

ABC GENERAL HOSPITAL ECHOCARDIOGRAPHY LABORATORY

PROTOCOL FOR PERFORMING COMPLETE TRANSTHORACIC ECHOCARDIOGRAMS

Purpose: To provide standards for performing quality echocardiograms.

General Guidelines:

- No echocardiograms will be performed without a written order (for stat requests, a verbal order is sufficient; obtain the written order ASAP). Examine the order for type of exam and indication.**
- All echocardiograms should contain the images and Doppler measurements listed under “Routine Echocardiograms”. In addition, the sonographer should obtain any images and/or Doppler measurements pertinent to the patient’s particular pathology. If the sonographer is unable to obtain an image, the attempt must be documented.**
- All echocardiograms will be captured digitally and stored in the xxxxx digital reading system. Two-beat loops will be obtained; for A-fib cases, obtain five-beat loops of the PLAX, PSAX at pap level, A4C and A2C.
- Two-beat digital captures will be obtained of each view, 2D measurement, color Doppler view, spectral waveform and waveform measurement.
- Images will be obtained from standard on-axis imaging planes; measurements will be made from standard orthogonal views.**
- Machine settings, transducer selection and patient position will be adjusted as needed to optimize images (including valvular morphology and endocardial border definition), color Doppler and spectral Doppler.**
- Contrast will be used to enhance endocardial border definition when two or more adjacent wall segments are not well visualized in any apical view.

Patient Preparation:

- Introduce yourself to patient.
- Verify patient identity according to hospital procedure.
- Explain the test.
- Allow privacy for [out]patient to change into hospital gown. (An inpatient will usually have a gown on.)**
- Attach EKG leads from the echo machine to the patient.**
- Position patient in the left lateral recumbent position.**
- Use gown or towel to cover female patient’s chest area during scanning.

ROUTINE ECHOCARDIOGRAMS:

Parasternal long axis view (PLAX) and related views:

- 1) Obtain a **PLAX**.**
- 2) Use increased depth to rule out effusions, then decrease depth.**
- 3) Measure all walls and chamber sizes using the linear measuring capability of the echo machine in the 2D mode. We will not routinely measure in M-mode. The following measurements will be made:
 - In **end-diastole**, measure the **anterior septum, left ventricular (LV) internal diameter**, and **posterior wall**.**
 - In **systole**, measure the **LV internal diameter**.**
 - The **aortic root** will be measured at **end-diastole**, at the sino-tubular junction, just distal to the sinus of Valsalva.**
 - The **left atrium** will be measured in **end-systole**, at its greatest anterior-posterior dimension.**
- 4) Interrogate the aortic and mitral valves with **color Doppler**.**
- 5) Obtain a **right ventricular outflow view (RVOT)**.
- 6) Interrogate the pulmonic valve with **color Doppler**.

- 7) Obtain a **right ventricular inflow view (RVIT)**.**
- 8) Interrogate the tricuspid valve with **color Doppler**.**
- 9) If tricuspid regurgitation (TR) is present, use **continuous wave (CW) Doppler** to obtain the RA/RV gradient, to calculate the **pulmonary artery pressure**.**

Parasternal short axis view (PSAX):

- 10) Obtain a **PSAX** at the level of the aortic valve. Demonstrate aortic, pulmonic and tricuspid valve leaflet morphology.**
- 11) Use **color Doppler** to individually interrogate the pulmonic, aortic and tricuspid valves. If TR is present, obtain the gradient with CW Doppler.**
- 12) Obtain pulsed **wave (PW) spectral Doppler** of the **tricuspid valve** inflow and the **pulmonic valve** outflow.**
- 13) Obtain a **PSAX** of the LV at the level of the mitral valve.**
- 14) Interrogate **interventricular septum** with **color Doppler**.
- 15) Obtain a **PSAX** of the LV at the level of the papillary muscles.**
- 16) Obtain a **PSAX** of the LV at the level of the apex.**

Apical four chamber and five chamber views (A4C and A5C):

- 17) Obtain an **A4C** from the apex of the heart. Take care not to foreshorten the image.**
- 18) Obtain **LA and RA areas** by tracing at end-systole. Take care to optimize volume of each chamber before tracing.
- 19) Obtain an **apical 5C** view to image the aortic valve.**
- 20) Use **color Doppler** to individually interrogate the mitral, aortic and tricuspid valves.**
- 21) If **TR** is present, obtain the **gradient** with CW.**
- 22) Obtain **spectral Doppler of the AV** with CW.**
- 23) Obtain **spectral Doppler of the LVOT** with PW.**
- 24) Obtain **spectral Doppler of MV** with PW at the leaflet tips.**
- 25) Obtain the **E/A ratio**.
- 26) Obtain **Tissue Doppler** in the myocardium of the basal lateral wall, adjacent to the LA junction.

Apical two chamber view (A2C):

- 27) Obtain an **A2C** view. Take care not to foreshorten the image.**
- 28) Interrogate the mitral valve with **color Doppler**.**

Apical long axis view:

- 29) Obtain an apical long axis.**
- 30) Interrogate the mitral and aortic valves with **color Doppler**.**

Subcostal view:

- 31) Obtain a **subcostal four-chamber view**.**
- 32) Interrogate the **mitral and tricuspid valves** with **color Doppler**.**
- 33) If **TR** is present, obtain the **gradient** with CW.**
- 34) Interrogate the **interatrial and interventricular septa with color Doppler**, to look for a shunt.**
- 35) Obtain **subcostal short axis views** if the parasternal short axis views were suboptimal.**
- 36) Image the **inferior vena cava (IVC) entering the right atrium**, with and without respiration.** Capture 5 beats to demonstrate respiratory changes of the IVC.

Suprasternal Notch view (SSN) - when indicated:**

- 37) Reposition patient on back with pillow under shoulders/neck to optimize SSN images.
- 38) Obtain **suprasternal notch view** to image **aortic arch**. Visualize branches if possible.
- 39) Interrogate arch with **color Doppler**.
- 40) Obtain **spectral Doppler of descending aorta** with PW.

ADDITIONAL DATA NEEDED - CERTAIN PATHOLOGY

In addition to the above guidelines, we are responsible for obtaining additional images, measurements and Doppler based on pathology. Listed below are common pathologies and the additional data required.

Aortic stenosis:

- 1) **Zoom on AV** in PLAX and PSAX for valve morphology.
- 2) On zoomed PLAX AV, **measure LVOT diameter** (inner-to-inner edges) in systole.
- 3) In A4C, obtain **CW of aortic outflow**. Trace multiple waveforms.
- 4) In A4C, obtain **PW in LVOT**. Trace multiple waveforms.
- 5) In apical long, obtain **CW of aortic outflow**. Document velocity, but enter data into analysis package only if higher velocity obtained.
- 6) Interrogate aortic outflow with **non-imaging probe in SSN area AND in right parasternal area**** (reposition patient onto right side for right parasternal area.**). Document velocity, but enter data into analysis package only if higher velocity obtained.

Greater than Mild Mitral Regurgitation:

- 1) **Obtain PISA:**
 - Obtain **CW Doppler of MR** jet.
 - **Zoom on MV** with PISA “shells” on LV side of MV.
 - **Reduce color scale** to about 30 to optimize PISA shells.
 - Obtain several 2D **linear measurements** of the hemispheric PISA shells.
- 2) **Measure vena contracta:**
 - Return color to **normal scale**.
 - **Zoom on MV** and LA side of MV.
 - Optimize narrowest area of MR jet; obtain 2D **linear measurements** orthogonal to narrowest MR flow.

Signatures:

_____ Medical Director

_____ Technical Director