RediStik®

Neonatal ECMO Cannulation Trainer

A COLLABORATION BETWEEN

SAWBONES®

AND

Texas Children's Hospital®

Video Set-Up Instructions

Visit sawbones.com for more information, including set-up videos and skills overview.

1. ABOUT THE RediStik® NEONATAL ECMO CANNULATION TRAINER

RediStik® versatile, anatomically accurate simulation training model enables surgical and perfusion teams to perform of all steps for Neonatal Extracorporeal Membrane Oxygenation (ECMO) neck cut down, cannulation, connection to ECMO circuit and de-cannulation in a neonatal patient. Progress from novice to advanced with just one model. Model features right side of the neck with palpable landmarks (mandible, clavicle), realistic tissue layers (skin, fat, sternocleidomastoid muscle), correct neurovascular positioning (internal jugular vein, carotid artery, vagal nerve), and transparent heart.

- Practice cut down and open percutaneous cannulation
- Use reperfusion set up as a teaching tool for POCUS and cannula positioning

2. PARTS OVERVIEW

RediStik® NEONATAL ECMO CANNULATION TRAINER INCLUDES:

- 1 x Duffle bag
- 1 x Heart/fittings (Spare set of fittings for carotid/IJV + 6 extra stopcocks) #1847-6
- 1 x Securement base for heart/neck (with 8" lift and IV bag holder*)
- 1 x Hard protector case for heart
- 4 x Necks, each with carotid, IJV, and vagus nerve
    - 2 x Neck, light tone (replacement part #1847)
    - 2 x Neck, dark tone (replacement part #1847-50)
- Extra set of vessels:
    - 1 x Internal jugular vein (replacement part #1847-2)
    - 1 x Carotid artery (replacement part #1847-1)
- 1 x Color tabs
- 1 x Small liquid soap
- 1 x Color Instructions

(Head/neck and vessels are for one-time use. New vessels can be placed in a previously cut neck. The heart, base for neck/heart, hard protector case for heart, and duffle bag are reusable.)

Model is not ultrasound compatible.

**IV bag not included*

3. SET-UP INSTRUCTIONS

Video Set-Up Instructions

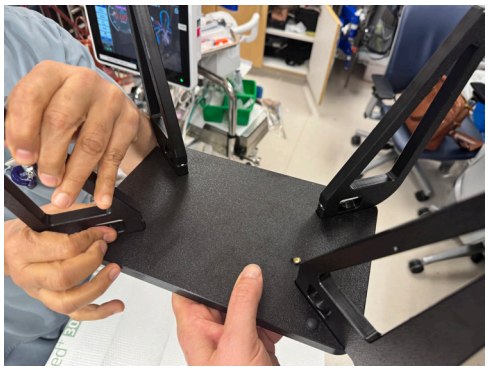
Fits 8 – 9 Fr Arterial cannula and 13-15 Fr venous cannula
Cannulation tips, recommended instruments, and supplies for simulations are refferenced further in document.

Step 1 Loosen heart from base as it makes it easier to connect vessels

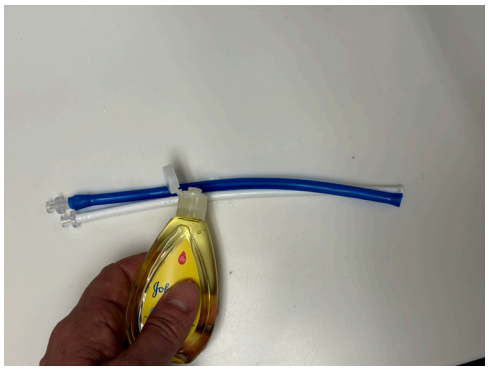
Handle heart with care. Please store in protective case when not in use.

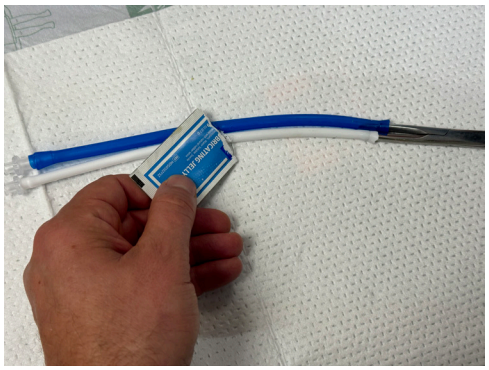
Visit sawbones.com for more information, including set-up videos and skills overview.

Step 2 Connect legs to base, keep leg with IV bag holder on bottom left side of base away from the head as this keeps IV bag out of working area

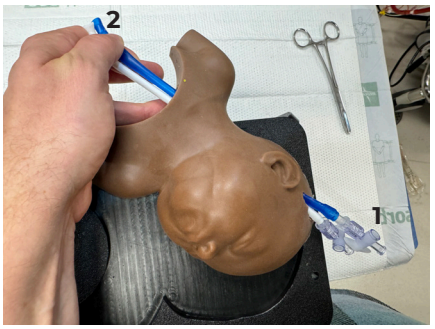


Step 3a Load vessels in neck: (Requires standard ECMO tubing clamp not included in kit)
Vessels pull through easier if use baby soap (included in kit) or lubricating jelly. Keep lubrication in middle of vessel **away from vessel ends that connect to heart**.

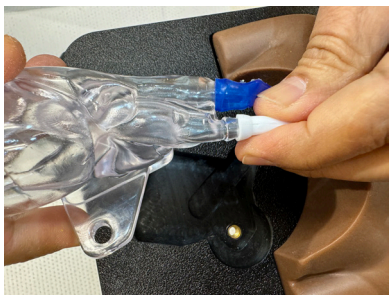




Step 3b Vessel has lure lock (1) connected on one side and other side that connects to the heart is flaired (2). Use your standard tubing clamp used for ECMO, slide clamp from bottom of neck through channel and exit top of head to grab end of flaired vessels. Pull vessel down towards heart - best to pull most of vessels through head as this gives you slack to connect to heart.



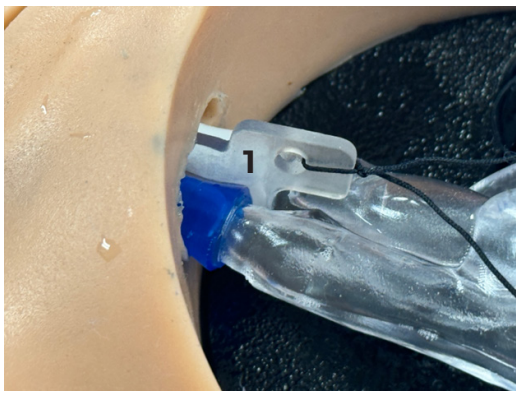
Step 4 Clean off any residual soap or lubrication on barb fitting of heart and inside the flared portion of the vessel before connecting. Alcohol wipes and a rag work well. Let dry then gently push flared end of vessel onto barb end of heart. (IJV blue/larger right side of heart, Carotid white/smaller on left side of heart).



Step 5 Once both vessels are secured to heart. Hold vessels at heart to keep from pulling off and GENTLY pull vessels from top of head to remove slack in vessel.

Step 6 Tighten heart onto base and remove remaining slack by repeating step 5.

Step 7 Insert reusable vessel spacer(1) that is attached to the black plastic base in between IJV and Carotid vessel. This is important as it prevents cannula hang ups if inserting medially towards chin. The spacer helps correct cannula angle towards middle of lumen. Include vessel spacer for open percutaneous and cut down simulations. **Reference tips on successful cannulation later in this document.**

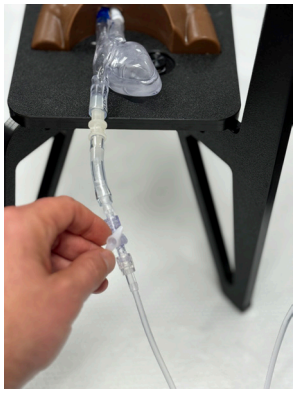


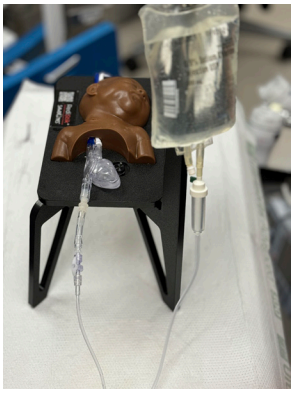
Step 8 **Priming:** Connect stop cock to lure lock end of both IJV and carotid, turn to open position

Step 9 Stop cock to bottom of heart works well to control bleed back flow during simulation

Step 10 Connect 500cc IV bag with IV extension tubing to the lure lock at the base of the heart. (IV bag and tubing not included) (tap water ok)

Step 11 Hang IV bag on built in IV bag holder





Step 12 Ensure Vessel stop cocks and IV extension tubing are open to prime heart.
To remove air from heart, tilt heart/neck/base with right side/IJV up and left side of heart down. Once air removed and water flowing out of IJV and Carotid close both stop cocks – you should see not leaking and you are ready for simulation.

4. ECMO SIMULATION INSTRUMENT AND SUPPLY LIST

SURGICAL EQUIPMENT:

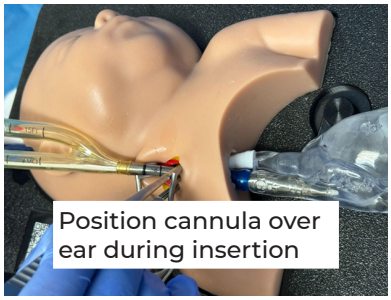
- Neonatal RediStik ECMO Cannulation Trainer fits:
    - Venous Cannula 13 -15 French
    - Arterial Cannula 8- 9 French
- Baby soap (in kit) place on cannula before inserting into trainer
- lubricating jelly (comes with each neck0
- Alcohol wipes (use to clean off heart connection before attaching new vessels)
- 11 blade scalpel - vessel
- 15 blade scalpel- skin
- Blue and Red vessel loops (general surgery places on vessel ties so easy to decannulate and not cut vessel)
- Control vessels:
    - (multiple) Silk 0 ties (do not use size 2 or higher as is too thin and can cut vessel when tie)
    - Vessel tourniquet (depends on surgeons' preference)
    - (multiple) 5-0 prolene sutures (4-0 acceptable) – tacking vessel for cannulation
    - 0 or 2-0 prolene for suturing cannula to skin
    - 3-0 prolene sutures for closing wound
    - 60ml syringe and basin for water to connect cannula to ECMO tubing
    - gowns, drapes, blue clothes and Sterile gloves
    - (1-2) Headlamps
    - 500 ml IV bag of water and extension tubing to connect to bottom of Heart/closed loop system. We prime in clear water. You can put color tabs for circuit. When go on pump heart will fill with colored fluid.
    - place chux under RediStik Base
    - Place cup under heart to catch bleed back (hole in base drains directly under heart)

SURGICAL INSTRUMENTS (AVAILABLE THROUGH SAWBONES #1847-11):

- (6) hemostat forceps (curved) 5 ½" – used to secure control silk ties
- (1) Delicate Right angle 5 ¼" length – need this to pass silk ties under cannulas
- (1)-Needle driver Castro-Viejo or Ryder TC micro needle holder 2mm serrated Jaw Length 6"
- (2) Debackey vascular forceps (pickups) length 6 ¼", jaw width 1.6mm
- (1) scissors (Metzenbaum) length 7"
- (1) Weitlaner retractor, length 4" (102mm) Sharp 32 x 3 prongs, 13mm depth x 13 mm height
- (1-2) Small right-angle retractor (CHOP) double ended 5 ½" length
- (2-4) ECMO tubing clamps for cannula and ECMO tubing

5. TIPS

TIPS TO SUCCESSFUL CANNULATION:


Position cannula over ear during insertion

- Directing the cannula properly can avoid vessel perforation and incorrect tip placement. The best method is to position the cannula over the ear while using the other hand or forceps to support/guide cannula close to insertion site advancing cannula parallel to the spine
    - Avoid holding the cannula away too far away from insertion site as this reduces the ability to direct the cannula properly. This is due to inherent cannula flexibility and holding it far away from the insertion site leads to bowing and bending.
- When holding the cannula properly over the ear, position your hand low and close to ear to attempt to get the cannula as parallel to vessel as possible (decrease the angle of incidence). Direct the cannula down the middle of vessel towards heart and parallel with spine. This prevents perforating the backwall of the vessel. It also prevents misdirection and vessel injury medially, which is a tendency for trainees.
- Gently twisting cannula during the process of insertion can be helpful.
- If resistance is encountered, back out the cannula a little and ensure your hands and cannula are positioned as recommended and gently advance (i.e. low angle of incidence and direct more laterally).
- In certain patients, directing the cannula in an extremely lateral direction may be needed. An example would be a left-sided congenital diaphragmatic hernia, where the mediastinum has been shifted dramatically to the patient's right.
- Once proper cannulation and positioning have been accomplished, place the external portion of the cannula behind the ear and suture to the skin around mastoid area.

— Mark V. Mazziotti, MD, M Ed, FACS, FAAP
Professor of Surgery and Pediatrics
Baylor College of Medicine
Program Director, Pediatric Surgery Fellowship

TIPS IF TROUBLE CANNULATING ON THE TRAINER:

- Ensure Vessel spacer is in place
- Ensure cannula has lubrication (soap or lubricating jelly)
- Ensure IV bag is open or partially open (some water flow helps with cannula insertion and prevents air entering heart once vessels cut)
- Is Venotomy/arteriotomy too small for cannula (hard to pass cannula if vessel opening is smaller than cannula)
- Is the trainee getting hung up or meeting resistance – Reference tips on successful cannulation

TIPS FOR USING RediStik® NEONATAL SIMULATOR:

- Watch set up video and read tips to successful cannulation
- Reference website for recommended instruments and supplies for simulations
- Previously cut neck can be reused by inserting new vessels.
- Fits 8 - 9 Fr Arterial and 13 and 15 fr venous cannulas
  very important to Dip cannula in soap before inserting cannulas into vessels
- Use vessel spacer
- Ensure IV Bag is open or partially open (this helps cannula insertion and also prevents water from sucking into heart.
- The base has two holes that allows a cup to be placed under the heart to collect bleeding during cannulation.
- Base secures heart and neck in correct position

Visit sawbones.com for more information, including set-up videos and skills overview.

- Option to add 8” lift to base by connecting 4 legs and hang IV bag
- If you do not use 8” lift you will need to find another way to hang IV bag
- Place chux under the trainer
- You can control flow with stopcock at bottom of heart. Increase flow by squeezing the IV bag.
  (If stop flow completely after vessel cut, some air will be sucked into heart. Once flow returns air will be pushed out of heart)
- Store dried heart in case

Handle heart with care. Please store in protective case when not in use.

6. CONTACT AND REORDER

Contact: michael@redistik.com

Order/reorder: visit sawbones.com

Sawbones Customer Service USA (servicing North America, South America, Asia and Australia):
(206) 463-5551 / info@sawbones.com, 6 am – 5 pm, PT

Sawbones Customer Service EMEA (servicing Europe, Middle East and Africa):
+46 40 650 7000 / info@sawbones.se, 8 am – 5 pm, CET