Cardiac Cath Lab: Intraprocedure Care of Patients Undergoing Diagnostic or Interventional Procedures

Site Applicability

SPH Cardiac Cath Labs

Practice Level

Specialized: Critical Care trained Rn's who have completed additional education and who work in a PHC Cath Lab

Need to Know

- A wide variety of diagnostic and interventional cardiology procedures are performed in the Cardiac Catheterization Labs. These procedures use a transCatheter technique, and may involve the coronary vessels and/or structural components of the heart such as the great vessels, heart valves or the septum.
- Anesthesiology may be involved with non-coronary interventional procedures such as an atrial septal defect (ASD) closure or left atrial appendage (LAA) closure.
- Non-coronary and other specialized procedures (e.g. Intravascular Ultrasound, coronary atherectomy, nitric challenge) warrant use of unique and specialized equipment. The **Special Procedures Binder** located in each Cath Lab lists the equipment associated with specialized procedures. Equipment necessary for procedures is subject to change, and subsequently the equipment lists are frequently updated by the Nurse Educator.
- A 'Difficult Intubation' cart is located in room 5210 and is maintained by anesthesia.
- This protocol addresses
    a. Safety Checks
    b. Patient Preparation
    c. Sterile Technique
    d. Equipment
    e. Medication Administration
    f. Radiation Safety
    g. Documentation and
    h. Perfusion Services in the Cath Lab.

Protocol

Assessment and Interventions

A. Cath Lab Safety Checks:

The following equipment safety checks are performed and signed for daily by the nursing staff assigned to the Lab before the first patient enters the Lab. The **daily safety checks** consist of:

- Cardiac Arrest Cart
  - Zoll defibrillator test
  - ECG cables attached to Zoll defibrillator
  - One Step defibrillator pads for hands free defibrillation connected
  - Zoll defib paddles on zoll
  - Visual inspection of intubation box in crash cart
  - Cardiac Arrest Cart drawers are unlocked at all times while RNs/MDs in the Lab
  - Cardiac Arrest cart wheels are unlocked with an unobstructed path to the patient
- LUCAS2 External Chest Compression Machine
  - Exchange battery every Monday
- Temporary Pacemaker
  - Turn on pacemaker to ensure functionality and then turn off
  - Ensure temporary pacemaker wire, connector cable and spare generator in bin
  - See B-00-13-10118 for changing/checking battery
- Airway Management (equipment to be found at head of patient table)
  - 1 each of oral airways in sizes 8, 9, 10
  - AMBU Bag with face mask, attached to oxygen *with* extension tubing, turn oxygen on and ensure ambu bag begins to fill, turn off.
  - 1 Simple face mask and 1 set of nasal prongs
  - 1 suction canister, 1 suction tubing, and 1 yaunker attached set up. Turn on suction to ensure functionality, then turn off.
- Other equipment
  - 500 mL bag of NS primed (replace if used)
  - Pericardiocentesis tray (located above lead in sub-sterile)
  - Thoracotomy tray (located above lead in sub-sterile area)
- Avoximeter daily quality control (QC) as per manufacturer's instructions (found in Cath Lab)
- ACT Machine daily QC and once weekly QC as per manufacturer's instructions (found in Cath Lab)

B. Pre-procedure preparation in Cath Lab:

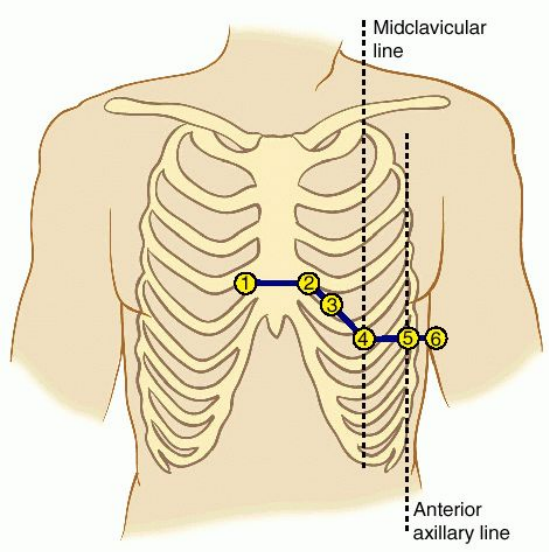
The Cath Lab team performs a Patient Safety Checklist (also known as the "timeout") prior to establishing vascular access on every patient. It can be initiated by any team member, but most often it is the circulating RN or the interventional fellow. See Appendix A.

Three RNs are involved in most diagnostic or interventional Cath Lab procedures, however there must be a minimum of two RNs in the Cath Lab for any diagnostic or interventional procedure. The three roles that are generally required to meet the intra-procedure care needs of the patient:

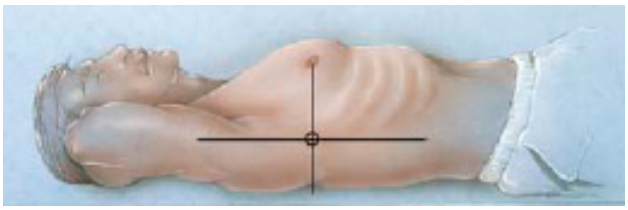
1. Circulating RN
2. Scrub RN
3. Hemodynamic Monitoring RN (staged supplemental education required/provided)

All three roles share patient care responsibilities to prepare the patient for the procedure.

- The RN confirms patient identity, allergy status, and completion of pt education.
- In an emergent, off-hours procedure (i.e. STEMI), establishing patient family contact is imperative.
- RNs assigned to the Cath Lab transfer the patient into the room and assist the patient onto the radiology table.
- The radiology table must be in the *locked* position before the patient is transferred from the stretcher to the table.
- Cardiac monitoring is established with a five lead ECG. The precordial lead monitored is V3, as this is the lead most sensitive to myocardial ischemia. The arm leads are placed posteriorly at the top of the scapula. Both leg leads are placed on the lateral left thigh.



- The phlebostatic axis is referenced for leveling the hemodynamic transducer. To obtain the axis, a theoretical line is drawn from the fourth intercostal space where it joins the sternum to a midaxillary line on the side of the chest. The midaxillary line is half the anteroposterior depth of the lateral chest wall. This point approximates the level of the atria.



- Noninvasive Blood Pressure (NIBP) is assessed in the Cath Lab prior to administering anxiolytic or analgesic.
- To ensure patient comfort the RN assesses the need for:
    - analgesic and/or anxiolytic medications
    - alterations in patient position on table (i.e. consider arm boards, pillow under knees, warm blankets)
- Establish NIBP monitoring in the absence of invasive arterial monitoring.
- Establish oxygen pulse oximetry.
- Patients (not on Contrast-Induced Nephropathy protocol) should receive NS TKVO throughout the procedure unless clinically contraindicated
- The patient's renal function (eGFR, creatinine) is assessed by the RN. Ensure contrast induced Contrast Induced Nephropathy protocol is established as per physician orders if the eGFR is less than 45 mL/min.
- Calculate MACD (maximum allowable contract dose) using GFR x 3.7. Record on procedural safety checklist and in MAC Lab report
- Confirm the vascular access site with the attending physician or delegate.
    - See Cardiac Cath Lab: Radial Vascular Access, Intraprocedure Care
    - Clippers are used if hair removal is required. Perform skin preparation of the femoral vascular access sites bilaterally with Chlorhexidine Gluconate 2% tinted swab sticks. The antiseptic agent should be applied as per manufacturer's instructions, and in a manner to prevent pooling of the agent in skin creases, under the patient, or near electrodes.

C. Sterile Technique:

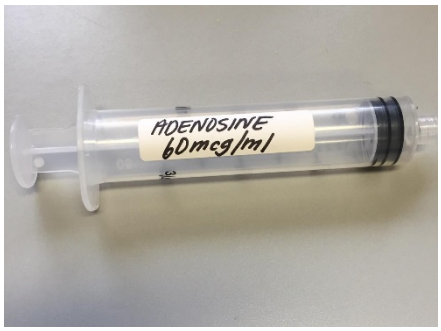
- The principles of sterile technique adhered to in the Cardiac Cath Lab are in accordance with the standards, guidelines and position statements of ORNAC (Operating Room Nurses Association of Canada).
- Surgical greens and warm-up jackets are provided and laundered by the hospital, and are the only attire permitted in the Cath Labs.
- Hats are worn at all times. Surgical masks are donned once sterile packages are opened or skin is prepped.
- Protective eyewear is recommended and provided for the scrub team.
- The scrub technique is posted in the scrub area and followed by all members of the team.
- The key principles of dispensing sterile equipment are strictly adhered to in the cardiac Cath Lab:
    - Only the working surface of a draped area is considered sterile.
    - Supplies are opened as close to the time of the procedure as possible, are continuously monitored, and are never left unattended.
    - Each package is checked for wrapper integrity and changed chemical indicators.
    - Large bundles or packages are opened on a flat surface
    - Items introduced onto the sterile field should be opened, dispensed and transferred by methods that maintain sterility and integrity. Methods of transfer include:
        - Expose the contents so the scrub RN can remove the item.
        - Place the item on the edge of the sterile field with the inside of the wrapper everted over your hand.
        - Flip only small and rigid items with caution. Flipping creates air turbulence and is the least preferred method of sterile transfer.
        - When pouring solutions care is taken to avoid splashing. The scrub nurse places the receptacle at the edge of the sterile table.
- Non-coronary procedures involving implants:
    - All staff wear surgical hats and masks.
    - The Cath Lab door remains closed during the procedure.
    - Traffic is limited.
- The scrub RN adheres to the established draping procedure and maintains sterility while draping the patient.

D. Equipment Management:

- Prepare and manage Acist Injector Pump for contrast delivery as per protocol (Acist Injector Pump)
- If Acist Injector Pump is not avaiLable, prepare and manage the manual manifold transducer:
    - The task of priming the transducer is uninterrupted from beginning to end.
    - Ensure no air bubbles remain in the system
    - Prime the 10 mL syringe with 8 mL of prescribed contrast
    - Prime the 10 mL syringe as prescribed by physician if hand injection of the femoral artery is procedural plan.
    - Zero the transducer in collaboration with the Hemodynamic Monitoring RN. Once zeroed, turn the stopcock off to the patient.
    - During the procedure multiple members of the scrub team may operate/handle the transducer. Monitoring for the absence of air is the responsibility of the operator who is handling the transducer at any given time, and who is injecting contrast into the Catheter.
- Prior to opening equipment packages, the circulating RN confirms the selection of equipment with the scrub RN.
- Catheters are flushed with heparinized saline prior to use and subsequent uses. The Catheters are flushed immediately after removal from sterile packaging.
- Wires are wiped between uses with heparinized saline soaked gauze, and visually inspected for signs of thrombus and damage.
- The inflation device is primed with a 1:1 solution (20 mL) of heparinized saline and contrast dye.
- Left ventricular angiography is performed using the Acist Injector Pump.
- The Medrad® Injection System is used only as a backup to perform Left ventricular angiography if the Acist is not avaiLable. The x-ray tech is responsible for set up and operating the Medrad Injection System.
- For equipment management and use of the Medrad Angiographic Injection System refer to Cardiac Cath Lab: Safety Process for Left Ventricular Angiograph using the MedRad angiographic Injection System

E. Medication Administration:

- Intraprocedure medication administration orders in the Cath Lab are provided verbally by the attending physician or delegate. The order is confirmed by the circulating or scrub RN prior to administration.
- Label medications on the sterile field with the sterile pen and Labels provided, and clearly state the drug name and concentration.



- The circulating RN documents anticoagulants and antiplatelet medications and infusions initiated in the Cerner Medication Administration Record.
- The Hemodynamic Monitoring RN, as informed, documents all medications given by the attending physician or delegate and circulating RN on the MacLab document.

F. Radiation Safety:

- All nursing staff receive Radiation Safety orientation and ongoing education when working in the Cath Labs.
- Radiation safety is the responsibility of all team members working in the Cath Labs.
- The ALARA (As Low as Reasonably Achievable) principles of radiation safety are adhered to in the Cath Labs. The four main principles of ALARA are:
    - Minimize fluoroscopy time
    - Maximize the distance between staff and the radiation source. Doubling distance from the radiation source decreases exposure by 75 %.
    - Radiation safety equipment
    - Personal protective lead must fit properly: Lead must be returned to hangers when not in use. The integrity of the lead is compromised if bent or folded for long periods of time. Use protective shielding when feasible.
    - Image optimization.
- Personal radiation dosimeters for staff are worn under protective lead. Dosimeters are measured three times per year by Health Canada.

Documentation

- The circulating RN is responsible for documenting in the patients Cerner electronic chart. This includes:
    - Sheath size and access site location
    - Radial compression device and time of application
    - Vascular closure device and time device was deployed
    - Anticoagulation, antiplatelet medications given intra procedure. Any infusions initiated
- The Hemodynamic Monitoring RN is responsible for accurate entry of all data into the MacLab hemodynamic monitoring system. The MacLab report summarizes events during the procedure and includes equipment used, patient disposition, hemodynamic status, hemodynamic measurements, medications administered, the maximum allowed contrast dose and the radiology summary.
- Basic hemodynamic measurements are performed by the hemodynamic monitoring RN who has completed basic MacLab training. Basic hemodynamic measurements include cardiac outputs, pullbacks between anatomical structures (e.g. left ventricle to aorta), and right heart Catheterizations.
- Advanced hemodynamic measurements are performed *only* by RNs who have completed the **Advanced Hemodynamic Workshop**. Examples of advanced hemodynamics include cases involving shunt runs, double transducers, valve area calculations, and drug challenges.
- Accuracy of all measurements calculated in the Cath Lab is paramount. Verify measurements with the attending physician or delegate as required.

Perfusion Services in the Cath Lab:

- Perfusion Services are involved with the insertion of the intra-aortic balloon pump (IABP), extracorporeal membrane oxygenation (ECMO), and Impella in the Cath Labs.
- Call Perfusion Services *immediately* upon notification of need for IABP, or Impella insertion
- For ECMO insertion first call ECMO/Implant Surgeon via switchboard, then initiate overhead Code ECMO call out. To initiate a Code ECMO overhead, call 7111 and state “Code ECMO Cath Lab”
    - IABP: After hours, the on-call RNs begin the initial set-up of the IABP until perfusion arrives so patient care is not delayed. Set-up instructions are posted in both Cath Labs. The physician or delegate is responsible for setting the timing of the IABP until perfusion arrives. Nursing is *not* responsible for timing of IABP.
    - The ECMO machine is located in the hallway across from room 5266 and maintained by perfusion services. The ECMO cannulas are located in the sub-sterile room behind the door.

I. Post Procedure

- Post procedure and prior to exiting the Lab, the scrub nurse will check the patient’s accessed limb’s pulses

- If radial access will check radial pulse distal from puncture site below the TR band.
- If femoral access will check the pedal pulses of affected leg.

Documentation:

Document all assessment, interventions and care given using GE Mac Lab system.

Cerner documentation includes but not limited to venous and/or arterial sheath size and location, anticoagulant or antiplatelet medications given, infusions started intra procedure, radial compression device, time of application or any closure devices used. During Cerner downtime, downtime paper Cardiac Short Stay Unit tri-fold must be used.

Patient and Family Education

- Team members will introduce themselves to the patient and family members present at the bedside.
- The RN's in the procedure will explain to the patient what they will be doing to get the patient prepped for the procedure once inside the room. (i.e. transferring onto the procedure table, setting up for the procedure, connecting to equipment.)

Related Documents

1. B-00-13-10090 – Cardiac Short Stay: Admission and Discharge
2. B-00-13-10063 - Cardiac Cath Lab: Post Procedure Care
3. B-00-13-10123 - Cardiac Short Stay: Pediatric Interventional Cardiology or Electrophysiology Procedure
4. B-00-13-10086 - Cardiology Procedures: Monitored Anesthesia Care or General Anesthetic (CSSU); Care of the Patient Following
5. B-00-12-10088 - Cardiac Cath Lab: Radial Vascular Access, Intraprocedure Care
6. B-00-12-10098 - Cardiac Cath Lab: Safety Checks for Left Ventricular Angiography using the Medrad® Angiographic Injection System

References

ORNAC Standards for Perioperative Registered Nursing Practice. (2021) 15th Edition. ORNAC.

Perpetua, Elizabeth M., & Keegan, Patricia A. (2021). Cardiac Nursing (7th Ed.). Wolters Kluwer

Appendices

Appendix A – Cardiac Cath lab Patient Safety Checklist (Time Out)

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Time Out for Cath Lab

Pre-Procedure (prior to bringing patient in room)

- ☐ Patient identity confirmed with two patient identifiers
- ☐ Consent signed and available
- ☐ Pre-procedure orders signed
- ☐ Special equipment identified & clarified with physician (refer to Special Procedures Manual if applicable for equipment lists)

Cath Lab Time Out (Initiated by circulating RN prior to puncture)

- ☐ Emergency Safety equip has been checked (1st case of day & after use)
- ☐ This is (patient name): _____
- ☐ **COVID-19 category: Green / Yellow / Red**
- ☐ They are here for a _____.
- ☐ Indications: _____.
- ☐ Is there BBB? If YES - re-assess need for RHC, LV Gram.
- ☐ Allergy status confirmed - ☐ None Known or ☐ Allergic to _____.
- ☐ The eGFR is _____. MACD is _____. The nephropathy protocol (has/has not) been initiated.

  Acist Injector syringe sequence number out of 5_____.
- ☐ The access site and sheath size will be (include left/right).
- ☐ The planned method of hemostasis is _____.
- ☐ Antiplatelet meds received were:

  1) Drug: _____ Dose _____Time Last given _____

  ☐ Loading Dose: Date: _____ ☐ NO Loading Dose

  2) Drug_____ Dose_____ Time Last given_____

  ☐ Loading Dose: Date: _____ ☐ NO Loading Dose
- ☐ They have received _____ for sedation.
- ☐ Are there any special considerations for this patient? (e.g. fistula, dual transducer, INR, anticoagulant, low EF, home alone, etc.)

- ☐ They will recover in _____.

Persons/Groups Consulted:

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