TRAINER’S MANUAL

This Trainer’s Manual is an essential component of the FAST1® education program. It contains the guidelines and information needed to effectively and efficiently teach emergency personnel how to perform adult intraosseous (IO) infusion using the FAST1.

Although the FAST1 can be quickly and easily mastered, this is a SPECIALIZED MEDICAL PROCEDURE WHICH SHOULD NOT BE ATTEMPTED BY UNTRAINED PERSONNEL.

Quality education is paramount to ensure users achieve the highest levels of competence and confidence with this lifesaving device.

Upon completion of training, students will be able to:

• Discuss the principles of intraosseous infusion
• List indications and precautions for use of the FAST1
• Demonstrate safe and effective use of the FAST1 on a manikin
• Explain and demonstrate the removal procedure for the FAST1

Pyng Medical Corp. is committed to “saving lives in seconds.” Comments and suggestions for improvement of training and use of the FAST1 are greatly appreciated.

Pyng Medical Corp.
7 - 13511 Crestwood Place
Richmond BC V6V 2E9 Canada

Phone:
604-303-7964
1-800-349-7964
info@pyng.com
FAST1 LESSON PLAN

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INTRODUCTION
(5 minutes)

1. Introduce yourself and welcome students

2. Display course objectives:
   By the end of this session you will be able to:
   • Discuss the principles of intraosseous infusion
   • List indications and precautions for use of the FAST1
   • Demonstrate safe and effective use of the FAST1 on a manikin and training device
   • Explain and demonstrate the procedure for removal of the FAST1

3. Provide overview of training:
   • Brief discussion of intraosseous infusion and FAST1 device
   • Demonstration of FAST1 (done in real-time)
   • Step-by-step instruction
   • Skill practice to mastery
   • Troubleshooting
   • Evaluation
INTRAOSSEOUS INFUSION AND FAST1
(10-15 minutes)

1. Have students recall their most recent cardiac arrest patients (codes) or most recent attempt to secure vascular access on a trauma casualty, and then ask these questions:
   • Were you able to establish a patent IV?
   • How many attempts were required?
   • How long did this process take?
   • Were chest compressions interrupted to start the IV?
   • Would your patients benefit from a faster, more reliable procedure?

Studies show it takes an average of 3-12 minutes to establish an IV with failure rates of 10-40% in the pre-hospital setting. Transport is often delayed due to the difficulty of inserting an IV in a moving vehicle.

2. Ask:
   • Who is familiar with IO?
   • Who has done IO before?
   • How does IO work?
   • Fluids and medications infused into the bone marrow are drained into the vascular/circulatory system
   • Who has performed this Sternal IO procedure on a patient?

Ask the student to share briefly about the experience.
3. FAST1

Provides vascular access comparable to a central line.

The manubrium is the most effective IO site (research shows fluids and medications reach the heart in 20-30 seconds) due to its close proximity to the heart and immediate absorption via internal mammary and azygos veins which empty directly into vena cava.

- Takes about 10 seconds to insert, less than 60 seconds for entire procedure.
- Does not interfere with other procedures and can be used concurrently (compressions, cricothyroidotomy, etc.).
- The location of the manubrium insertion site high on the torso is often protected in trauma and military situations, and allows for emergency care from a single area near the patient's head.
- Can be inserted while transporting the patient in moving vehicles.
- Fluids and medications can be administered as you would for IV such as slow drip, boluses or pressure infuser.
- Fluids and medications have infused into sternums at 30ml/min by 1 m gravity drip, 120ml/min by pressurized source and 250ml/min by syringe (infusion rates).
- Safe for patient (penetrates 6mm into the manubrium) and staff.
- Is quick to learn and easy to retain the knowledge.
4. Pass around sample Infusion Tubes
   • Note its flexibility - this allows it to move with patient’s skin which prevents it from dislodging
   • Look at steel bone portal - it will be inserted just inside marrow space
   • Approximately 14 gauge inner diameter tubing
   • Approximately 17 gauge inner diameter portal
   • See Page 3 for system infusion rates

5. Hold up FAST1 Introducer
   • Releases at a depth of 6 mm from the surface of manubrium to place in the marrow space
   • “Muscle-powered” (not battery-dependent, spring-loaded or pneumatic)
   • Actual force will vary depending on patient anatomy
INDICATIONS

- Establish a sternal intraosseous access route for fluids or drugs
- For patients 12 years of age and older (adolescents to adult)
- Use whenever vascular access is required to facilitate emergency resuscitation
- Can be left in place for up to 24 hours

PRECAUTIONS/WARNINGS

- Trauma, infection or burns at insertion site may prelude use.
- Safety with very severe osteoporosis has not been proven.
- Use in patients with recent sternotomy may prove less effective.
- The function of the device may be affected by fracture of the sternum or vascular injury which may compromise the integrity of the manubrium or its vascularization.
- Insertion in sites other than the manubrium are not approved and may result in ineffective infusion and/or serious injury to the patient.
- Reuse of the FAST1 is not recommended due to the potential of cross-contamination, which may lead to serious injury or death. The FAST1 is unlikely to function after use.
DEMONSTRATION
(Should be less than 1 minute)

1. Be sure the trainer, manikin, and other equipment are ready for a speedy, flawless procedure. Practice, practice, practice!

2. Invite someone to time it. Ask students to hold their questions until afterward.

3. Describe a real-life scenario with the manikin as your patient.
   (ex1: “Here’s a 68 year-old male in cardiac arrest – we need to give drugs– I’m going to use the FAST1.”)
   (ex2: “A 19 year-old male with bilateral lower extremity amputation is in severe pain following tourniquet application. Hemorrhage and breathing have been controlled and the airway is secure. There are no visible or palpable peripheral veins because of significant blood loss. I’m going to use the FAST1 to secure vascular access.”)

4. Perform procedure.

5. Ask if this appears to be superior to numerous IV attempts, interrupting CPR, and/or delaying transport.
1. Expose sternum and locate sternal notch.
   Tell students to place index finger in the sternal notch.
   Have them pair up and do the same with their partner.
   “This is the landmark – it’s easy to find in any patient. That’s where you put the Target Patch.”

2. Clean insertion site.
   Put Target Patch on manikin; pull off tabs #1, then #2 to adhere.
   (To preserve the manikin’s skin and avoid wasting Target Patches, permanently affix a Target Patch to the manikin and just demo this.)
   Point out that it is just below the sternal notch with Target Zone over manubrium.
3. Stand at patient’s head, hold FAST1 Introducer in dominant hand (or as comfortable).

   Twist to remove Sharps Protection Cap.

   Place Stabilizer Needles in Target Zone.

   Hold Introducer perpendicular to manubrium and PAUSE.

   “This position ensures the Infusion Tube tip will be inserted correctly.”

   Give everyone an opportunity to see what “perpendicular to the manubrium” looks like and also model “NOT” perpendicular.

4. Press down smoothly with increasing force until you hear and feel the Infusion Tube separate from the FAST1 Introducer.

   Hold this position while you ask a couple of students to describe the pressure you just used.

   Reinforce that it was smooth and steady.

   “Don’t stab, jab, or twist – just push until it releases.”
5. Pull Introducer up, off Infusion Tube.

IMMEDIATELY push Stabilizer Needles into the bright red Sharps Foam Plug (one-hand procedure. The Sharps Foam Plug must remain on the table-top, and NOT be picked up and pushed on). Discard the FAST1 following local contaminated sharps protocols.

6. Remove BLUE cap and connect Infusion Tube to friction fitting on tubing attached to Target Patch.

Remove WHITE cap from Luer fitting and connect IV tubing.

“Or you could immediately inject medications/ fluid directly into this site.”

Option: (refer to your protocols)
- Flush with fluid to clear
- Confirm placement by aspiration

7. Secure Protector Dome directly over Target Patch and press down firmly.
SKILL PRACTICE TO MASTERY
(Time variable)

Most medical providers will only need one or two trials to be totally competent and confident: however, since everyone achieves mastery of psychomotor skills at a different rate, be sure to plan for and allow plenty of time with this section.

Remember, once a medical provider feels comfortable with the FAST1, he/she is more likely to utilize it.

HANDY TEACHING HINT:

Put the students who finish first to work: they can quickly be taught to reset the trainer, turn the manikin’s disk, etc., which frees you up to work more closely with anyone who requires a bit more instruction. Reassure those who are struggling that, “I needed to practice that a few times too.”
REMOVAL

Students are taught how to remove the FAST1 because there’s a strong possibility the hospital staff may request assistance (or just reassurance) with the procedure.

1. Remove Protector Dome.

2. Turn off the source of fluid and medication. Disconnect IV and friction fitting from Infusion Tube.

3. Grasp Infusion Tube with fingers or clamp and pull perpendicular to the manubrium until entire Infusion Tube (including metal tip) emerges from patient’s chest.

   Note: Pull in one continuous motion (do not start/stop) until removed. Use the Tube to pull, not the Luer connection. It is normal for the tubing to stretch.

4. Peel off Target Patch and dress the site as per standard protocol.

5. Discard Infusion Tube and Target Patch following local contaminated sharps protocol.
FAST1 TRAINING DEVICE INSTRUCTIONS

DEPLOYMENT

1. Place Target Patch on a SimStern block (yellow foam with plastic over white foam).
   a. The clear, hard plastic represents the bone.
   b. The yellow foam represents the skin and fat tissue.
   c. The white Styrofoam represents the marrow.

2. Peel off tabs #1, then #2 and adhere to SimStern block.

3. Hold FAST1 Training Device in dominant hand (or as comfortable).

4. Remove the Sharps Protection Cap from the FAST1 Training Device.
5. Place Stabilizer Needles in the Target Zone of the Target Patch, perpendicular to the SimStern block.

6. Press down with firm and increasing force until the Introducer releases.

7. Pull the FAST1 Training Device straight back to separate the Handle from the Infusion Tube, which is now inserted into the SimStern “bone.”

8. Push the Stabilizer Needles straight into the red Sharps Foam Plug and reattach Sharps Protection Cap.

This is a one-handed procedure and the Sharps Foam Plug must remain on the table/surface and NOT be picked up.
9. Remove BLUE cap and connect the Infusion Tube to the connector tubing attached to the Patch. Remove the WHITE cap from Luer fitting and connect IV tubing.

10. Secure Protector Dome to Target Patch.

REMOVAL

11. Remove the Protector Dome.

12. Disconnect the IV line from the Connector Tube on the Target Patch and the friction fitting from the Infusion Tube.

13. To remove, grip as close to the lower end of the Infusion Tube as possible. Pull the Infusion Tube out from the SimStern “bone.”

   Note: Pull in one continuous motion (do not start/stop) until removed. Use the Tube to pull, not the Luer connection. It is normal for the tubing to stretch.
RESETTING THE FAST1 TRAINING DEVICE

RESETTING THE STABILIZER NEEDLES

1. Remove the Sharps Protection Cap and/or Sharps Foam Plug.

2. Ensure that there is no Infusion Tube on the Stylet.

3. Reset the FAST1 Training Device using the Reset Tool.

   Insert the Reset Tool through the small hole in the distal end (opposite end from the Stabilizer Needles) of the Training Device.

4. Hold the FAST1 Training Device in one hand and the Reset Tool in the other, so that the Reset Tool can be pushed while keeping the Stabilizer Needles pointed away from you and anyone else.

   Warning: When you reset the Training Device, its sharp Stabilizer Needles will snap forward into place. Keep fingers well away from this end.

5. Reset the FAST1 Training Device by pushing on the Reset Tool (as shown) until the Stabilizer Needles snap forward into place. Remove the Reset Tool.

   The Stabilizer Needles are now reset.
REPLACING THE INFUSION TUBE AND STYLET SUPPORTS

Warning: The Stabilizer Needles are very sharp. Use caution when replacing the Infusion Tube and Stylet Supports. Use the Reset Tool to prevent needle stick injuries.

1. After the Stabilizer Needles have been reset, place the Infusion Tube into the center of the Stabilizer Needles.

   Ensure the Stylet enters the Infusion Tube. Be careful not to puncture the Tube with the Stylet tip.

2. Use the Reset Tool to seat the stainless steel bone portal tip on the tip of the Stylet.

3. Pick up one Stylet Support. Loosely place its bulb end into the bore of the Stabilizer Needles, on one side of the Infusion Tube. The bulb end must face into the Introducer.
4. Hold the Reset Tool as shown to push the Stylet Support gently into the bore until it clicks into place. The Reset Tool will slide between the needles.

Once in place, the end of the Stylet Support should be approximately flush with the proximal face of the bone probe.

**Note:** Holding the Reset Tool as shown prevents over-insertion of the Stylet Supports.

5. Repeat steps 3 and 4 with the second Stylet Support.

Be careful to insert the second Stylet Support on the opposite side of the Infusion Tube from the first support. Ensure the Stylet Support is inserted bulb end first.

6. Replace the Sharps Protection Cap.

The FAST1 Training Device is now reset and reloaded. It is ready to be used in the SimStern.
FAST1 SIMIO TRAINING DEVICE INSTRUCTIONS

DEPLOYMENT

1. Have “volunteer” patient lay down on the floor in the supine position.

   Expose sternum and locate the sternal notch by placing index finger in the notch.

2. Place SimIO Target Patch on patient by removing the adhesive backing. Pull off tabs #1, then #2 and adhere.

3. Stand at the patients head and hold the SimIO Training Device in dominant hand (or as comfortable).

   Place the “hook-sided” Velcro Patch that is on the SimIO Training Device, on the Target Zone of the SimIO Target Patch (loop-side).

   Hold SimIO Training Device perpendicular to the manubrium.

4. Press down smoothly with increasing force until you hear the Infusion Tube separate from the SimIO Training Device.
5. Pull SimIO Training Device up, off of the SimIO Infusion Tube.

6. Remove BLUE cap and connect SimIO Infusion Tube to friction fitting on tubing attached to the SimIO Target Patch.
   Remove WHITE cap from Luer fitting and connect IV tubing.

7. Secure Protector Dome to SimIO Target Patch.
REMOVAL

8. Remove the Protector Dome. The SimIO Target Patch may have to be held down while the Dome is being removed.

9. Disconnect the IV line from the Connector Tube on the SimIO Target Patch and the friction fitting from the SimIO Infusion Tube.

10. Remove the SimIO Infusion Tube from the SimIO Target Patch by disengaging the Velcro fastening.

11. Remove the SimIO Target Patch.
RESETTING THE SIMIO TRAINING DEVICE

1. Reset the SimIO Training Device by using the Reset Tool.

   Insert the Reset Tool through the small hole in the distal end (opposite end from the Velcro Patch) of the SimIO Training Device.

2. Push the Reset Tool forward until the SimIO Foot snaps into place. Remove the Reset Tool.

3. Insert the SimIO Infusion Tube, Luer end first, into the SimIO Foot. The Foot is magnetized and will attach itself to the SimIO Infusion Tube.

4. The SimIO Training Device is now reset and reloaded, and is ready to be re-used.
TROUBLESHOOTING

1. Fluid or medication does not flow through IV line to site:

   Flush to clear. If fluid or medication does not flow even after flushing, infusion should be discontinued and an alternative method of vascular access should be used.

2. Leakage at Insertion Site (Extravasation):

   If excessive, use alternative method of vascular access.

3. First attempt to place FAST1 fails:

   Double check insertion site, patient position, medic position, and try again with a new device. Be sure to remind students to save a device if the procedure/attempt with the FAST1 was not successful (after protecting the sharps) for shipment back to Pyng for replacement and examination.

4. Removing entire Infusion Tube:

   Pull perpendicular to the manubrium until the entire Infusion Tube (including metal tip) emerges from the patient’s chest.

   Ensure to pull in one smooth continuous motion (do not start/stop) until removed. Use the tube to pull, not the Luer connection. It is normal for the tubing to stretch.
5. Introducer does not release:

Pull Introducer back. If Infusion Tube remains in patient, verify placement by aspirating marrow, and proceed with use.

If marrow cannot be withdrawn, remove tube and insert a second FAST1.

6. Introducer releases but Infusion Tube is not secured in patient:

Use new FAST1.

7. Force is applied but Introducer does not release:

Without pulling back, ensure Introducer is perpendicular to manubrium and force is being applied directly along this line.
FAST1 SKILLS EVALUATION

1. Clean insertion site.

2. Apply Target Patch (just below sternal notch).

3. Stand at patient’s head, hold Introducer in dominant hand (or as comfortable).

4. Twist to remove Sharps Protection Cap.

5. Place Stabilizer Needles in Target Zone (perpendicular to manubrium).

6. Press down smoothly with increasing force until Infusion Tube separates from Introducer.

7. Pull Introducer up, off Insertion Tube.

8. Immediately push Stabilizer Needles into bright red Sharps Foam Plug (MUST remain on tabletop). Discard following local contaminated sharps protocols.

9. Remove BLUE cap and connect Infusion Tube to friction fitting on tubing attached to Target Patch.

10. Remove WHITE cap from Luer fitting and connect IV.

11. Secure Protector Dome directly over Target Patch and press down firmly.
1. Precautions for the FAST1 include:
   a) previous sternotomy
   b) compromised skin over site
   c) severe osteoporosis
   d) all of the above

2. The landmark for the Target Patch is the:
   a) xiphoid process
   b) sternal notch
   c) subclavian ridge
   d) Angle of Louis

3. Preparation of the site should include:
   a) sterile draping
   b) wash with soap and water
   c) maintain aseptic technique throughout the procedure
   d) no preparation is recommended

4. Approved sites for the FAST1 include:
   a) manubrium of sternum
   b) medial tibia
   c) proximal humerus
   d) none of the above

5. Proper placement of the Infusion Tube can be ensured by holding the Introducer:
   a) at a 45-degree angle to the floor
   b) perpendicular to the manubrium
   c) vertical to the body of the sternum
   d) aimed toward the heart
6. The Introducer is powered by:
   a) pneumatic force
   b) batteries
   c) springs
   d) muscles

7. How should force be applied to the Introducer?
   a) with a quick thrust
   b) smooth, increasing until release
   c) steady, decreasing for 5 seconds
   d) any of the above is acceptable

8. The FAST1 can be left in place for:
   a) 24 hours
   b) 1 hour
   c) only until the patient is stabilized
   d) 48 hours

9. Which of these can be delivered through the FAST1?
   a) epinephrine
   b) blood and blood products
   c) normal saline or Ringer’s Lactate
   d) all of the above
ANSWER KEY

1. Precautions for the FAST1 include:
   a) previous sternotomy
   b) compromised skin over site
   c) severe osteoporosis
   d) all of the above

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REFERENCES


David L Johnson; Judy Findlay; Andrew J Macnab; Lark Susak: Cadaver testing to validate design criteria of an adult Intraosseous infusion system. Military Medicine, March 2005; 170, 3; ProQuest Medical Library, 251-257.