TTE Basics
Anesthesia Residency
POCUS Curriculum
Transthoracic Echocardiography

- A “point of care” ultrasound (POCUS) exam can be performed at the patient’s bedside and can be used in acute clinical situations to aid in making a diagnosis or providing a qualitative assessment of a patient.
• Advantages
  ▫ Fast and immediate results
  ▫ Non-invasive exam
  ▫ Dynamic assessments
  ▫ Serial monitoring

• Disadvantages
  ▫ Highly user-dependent
  ▫ Does not provide quantitative analysis
TTE in the unstable patient

- Identification of:
  - Hypovolemia (evaluation of volume status)
  - Cardiac tamponade
  - Left ventricular or right ventricular failure
  - Severe valvulopathies
Equipment

- Ultrasound machine
- TTE transducer
  - phased-array probe
- Gel
TTE Basic Exam

- 3 main windows

Images courtesy of: Introduction to Transthoracic Echocardiography. Philips Tutorial.
Parasternal Long Axis View

• Place transducer at the left sternal border, in the left 3\textsuperscript{rd}-4\textsuperscript{th} intercostal space

• Orient transducer with the probe indicator directed towards the right shoulder

• Optimal depth:
  ▫ To view the cardiac chambers and valves: 12-16cm
  ▫ To assess for pericardial or pleural effusions: 20-24cm
Parasternal Long Axis View
Parasternal Long Axis View

• Assessment of:
  ▫ LV size and function
  ▫ RV size and function
  ▫ Interventricular Septum
  ▫ Ascending Aorta
  ▫ Aortic valve
  ▫ Mitral valve
  ▫ Pericardium (& presence of effusions)
Parasternal Short-Axis View

• From the parasternal long-axis view, rotate transducer 90° clockwise

• Indicator now points towards the left shoulder

• Tilting the transducer allows for assessment of the heart at three locations:
  ▫ Aortic Valve
  ▫ Mitral Valve
  ▫ LV (@Mid-papillary level)

• Optimal depth: 12-16cm
Parasternal Short-Axis View

• Three views from parasternal window are obtained by tilting the transducer from the right shoulder/head towards the feet:
  ▫ 1) Aortic valve
  ▫ 2) Mitral valve
  ▫ 3) Mid-papillary
Parasternal Short Axis View

- Assessment of:
  - LV size and function
  - RV size and function
  - Aortic valve
  - Mitral valve
  - Presence of wall motion abnormalities
Apical 4-Chamber View

- Place transducer at the apical impulse, usually just inferior and medial to the left nipple (may need to scan more lateral in some patients)

- Indicator points towards the left flank (approx 3 o’clock)

- Optimal depth: 14-18cm
Apical 4-Chamber View
Apical 4-Chamber View

- Assessment of:
  - Left Ventricle and Atrium
  - Right Ventricle and Atrium
  - Aortic Valve
  - Mitral Valve
  - Tricuspid Valve
Subcostal 4-Chamber View

- Place transducer 2-3cm below xyphoid process
- Direct transducer toward the left shoulder
- Indicator probe should be directed towards the left shoulder (approx 3 o’clock)
- Optimal depth: 16-24 cm
Subcostal 4-Chamber View
Subcostal 4-Chamber View

- Assessment of:
  - Left Ventricle and Atrium
  - Right Ventricle and Atrium
  - Mitral Valve
  - Tricuspid Valve
  - Pericardium
Subcostal Inferior Vena Cava

- From the subcostal 4-chamber view, rotate the transducer 90° counter-clockwise
- Probe indicator points towards the head (12 o’clock)
- Important to see IVC merging into RA
Subcostal Inferior Vena Cava
Inferior Vena Cava

- Measure IVC diameter 2-3 cm inferior to the IVC/RA junction

Spontaneous Ventilating Patients
- An IVC collapse of greater than 50% during the respiratory cycle is strongly predictive of a low RA pressure (less than 10mmHg)

Mechanically Ventilated Patients
- IVC respiratory variation is a good predictor of pre-load responsiveness.
- Small IVC (<1.2cm) has a 100% specificity (but low sensitivity) for a RA pressure of less than 10mmHg.
References


5. Other resources:
   2. Tamingthesru.com
   3. https://lagunita.stanford.edu/courses/Medicine/FocusedTTE/OnGoing/about