**

*Indications:*

- Drainage of pericardial fluid

Material Needed
<ul style="list-style-type: none"> <li>• Clippers</li> <li>• 3-step surgical scrub</li> <li>• MILA™ 1212F over the needle catheter or MILA™ Teflon over-the needle catheters</li> <li>• MILA™ automatic 3-way/centesis adaptor</li> <li>• 2% lidocaine for local block +/- sedation</li> <li>• Scalpel blade</li> <li>• 35-60 mL syringe</li> <li>• Extension set</li> <li>• Sterile gloves</li> <li>• EKG monitor</li> </ul>

*Procedure:*

- Clip and aseptically prepare the ventral aspect of the right hemithorax from the 3<sup>d</sup> to 8<sup>th</sup> rib.
- Attach an EKG to allow continuous monitoring
- Perform a local block at the level of CCJ near 4-5<sup>th</sup> ICS (or u/s guided location) over right hemithorax. Infuse down to the pleural lining on the cranial aspect of the rib to avoid the neurovascular bundle
- Wash your hands
- Open sterile gloves and prior to gloving, open and place MILA™ catheter, syringe, extension set and MILA™ automatic 3-way/centesis adaptor onto your sterile surface. Glove up and assemble materials aseptically
- Palpate the cranial aspect of the rib at your insertion point. Slowly insert the needle until the pleural space and pericardial space is penetrated. Once the pericardial space is penetrated remove the stylet (if applicable) and attach the extension set and MILA™ automatic 3-way centesis adaptor.
- Gently aspirate and monitor the patient for presence of VPCs/Ventricular tachyarrhythmia due to myocardial irritation. Ensure hemorrhagic fluid is not-clotting indicating penetration into ventricular lumen

*Post Procedure Care:*

- Continuously monitor patient for ongoing hemorrhage and fluid reaccumulation and presence of ventricular arrhythmia

## **Indwelling Urinary Catheter Placement**

*Indications:*

- Accurate monitoring of urine output in patients with kidney injury
- Avoid urine scalding in recumbent or non-ambulatory patients

### Canine Male Urinary Catheters

Equipment Needed
<ul style="list-style-type: none"><li>• Chlorhexidine soap</li><li>• MILA™ 3.5 to 5 Fr small animal catheter or 6 to 12 Fr foley catheter</li><li>• Sterile lubricant</li><li>• Sterile gloves</li><li>• MILA™ Urine collection bag</li><li>• Connection adapter</li><li>• Syringe with sterile water (if Foley catheter used)</li><li>• Suture material &amp; 20 gauge needle</li><li>• Tape to secure catheter to leg/abdomen</li><li>• +/- sedation</li></ul>

*Placement:*

- Hold the dog in lateral recumbency. Provide sedation is needed
- Clean prepuce tip with chlorhexidine scrub +/- clip hair if in the way
- Have an assistant exteriorize the penis from the sheath and clean the tip with chlorhexidine scrub
- Place sterile gloves and remove the catheter from the sterile sleeve
- Premeasure and mark (with permanent marker) the urinary catheter to an estimated point midway into the bladder. If preexisting marks are already present note the estimated length.
- Lubricate the catheter tip well with sterile lubricant
- Feed the catheter in a sterile fashion up the urethra to the premeasured point or 2-3 cm past initial urine flow
- Attach urinary catheter to a sterile closed collection system
- Pierce the prepuce with a 20 gauge needle and tie in the catheter with a Chinese finger trap suture pattern. If a Foley catheter is used then inflate the “balloon” with the appropriate amount of sterile water noted on the catheter. Do not over fill. Slowly retract the catheter until it lodges into the bladder trigone
- Secure the catheter to the patient with tape, ideally around the abdomen or leg. Avoid attaching to the tail as this will increase the risk of fecal contamination. Ensure it will not pull when the patient moves

- Hang the collection bag or cover the collection bag and insertion point to avoid placing it directly on the floor. Bag must remain below the patient to allow gravity flow.

### Canine Female Urinary Catheters

Equipment Needed
<ul style="list-style-type: none"> <li>• Chlorhexidine soap</li> <li>• MILA™ 6 to 12 Fr foley catheter</li> <li>• Sterile lubricant</li> <li>• Sterile gloves or washed hands</li> <li>• Sterile Lidocaine lubricant</li> <li>• MILA™ Urine collection bag</li> <li>• Syringe with sterile water (to inflate balloon)</li> <li>• Tape to secure catheter to leg/abdomen</li> <li>• +/- sedation</li> </ul>

#### *Placement:*

- Hold the dog in sternal or lateral recumbency with its hindend off the edge of a table or cage with the tail elevated
  - Clip the surrounding hair (if necessary) and then using warm water & chlorhexidine scrub, clean the perineal & vulvar area
  - Instill a generous amount of sterile lidocaine lubricant into the vestibule of the vagina
  - Wash your hands thoroughly with antibacterial soap. Rinse well
  - Lather your hands again well, but do NOT rinse
- (as an alternative sterile gloves can be worn)
- Apply a generous amount of sterile lubricant to the catheter tip and index finger of the non-dominant hand
  - Slide your index finger into the vulva/vestibulovaginal junction and advance dorsally until you palpate the urethral opening cranial/ventral to the vaginal opening and dorsal to the ischial arch.
  - With your dominant hand guide the Foley catheter under your index finger into the urethral orifice
  - Insert completely into the bladder. There should be no resistance when advancing
  - Inflate the “balloon” with the appropriate amount of sterile water noted on the catheter. Do not over fill
  - Slowly retract the catheter until it lodges into the bladder trigone
  - Attach the urinary collection bag in a sterile fashion
  - Secure the catheter to the patient with tape, ideally around the abdomen or leg. Avoid attaching to the tail as this will increase the risk of fecal contamination. Ensure it will not pull when the patient moves
  - Hang the collection bag or cover the collection bag and insertion point to avoid placing it directly on the floor. Bag must remain below the patient to allow gravity flow.



## Feline Female Urinary Catheter

Equipment Needed
<ul style="list-style-type: none"><li>• Chlorhexidine soap</li><li>• MILA™ Tomcat catheters (3.5 or 5 Fr +/- stylet)</li><li>• Sterile lubricant</li><li>• Sterile gloves</li><li>• Suture material &amp; 20 gauge needle</li><li>• MILA™ urine collection bag</li><li>• Tape to secure catheter to leg/abdomen</li><li>• +/- sedation</li></ul>

### *Placement:*

- Place the cat in sternal or lateral recumbency with the tail to one side
- Clean the perineal and vulvar area with chlorhexidine scrub
- Place sterile gloves and remove the catheter from the sterile sleeve
- Premeasure and mark (with permanent marker) the urinary catheter to an estimated point midway into the bladder. If preexisting marks are already present note the estimated length
- Lubricate the catheter tip well with sterile lubricant
- Feed the catheter in a sterile fashion blindly into the urethra to the premeasured point or 2-3 cm past initial urine flow. No resistance should be felt if you are in the urethra. Small readjustment should be made until the urethra is entered. Staying midline will increase your chance of entering the urethra
- Attach urinary catheter to a sterile closed collection system. A syringe can be used to initially empty the urinary bladder
- Pierce either side of the vaginal labia with a 20 gauge needle and tie in the catheter with 4 square knots.
- Secure the catheter to the patient with tape. Ideally around the abdomen or leg. Avoid attaching to the tail as this will increase the risk of fecal contamination. Ensure it will not pull when the patient moves
- Hang the collection bag or cover the collection bag and insertion point to avoid placing it directly on the floor. Bag must remain below the patient to allow gravity flow

## Feline Male Urinary Catheter

Equipment Needed for Feline Male Urinary Catheter Placement
<ul style="list-style-type: none"><li>• Chlorhexidine soap</li><li>• MILA™ Tomcat catheters (3.5 or 5 Fr +/- stylet)</li><li>• Sterile lubricant</li><li>• Sterile gloves</li><li>• Suture material &amp; 20 gauge needle</li><li>• MILA™ urine collection bag</li><li>• Tape to secure catheter to leg/abdomen</li></ul>

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| <ul style="list-style-type: none"><li>• +/- sedation</li></ul> |
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*Placement:*

- Place the cat in dorsal or lateral recumbency with the tail to one side
- Clean the perineal area with chlorhexidine scrub
- Place sterile gloves and remove the catheter from the sterile sleeve
- Premeasure and mark (with permanent marker) the urinary catheter to an estimated point midway into the bladder. If preexisting marks are already present note the estimated length
- Lubricate the catheter tip well with sterile lubricant
- With your non-dominant hand, exteriorize the penis from the prepuce sheath. Extend the penis caudodorsally to straighten out the urethra which will facilitate catheter placement
- Feed the catheter in a sterile fashion up the urethra to the premeasured point or 2-3 cm past initial urine flow. Mild resistance may be felt at the level of the ischial arch as you pass the curvature.
- Attach urinary catheter to a sterile closed collection system. A syringe can be used to initially empty the urinary bladder.
- Pierce the prepuce with a 20 gauge needle and tie in the catheter with a Chinese finger trap suture pattern. If a Foley catheter is used then inflate the “bulb” with the appropriate amount of sterile water. Do not over fill. Slowly retract the catheter until it lodges into the bladder trigone
- Secure the catheter to the patient with tape, ideally around the abdomen or leg. Avoid attaching to the tail as this will increase the risk of fecal contamination. Ensure it will not pull when the patient moves
- Hang the collection bag or cover the collection bag and insertion point to avoid placing it directly on the floor. Bag must remain below the patient to allow gravity flow

*Post Placement Care:*

- All urine collection bags should be kept directly off the floor to reduce the risk of contamination. Hang the collection bag on the cage door or cover the collection bag and insertion point. Bag must remain below the patient to allow gravity flow
- When urine is drained from the bag, gloves (non sterile) must be worn and the extension tubing to collection bag connection swabbed with alcohol each time
- Urine is drained into the urine collection dish and measured with a syringe. Use caution to avoid touching the edge of the collection bag to the urine collection dish
- Indwelling catheters should be swabbed every 8 hours to reduce the risk of bacterial contamination

**Jackson Pratt Drain Placement**

*Indications:*

- Active drainage of contaminated abdominal cavity

- Active drainage of contaminated wound
- Decrease dead space and seroma formation (eg. wounds, mass removal)

Material Needed
<ul style="list-style-type: none"> <li>• MILA™ Jackson Pratt Drain (Size 4.5, 7,10 or 13 mm)</li> <li>• Suction bulb - grenade</li> <li>• Sterile non-absorbable suture (3-0 or 2-0)</li> <li>• Sterile curved hemostat</li> <li>• Scalpel blade</li> </ul>

*Placement (peritoneal cavity):*

- Select the appropriate size MILA™ Jackson Pratt Drain for the size of the patient
- Position the perforated end of the drain towards the most contaminated area
- Exit the proximal end of the drain out the lateral body wall through a stab incision made overlying the curved hemostat
- Place a purse-string suture around the exit site followed by a finger trap pattern up the drain
- Attach the suction bulb. Charge the grenade by squeezing the bulb and capping the port

*Placement (wound or mass removal):*

- Select the appropriate size MILA™ Jackson Pratt Drain for the size of the wound
- Position the perforated end of the drain into the most contaminated area or beneath the subcutaneous tissue to decrease dead space
- Close the overlying subcutaneous tissue and skin layer to form a tight seal
- Exit the proximal end of the drain outside of the incision through a stab incision made overlying the curved hemostat
- Place a purse-string suture around the exit site followed by a finger trap pattern up the drain
- Attach the suction bulb. Charge the grenade by squeezing the bulb and capping the port

*Post placement care & use:*

- Apply a sterile bioclusive dressing (eg. OpSite) over the insertion site
- Empty suction bulb every 4-6 hours as needed to maintain negative suction
- Measure drain volume and trend character (eg. cytology). Remove drain when volume < 5-10mL/kg/day and intracellular bacteria absent

**Diffusion Pain Catheter Placement**

*Indications:*

- Provide local anesthesia to reduce pain transmission
- Ideal for amputations, major wound repairs, mass removals or thoracic surgery

Material Needed
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- Appropriate sized MILA™ diffusion/wound catheter (DIFF 2 – 2inches of coverage; DIFF 9 -9inches of coverage)
- Sterile non-absorbable suture (3-0 or 2-0)
- Bupivacaine 0.5% solution
- Sterile syringe and needle for drug withdrawal and delivery
- Sterile biooclusive bandage (eg. OpSite™)

*Placement:*

- Select the appropriate size/lengthed MILA™ diffusion catheter for the desired area
- Place the distal end of the catheter over the deepest layer and associated nerves if possible
- Exit the catheter distally ensuring that all of the micropores are below the skin
- Tightly secure the end of the catheter to the skin by suturing down the wings provided.
- Cap the end with a PRN and apply a sterile biooclusive dressing (eg. OpSite) over the insertion site

*Bupivacaine Administration:*

- Preload the catheter prior to extubation with 1-2mg/kg
- Maintenance dosage of 0.5 to 2mg/kg can be given every 6 hours
- Typically remove the catheter after 24-48hrs of use to reduce the risk of infection
- Monitor the patient's pain level for 12-24hrs after the last dose of bupivacaine prior to removing the catheter to ensure the patient is comfortable

*Complications:*

- Leakage if improperly placed with micropores exiting skin
- Infection if sterile technique not maintained and infusion catheters maintained beyond 48-72hrs

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