I. Statement of Purpose

To provide a mechanism to standardize and manage transesophageal echocardiograms performed in the inpatient and outpatient setting.

II. Definitions

Not applicable

III. Statement of Policy

3.1 Outline of the transesophageal echocardiograms performed in the organization with a standard protocol.

3.2 Monitoring personnel are responsible for patient tolerance and potential complications during the TEE procedure including:

3.2.1 Pre-Procedure Assessment/Care:

- Obtain patient’s medical history including allergies, dysphagia, cardiac surgery, anesthetic history.
- Verify signed informed consent.
- Verify NPO status.
- Establish patent intravenous line as ordered.
- Remove dentures or dental prosthesis.
- Notify physician if patient is currently on anticoagulants, ASA, or nonsteroidal anti-inflammatory products, and if laboratory results are abnormal (PT/INR).
- Obtain baseline vital signs.
- Obtain blood glucose for diabetic patients prior to procedure. (Necessary for all diabetics.)

3.2.2 Patient Teaching

- Explain the purpose of the procedure, positioning, relaxation methods, techniques to be used, estimated length of the procedure and the sensations the patient is likely to experience during and after the exam.
- Explain the various roles of the personnel present during the exam.
- Explain the effects of any sedative medication to be used.
- Explain the use of the bite block and oral suction.
• Document teaching and patient’s comprehension.

3.2.3 Responsibilities During Procedure
• Administer medications per Medical Doctor’s orders.
• Position patient as per physician preference (i.e. head elevated 45 or left lateral decubitus at 30).
• Maintain bite block position to prevent trauma to probe, lips and teeth.
• Assist physician with probe passage.
• Monitor vital signs, ECG rhythm, color, warmth, and dryness of skin, level of response and pain tolerance.
• Maintain airway and manage oral secretions.
• Provide emotional support to the patient.
• Inject agitated NS to perform bubble study (see Bubble Study) per MD order.

3.2.4 Potential Complications
• Cardiac arrhythmias or arrest
• Aspiration
• Perforation
• Respiratory depression or arrest
• Bleeding
• Hypotension

3.3 Monitoring personnel are responsible for post-procedure recovery and discharge education.
3.3.1 Post-Procedure Assessment/Care
• Monitor vital signs as per Moderate Sedation policy.
• Maintain NPO status until gag reflex returns (2-3 hours).
• Observe patient for
  o Bleeding
  o IV site complications
  o Cardiac arrhythmias
  o Change in vital signs
  o Pain (especially chest pain)
  o IV site complications
• Provide outpatients with written discharge instructions or provide verbal report to nurse responsible for inpatient’s care.
• Patient may be discharged when discharge criteria is met for moderate sedation.
• Sedated patients must have someone to drive them home.

3.4. Patient recovery for intraoperative TEE is the same as for the patient undergoing moderate sedation, and prior to procedure the patient should be assessed for difficulty swallowing or unusual throat/abdominal discomfort.

IV. Procedure
4.1  **Pre-procedure**

4.1.1  Patient is to be notified regarding pre-procedure preparations and what they can expect during the procedure.

4.1.1.1  Verify order and coordinate time of procedure with patient, exam physician and nurse.

4.1.1.2  Patient is to fast for four to six hours prior to the examination.

4.1.1.3  Inspect the TEE probe for any rips, tears, or abnormalities.

4.2  **Equipment/Personnel**

4.2.1  A physician, a cardiac sonographer, and a Registered Nurse shall be present during all TEEs performed.

4.2.2  Ultrasound machine with TEE probe.

4.2.3  Sedation and reversal agents.

4.2.4  Suction canister with tubing and tip. Emesis basin.

4.2.5  O2 nasal prongs with connection to O2.

4.2.6  Thermometer.

4.2.7  Pulse oximeter.

4.2.8  Blood pressure monitoring.

4.2.9  Gloves, tongue blades, bite block, lubricant, gowns, goggles or mask when indicated.

4.2.10  Intravenous access, 2 – 10 cc syringes, and NS with three way stopcock for saline bubble study.

4.2.11  EKG electrodes and monitor.

4.2.12  Crash cart and ACLS trained personnel readily available.

4.2.13  Signed consent form and medication logs.

4.2.14  IV pump.

4.2.15  Medication handheld scanner.

4.3  **Goal**

4.3.1  To provide the patient and physician with a detailed, accurate, and informative transesophageal echocardiogram by achieving an assessment of overall function of the heart and great vessels.

4.4  **Indications**

4.4.1  A TEE order will be the physician’s decision based on the patient’s signs, symptoms, and history.

4.4.2  To assess prosthetic valve function, note presence of atrial tumors or thrombi, valvular vegetation from infective endocarditis, valvular defects, congenital heart defects and thoracic aortic dissection.

4.4.3  Monitor cardiac function in high-risk cardiac patients during non-surgery with continuous “on-line” assessment of left ventricular function.
4.5 **Contraindications**

4.5.1 Contraindications will be considered by the doctor when ordering a transesophageal echocardiogram and include but is not limited to: (Relative*)

- Uncooperative/Unwilling patient
- Dysphagia
- Mediastinal radiation
- Active upper gastrointestinal bleeding
- Penetrating/blunt chest trauma
- Recent gastroesophageal surgery
- Known esophageal pathology
- Extreme oropharyngeal muscle weakness
- Severe, uncontrolled bleeding disorders
- *History of esophageal surgery (i.e. esophagectomy)*
- *History of esophageal cancer*
- History of obstruction (i.e. esophageal strictures, esophageal diverticulae)
- Active GI bleed
- Perforated viscus
- Severe cervical arthritis
- *History of esophageal varices*
- Profound oropharyngeal distortion
- *Coagulopathy*
- Uncooperative patient
- History of chest wall radiation therapy

4.6 **Protocol**

4.6.1 Explain the procedure to the patient and obtain a signed consent.

4.6.2 Remove patient dentures.

4.6.3 Check CPR equipment and obtain IV access.

4.6.4 Anesthetize the pharynx to suppress gag reflex.

4.6.5 Deliver IV sedation.

4.6.6 Flex the patient’s neck with patient in left lateral position, place a bite guard in the patient’s mouth, apply gel to the probe and insert through the bite guard while having the patient swallow.
4.6.7 Acquire approval must be turned off in machine settings (echosonographer).

4.6.8 After patient is sedated and the probe is in place, the sonographer will begin acquiring images per protocol and physician’s orders.

4.7 Post-Procedure

4.7.1 Following the study, when the probe is removed, check it for any evidence of bleeding, clean it of all debris, rinse it, and place it in the glutaraldehyde soaking tube for 20 minutes (One hour for known Tuberculosis patients. Please refer to the Glutaraldehyde Management (Cidexplus®) for Transesophageal Echocardiography policy.)

4.7.2 Removal of the probe is to be done with a towel to insure no dripping and rinsed for roughly one minute. It is then placed in the water soaking tube for approximately 2-3 minutes.

4.7.3 The patient is to be monitored for 60 minutes post sedative administration, and should remain NPO until gag reflex returns (roughly 2 to 3 hours). The IV is to be discontinued after the patient is able to stand and walk, and the blood pressure is near baseline. The patient is to also be informed that certain tasks such as driving or operating moving equipment should not be done for 24 hours. Patient is to report a sore throat if it persists for more than two days, and contact a physician immediately if bleeding from the mouth occurs, IV site is painful, fever develops, or if patient has any other problems or concerns. If patient is discharged to home, a responsible adult must drive the patient home.

4.8 Bubble Study

4.8.1 A bubble study is a diagnostic procedure performed during a Transesophageal Echocardiogram to evaluate the intra-atrial septum for atrial septal defect - looking to see if there is a hole in the septum.

4.8.2 During a Bubble Study, trained personnel will rapidly inject of Cardio-Green or an agitated solution of Normal Saline or 50% Dextrose. The procedure may require a second person to prepare the agitated solution or inject it rapidly through an 18—20 gauge IV port.

4.8.3 To obtain an agitated solution:
4.8.3.1 Draw up 10 cc Normal Saline, 50% Dextrose, or Cardio Green in one syringe, attach to a three-way stopcock.
4.8.3.2 Attach empty 10 cc syringe to a 3-way stopcock.
4.8.3.3 Turn stopcock to flush solution back and forth between the 2 syringes.
4.8.3.4 When the solution is fully agitated, inject rapidly through IV port nearest insertion site. Notify attending physician when bubble study is complete/in.
4.8.3.5 The agitation of the solution causes “BUBBLE” to form, hence, it is called a bubble study.