Cardiac Cath Lab: Acist Injector Pump for Cardiac Procedures

Site Applicability

St. Paul's Hospital: Cardiac Cath Labs

Practice Level

Specialized Skill: RN, MRT, MD

This skill requires specialized training, and opportunity for frequent practice in the Cardiac Labs at St Paul's hospital

Requirements

Prior to first using the pump, and then annually, all users of the Acist Injector pump must be trained on safe use of the system and be signed off as completing their training.

Need to Know

Clinical Indication: patients undergoing procedures in the Cardiac Catheterization Laboratories requiring contrast injection during cardiac angiograms, valve procedures and electrophysiology lab procedures.

The use of mechanical injector pumps (MIP) has been shown to decrease the amount of contrast used in procedural cases and therefore decrease the incidence of Contrast Induced Nephropathy. MIP have air detection technology shown to decrease air embolism in patients.

- Left Ventricular Angiography (LVA) is performed to evaluate left ventricular wall motion, ejection fraction of the Left Ventricle (LV) and valvular structure or function. LVA is performed as part of *most* coronary angiography studies and is routinely performed *after* coronary angiography.
- Common contraindications to performing a LVA include: Left main stenosis, aortic valve stenosis, eGFR less than 60, and severe LV dysfunction. Patients with severe LV dysfunction and/or elevated LVEDP (more than 25 mmHg) may be at risk for hemodynamic compromise post LVA.
- Adequate radiographic visualization of the LV is accomplished by delivering a large volume bolus of x-ray contrast (usually 20 to 40 mL) over a short amount of time (3 seconds) into the LV through the Acist injection pump.
- Ventricular ectopy is common upon injection of contrast into the LV.
- The Acist injection pump is also used to visualize and assess various anatomical structures (pulmonary vasculature, aortic root, iliac arteries).

- The contrast delivery syringe system **MUST** be disposed at end of shift and changed every 5 patients or every 8 hours, whichever comes first.
- The method of priming, attaching to the angiographic catheter, and the safety checks *remain the same* regardless of anatomy being studied.
- It is *imperative* that all air and air bubbles be expelled from the injection syringe and tubing prior to injection to prevent air embolization.
- The process of priming the Acist injection pump requires *uninterrupted attention* from start to completion and must follow strict aseptic technique to avoid cross contamination.
- To prevent cross contamination the patient and contrast delivery syringe system must remain isolated from each other. Therefore strict aseptic technique must be followed: throughout the case, when removing the patient delivery system at the end of the case, applying the sterile cap and then setting up the patient delivery system for the next case.
- During the case the Acist system must be draped to avoid contamination from blood and body fluids.
- Strict sterile technique must be used when working with the patient delivery system (i.e. manifold and hand controller).

Equipment and Supplies

1. BT-2000 Automated Manifold Kit: injection manifold, a check valve, a saline spike, a red cap, hand syringe and tubing.- **Single use only**
2. Contrast bottle
3. Drape/cover
4. AT Angio Touch Hand Controller Kit: 3-way high pressure stopcock, high pressure tubing, angioTouch hand controller - **Single use only**
5. The A2000 Multi Use Syringe Kit - syringe and contrast spike assembly and dual port syringe with interconnections - **Can be used for up to 5 patients or 8 hours, whichever comes first.**

Procedure

Set Up

Note: Multi-Use syringe assembly can be used for 5 cases or up to 8 hours, whichever comes first.

Multi-Use Syringe Assembly and Manifold	
RN/MRT	**Safety Checks/ rationale**
1. Wash hands and follow strict aseptic technique when performing the following instructions.	Routine hand hygiene is performed before clean or aseptic technique
2. Power on - Green light will appear when on	
3. Press Start on LCD control screen.	

RN/MRT	Safety Checks/ rationale
4. Choose Cardiac Maintaining aseptic technique, follow instructions on screen and Acist user manual guidelines to set up syringe, load contrast and saline assembly. Purge and flush saline tubing and manifold. Use hammer to tap air bubbles out of saline tubing, pressure transducer and manifold. Inspect chamber prior to loading to ensure patency.	Use strict Aseptic technique to ensure sterility. Ensure all air is removed from system to prevent air embolus
Hand Controller and Patient Tubing	
Circulating RN/MRT	**Safety Checks/Rationale**
1. Assist scrub RN applying the sterile drape. Ensure the display screen is covered and secured to the back of the screen with clamps to preventing drape slippage and contamination when scrubbed personal uses touch screen	Do not puncture holes in drape. Doing so will inhibit sterility.
2. Using strict aseptic technique open single-use AngioTouch kit. Package includes hand controller, high-pressure injection tubing and 3-way stopcock. Scrub RN to place on sterile field.	
3. Double check system for air embolus. Including saline spike, saline tubing, transducer cartridge, and manifold assembly	Ensure no air bubbles in tubing
4. Accept end of high pressure tubing from scrub RN, attach it to the manifold tubing and place the tubing through the air column sensor. Tubing is to be handed over the drape **DO NOT PUNCTURE HOLE IN DRAPE.**	Any splashing of body fluids on the equipment or delivery system will cause contamination. In which case the equipment will require disinfection and the delivery systems replaced.
5. Accept the two connectors of the hand controller and connect luer connections to control panel. Tubing is to be handed over the drape **DO NOT PUNCTURE HOLE IN DRAPE.**	

Scrub RN	Safety Checks/Rationale
1. **Using strict aseptic technique** complete surgical scrub and don sterile gloves prior to completing to following tasks	Use strict Aseptic Technique to maintain sterility and prevent contamination
2. Apply sterile drape with assistance of circulator. Cover display screen and ensure circulator secures with clips, to ensure it does not slip while using the touch screen.	
3. Set up Angiotouch hand controller by following instructions on display and user manual	
4. Pass end of high-pressure injection tubing to circulator RN to connect to manifold. Tubing is to be handed over the drape **DO NOT PUNCTURE HOLE IN DRAPE.**	Do not puncture holes in drape. Doing so will inhibit sterility.
5. Connect 3-way stop cock to other end of tubing.	Any splashing of body fluids on the equipment or delivery system will cause contamination. In which case the equipment will require disinfection and the delivery systems replaced.
6. Hand off the two connectors from the end of the pneumatic hand controller to circulator RN. Circulator connects to the control panel.	
7. Ensure hand controller connections are tight	
8. Calibrate hand controller- Follow instructions on screen, *Starting hand controller calibration,* press 'OK'. Completely press the top C button on the hand controller with-in 4 seconds.	
9. Flush the high pressure tubing with saline ensuring there are no air bubbles. Ensure both ports of the stopcock are flushed and air is taped out while the saline flushing is in progress.	
10. Purge 10 mL of contrast using the "Purge" button on the monitor.	
11. Zero the transducer at the patients mid-axillary level	

Intraprocedure

Circulating RN	Safety Checks/Rationale
Safety Check 1. During safety check Time Out, announce patient count on the multi-use syringe. MacLab RN to document on MacLab report. ***NOTE: Multi-Use syringe can be used for 5 cases or up to 8 hours, whichever comes first***	Testing and data performed by manufacturing company support the use of 5 patient procedures on the Acist Multi-use Syringe kit.
Change Contrast Bottle 1. Monitor contrast bottle. If contrast bottle is close to empty you may spike a new one.	Use strict aseptic technique when changing contrast bottle to prevent contamination.
Performing Injections and Pressure Monitoring	
Scrub RN/ Physician or delegate	**Safety Checks/Rationale**
Injections: 1. Before connecting to patient, purge the high-pressure injection tubing and stop cock with contrast to clear the saline from the tubing.	To prevent air embolus: when flushing any air from components ensure tubing is disconnected from patients and inspect all tubing and connections for air
2. Now stopcock can be connected to the catheter by physician (**ensuring no air bubbles in tubing**).	
3. With consultation with physician or delegate, select the injection type by pressing the desired selection on the touch screen. Including: LCA, RCA, LV/Ao or other.	
4. Follow instructions on screen. When Green light is on, system is armed and ready. When performing large injections the backlight will flash on/off.	
5. Press the contrast button on the hand controller to initiate the injection.	
6. Release hand controller when injection complete or if you need to stop injection for any reason.	
7. Injector will remain armed if the flow rate is 10 mL/sec or lower and you may continue to inject until parameter or injection mode is changed.	

Scrub RN/ Physician or delegate	Safety Checks/Rationale
8. Review and revise injection parameters as clinically indicated for the patient.	
9. Repeat steps 4 to 8.	
Pressure Monitoring 1. Pressure may be dampened when contrast in the tubing. Flush catheter only with saline to decrease dampening. Saline flushing should be done with a syringe full of saline manually by the physician at the Med Port of the stopcock to ensure the high pressure tubing be kept full of contrast.	

Post Procedure

Ending a case or shutdown of system	
Scrub RN/MRT	**Safety Checks/ Rationale**
1. Report contrast dose to Mac Lab RN	
2. Press End Case, then Ok	
3. Shut down: 3.1 **If end of day shutdown system.** Follow instructions on touch screen to shutdown system, remove patient tubing and discard immediately without touching the equipment or port. Allow circulator to finish end of day shutdown.	To prevent cross contamination the contrast delivery syringe system must be changed after every 5 cases or if it has been hung for 8 hours.
3.2.**If not end of day do not shut down system.** Follow instructions on touch screen. Have circulator close white contrast clamp to ensure no cross contamination occurs. Then remove patient tubing and discard immediately without touching the equipment or contrast delivery system port, move to step 4.	

Scrub RN/MRT	Safety Checks/ Rationale
4. The contrast delivery syringe system can only be used for 5 cases or hung for 8 hrs. 4.1 If number of cases performed is less than 5, **follow instructions on display to** use same contrast delivery syringe system. 4.2 If 5 cases performed on multi-use syringe, use new contrast delivery syringe system. The system will notify operator at the end of every case, or, touch the "system info" button on the bottom right corner of the screen at any time.	

Changing or disconnecting Multi-Use syringe	
Circulating RN/ MRT	**Safety Checks/Rationale**
1. **Wash hands and follow strict aseptic technique when performing the following instructions.**	
2. Using **new contrast delivery syringe system, or shut down system at end of day** 2.1 Disconnect the high pressure injection tubing from the injection system 2.2 Remove the contrast container from the contrast holder. Press ok. 2.3 After the syringe plunger has disengaged close the white contrast spike clamp. This prevents spills from residual contrast in syringe remove the syringe. 2.4 Disconnect and discard all of the disposables and the catheter. 2.5 If not end of day follow instruction on screen to restart then clean and inspect chamber sleeve.	***CAUTION:*** *Make sure the contrast spike is removed from the contrast container and the white clamp is open to allow air into injector syringe prior to opening the chamber.* To ensure sterility and prevent cross contamination use strict aseptic technique when placing sterile cap on syringe set up connection.
3. **If end of day, follow instructions on screen to power off,** turn off the power switch, clean sensors, chamber sleeves with soft cloth and warm water	

Circulating RN/ MRT	Safety Checks/Rationale
4. If reusing contrast delivery **syringe system** 4.1 Close white contrast clamp 4.2 Disconnect and discard the high pressure injection tubing, stop cock and manifold kit without touching syringe system port. 4.3 Place sterile cap on the connection to the contrast delivery system using strict aseptic technique to prevent any cross contamination. In-between cases machine to be wiped down with soap and water	

Documentation

The MacLab RN will document the following in the MacLab:

1. Sequence number of the contrast delivery syringe system out of 5 that the patient received.
2. The total amount and type of contrast delivered.
3. The amount of contrast delivered for non-coronary arteries injections including LV grams and aorta-grams.

Related Documents

1. B-00-12-10088 - Cardiac Cath Lab: Radial Vascular Access, Intraprocedure Care
2. B-00-12-10024 - Cardiac Cath Lab: Intraprocedure Care of Patients Undergoing Diagnostic or Interventional Procedures

References

1. Acist Medical Systems, 2020. ACIST Angiographic Contrast Delivery System Instructions for Use, Acist Medical Systems Inc.
2. Acist Medical Systems, 2020. Contrast Delivery System Quick Guide for ACIST CVi. Acist Medical Systems Inc.
3. Perpetra, Elizabeth M., & Keegan, Patricia A. (2021). Cardiac Nursing (7th Ed.). Wolters Kluwer

Groups/Persons Consulted:

CV Technologist Supervisor, Cardiac SPH
RN Clinical Nurse Leader, Cardiac SPH
RN Clinical Nurse Specialist, Cardiac SPH

Developed/Revised By:

Nurse Educator, Cardiac Cath Labs

First Released Date:	APR-2018
Posted Date:	12-SEP-2023
Last Revised:	12-SEP-2023
Last Reviewed:	12-SEP-2023
Approved By: *(committee or position)*	PHC
	Professional Practice Standards Committee
Owners: *(optional)*	PHC
	Cardiology