

## **STANDARDIZED PROCEDURE**

### **SWAN GANZ CATHETER PLACEMENT/READJUSTMENT**

*These procedures are intended to describe procedures performed by Nurse Practitioners and/or Certified Nurse Midwives (depending on the clinical privileges granted to the individual practitioner) at UC San Diego Health.*

#### **I. Policy**

**a. Function:** To insert and or readjust a Swan-Ganz catheter.

**b. Circumstances:**

**i. Setting:** See Cardiothoracic Surgery Nurse Practitioner General Policy Standardized Procedure

**ii. Supervision:** See Cardiothoracic Surgery Nurse Practitioner General Policy Standardized Procedure

**iii. Patient Conditions/Indications for Swan-Ganz Catheter**

**Insertion/Readjustment include but are not limited to:**

1. Titration of drug and other interventions in highly unstable patients (i.e. vasodilators, inotropes, parenteral fluids)
2. Hemodynamically unstable patients unresponsive to conventional therapy
3. Cor Pulmonale or Chronic Obstructive Pulmonary Disease (COPD) in a patient with both cardiac and pulmonary disorders
4. Sepsis
5. Peri-Operatively to enable optimization of the patient's status
6. To obtain continuous evaluation of mixed oxygen saturation
7. Guidance of complex fluid management in certain difficult situations (i.e.: shock, postoperative state, adult respiratory distress syndrome (ARDS), acute renal failure)
8. Incorrect placement as evidenced by waveforms or radiographically

**iv. Contraindications for Swan-Ganz Catheter Insertion/Readjustment include but are not limited to:**

1. Vein Thrombosis
2. Coagulopathy (PT or PTT >1.3 ratio, platelets <20,000)
3. Untreated, ongoing sepsis
4. Severe Pulmonary Hypertension
5. Distortion of local anatomy or landmarks
6. Suspected acute or prior injury to the vein
7. Bleeding diathesis or current anticoagulation therapy (i.e.: Heparin gtt currently infusing)
8. Full-thickness burn, cellulitis, or other infection over the anticipated insertion site
9. Pneumotorax or hemothorax on the contralateral side, or inability to tolerate pneumothorax on ipsilateral side
10. Patients unable to tolerate Trendelenburg position

11. Prior infection of a sclerosing agent in the intended vein
12. Morbid or marked obesity
13. Marked cachexia
14. Vasculitis that predisposes to sclerosis or thrombosis of veins
15. Mastectomy proposed on the side of subclavian insertion
16. Patients receiving ventilatory support that have high-end expiratory pressure
17. Patients undergoing cardio-pulmonary resuscitation
18. Prosthetic right heart valve patients
19. Cardiac-paced patients
20. Severely hypotensive patients
21. Highly unstable arrhythmias
22. Highly unstable respiratory status

## II. Protocol

- a. Definition: Swan-Ganz Catheter Placement for the above conditions
- b. Objective: See section I-b-iii for indications for Swan-Ganz Catheter Placement
- c. Assessment: Patient which meets Swan-Ganz Catheter Placement as described above in section I-b-iii and does not have any contraindications as outlined in section I-b-iv
- d. Plan:
  - i. Equipment Necessary includes but is not limited to:
    1. Central Venous Access with introducer catheter 8.5 Fr. (See Central Venous Catheter Placement Standardized Procedure for Insertion)
    2. Balloon Flotation, flow-directed, thermistor-tipped pulmonary artery thermodilution catheter with syringe for balloon inflation
    3. Pressure Transducer
    4. High-pressure tubing and pressure bag set up (500 cc Normal Saline)
    5. Sterile Gown, Drapes, Gloves, Masks, Goggles, Cap
    6. Guide Wire
    7. Suture
    8. Povidone-iodine solution or Hexachlorophene if patient is iodine-allergic
    9. Code Cart nearby
  - ii. Pre-Procedure
    1. Explain indications for Swan-Ganz Catheter Insertion to family and patient (if alert)
    2. Explain risks and benefits of insertion of Swan-Ganz Catheter
      - a. Risks include but are not limited to:
        - i. Pulmonary infarction
        - ii. Arrhythmias
        - iii. Lethal Arrhythmias

- iv.** Balloon Rupture
- v.** Pneumothorax
- vi.** Rupture of Pulmonary Artery
- vii.** Knotting of the catheter
- viii.** Infection

**b.** Benefits include but are not limited to:

- i.** Improved hemodynamic management
  - ii.** Improved ventilator management
- 3.** Obtain consent from patient (if legally able), from family member-power of attorney or next of kin, or double provider consent

**iii.** Swan-Ganz Catheter Insertion

- 1.** Establish Central Venous Access (See Central Venous Catheter Placement Standardized Procedure). Order of preference for placement are: Right IJ Vein, Left Subclavian Vein, Left IJ Vein, and Right Subclavian Vein
- 2.** Instruct the nurse to set up, calibrate, and level the transducer
- 3.** Place patient in Trendelenburg Position
- 4.** Don mask, goggles, cap
- 5.** In a sterile fashion don sterile gown and gloves, prep the introducer site with povidone-iodine/hexachlorophene and cover with sterile towels
- 6.** Remove the Swan-Ganz catheter from its sterile packaging
- 7.** Place the protective shield over the distal end of the catheter
- 8.** Flush the catheter by injecting sterile saline into the 3 or 4 ports of the catheter
- 9.** Attach the smaller syringe to the balloon port. Fill the balloon with air to test balloon integrity
- 10.** Hand the proximal end of the catheter to the nurse so that the catheter can be connected to the pressure tubing
- 11.** Pass the deflated balloon-tipped catheter through a sheath to the 10 or 5 cm mark. Watch the waveform on the bedside monitor for a characteristic central venous tracing or a right atrial tracing
- 12.** Inflate the balloon with air to the recommended full volume as indicated on the package or the syringe (0.8-1.5 cc of air). **NEVER ADVANCE THE CATHETER BEYOND THIS POINT WITHOUT THE BALLOON INFLATED.**
- 13.** Pass the catheter to the 30 or 40 cm mark in a quick but not too rapid fashion, while watching the waveform on the bedside monitor for the characteristic right ventricular tracing.
- 14.** Watch the ECG for ectopy
- 15.** Once the right ventricular waveform appears on the bedside monitor, pass the catheter rapidly to the 40-50 cm. mark and into the pulmonary artery.

- 16.** Once in the pulmonary artery, continue passing the catheter at a much slower pace, watching for the characteristic pulmonary capillary wedge pressure (PCWP) waveform at about the 50 cm. mark.
- 17.** Once the PCWP tracing is obtained, passively deflate the balloon and watch the return of the pulmonary artery pressure tracing
- 18.** Extend the catheter protective shield and attach it to the sheath with the docking mechanism
- 19.** Secure the entire assembly with suture and tape. Apply a sterile dressing and make certain to record the marking of the Swan-Ganz Catheter once you have completed the procedure.
- 20.** Instruct nursing staff to check the measurement on the Swan-Ganz Catheter every shift and after any procedures/movement.

**iv.** Troubleshooting

- 1.** If several premature ventricular contractions occur during catheter advancement, deflate the balloon and withdraw the catheter into the right atrium. If further attempts at passing the catheter result in sustained or frequent ectopy, deflate the balloon and pull the catheter back. The Critical Care Attending, Cardiothoracic Surgery Attending, Fellow, or Chief Resident should then be notified for assistance
- 2.** If a pulmonary artery or PCWP tracing cannot be obtained, keep the balloon deflated, pull the catheter back to 12 cm and try to advance the catheter again per protocol
- 3.** Adjust the position of the catheter as necessary. If the pulmonary artery pressure tracing shows a loss of phasicity and begins to resemble the PCWP tracing without a balloon inflation, withdraw the catheter until the typical phasic pulmonary artery tracing reappears

**v.** Patient Conditions Requiring Physician Consultation (Limitations):

- 1.** Sustained or frequent ectopy
- 2.** Thrombosis
- 3.** Hemorrhage
- 4.** Air Embolism
- 5.** Respiratory Difficulty
- 6.** Ischemia or necrosis to distal site
- 7.** Aneurysm
- 8.** Infection
- 9.** Arteriovenous Fistula
- 10.** Local Hematoma
- 11.** Pulmonary Infarction
- 12.** Pneumothorax
- 13.** Rupture of the Pulmonary Artery

**vi.** Follow Up

1. Order a portable chest X-ray to confirm placement of the Swan-Ganz Catheter and to evaluate for pneumothorax
  2. Document the procedure in the patient record including the date, time, procedure done, and any complications as well as the tracing pressure readings
  3. Order daily dressing changes per protocol and every four hours and prn cardiac output parameters
- e. Record Keeping: See Cardiothoracic Surgery Nurse Practitioner General Policy Standardized Procedure

### **III. Requirements for the Nurse Practitioner**

- a. Education and Training: See Cardiothoracic Surgery Nurse Practitioner General Policy Standardized Procedure
- b. Evaluation: See Cardiothoracic Surgery Nurse Practitioner General Policy Standardized Procedure

### **VII. RESPONSIBILITY**

Please contact the Advanced Practice Council if you need help. The administrative assistant for the Chief Nursing Officer can direct you. Call; 619-543-3438

### **VIII. HISTORY OF POLICY**

Revised by the Committee of Interdisciplinary Practices:	2/26/2014, 9/28/2016
Reviewed by the Medical Staff Credentials Committee:	3/5/2014, 10/6/2016
Approved by the Medical Staff Executive Committee:	3/20/2014, 10/7/2016

## Performance Based Development System: Cardiothoracic Surgery Nurse Practitioner

### Standardized Procedure for Swan-Ganz Catheter Placement/Readjustment

CRITICAL ELEMENTS	MET	NOT MET
Establish Central Venous Access		
Instruct the nurse to set up, calibrate, and level the transducer		
Place patient in Trendelenburg Position		
Don mask, goggles, cap		
Prep introducer site		
Remove the Swan-Ganz catheter from its sterile packaging		
Place the protective shield over the distal end of the catheter		
Flush the catheter by injecting sterile saline into the 3 or 4 ports of the catheter		
Attach the smaller syringe to the balloon port. Fill the balloon with air to test balloon integrity		
Hand the proximal end of the catheter to the nurse so that the catheter can be connected to the pressure tubing		
Pass the deflated balloon-tipped catheter through a sheath to the 10 or 5 cm mark. Watch the waveform on the bedside monitor for a characteristic central venous tracing or a right atrial tracing		
Inflate the balloon with air to the recommended full volume as indicated on the package or the syringe		
Pass the catheter to the 30 or 40 cm mark in a quick but not too rapid fashion, while watching the waveform on the bedside monitor for the characteristic right ventricular tracing.		
Watch the ECG for ectopy Once the right ventricular waveform appears on the bedside monitor, pass the catheter rapidly to		

the 40-50 cm. mark and into the pulmonary artery.		
Once in the pulmonary artery, continue passing the catheter at a much slower pace, watching for the characteristic pulmonary capillary wedge pressure (PCWP) waveform at about the 50 cm. mark		
Once the PCWP tracing is obtained, passively deflate the balloon and watch the return of the pulmonary artery pressure tracing		
Extend the catheter protective shield and attach it to the sheath with the docking mechanism		
Secure the entire assembly with suture and tape		
Instruct nursing staff to check the measurement on the Swan-Ganz Catheter every shift and after any procedures/movement		

\_\_\_\_\_ Passed

\_\_\_\_\_ Needs To Repeat

Validated By \_\_\_\_\_ Date \_\_\_\_\_

Preceptee's Signature \_\_\_\_\_

Preceptee's Name (Printed) \_\_\_\_\_