Setup Enter patient information Attach EKG leads Select phased array transducer Choose ST UMMC 1 Echo preset

Parasternal long axis (PLAX) Qualitative EF assessment (CLIP) LVOT diameter (SAVE) PLAX, during end systole Inner edge to inner edge of aortic at base of aortic valve Normal 1.8-2.4 (~BSA, can use as surrogate if unable to measure) Color doppler over MV and AoV to look for regurgitation (CLIP)

Parasternal short axis (PSAX) Qualitative EF assessment at each level Level of papillary muscles (CLIP) - assess RV as well Level of mitral valve (CLIP) Level of aortic valve (CLIP) Color doppler over tricuspid to check for TR (CLIP)

Apical four chamber (A4C) Qualitative assessment of RV and LV size (CLIP) Color doppler over MV, LA, and LV (CLIP) Mitral inflow E-a (SAVE) A4C, mitral valve, PW doppler just inside ventricle Above baseline, measuring flow into the ventricle/towards the probe E = early diastolic filling A = late atrial kick A is just before QRS, E is before A E > A in normal and pseudonormal (super abnormal) Mitral annulus TDI (SAVE) A4C, mitral valve, lateral annulus, TDI → PW A' is just before QRS, E' is before A' E' and E occur at the same time point in the cardiac cycle Normal E/E' >10 Color doppler over TV (CLIP) TR Vmax (SAVE) A4C, CW doppler Can also be done in PSAX, CW doppler, if visible at aortic valve level Only if tricuspid regurgitation is present Surrogate for RVSP/PASP (TR max PG = RVSP + CVP) TAPSE (SAVE) A4C, tricuspid valve, lateral annulus, M-mode Estimate visually before measuring Measure peak to valley RV specific, only free wall, no contribution from septum/LV Normal >1.7

Apical five chamber (A5C) Collar doppler over LVOT and AoV (CLIP) LVOT VTI (SAVE) A5C, aortic valve, PW doppler where LVOT diameter was measured Quantitative surrogate for stroke volume (SV) Trace largest flow away from probe, baseline to baseline Normal 18-24 in euvolemia (approx. 10x BSA) Stroke volume variation (SAVE) Using doppler saved for LVOT VTI, need at least 10 beats Decrease sweep speed (25-35 mm/sec) to see multiple beats Measure SV maximum and minimum flow Cannot do in arrhythmia, not validated in low EF AoV Vmax A5C, aortic valve, CW doppler If AS, SVV measurement is invalidated Normal <200

Subcostal (SC) Evaluate for pericardial effusion (CLIP) Oblique view with IVC (CLIP) IVC collapsibility (SAVE) SC oblique, M-mode If variability, measure max and min Hepatic vein IVC view, PW doppler Drains right atrium/IVC, transduces the pressures of the right side Occurs between two QRS complexes S = ventricular systole, actually seeing atrial diastole D = ventricular diastole, actually seeing atrial systole A = atrial kick, causes small reversal in pressure Portal vein IVC view, PW doppler Normal vein, should have continuous flow "Pulsatility" or "to and fro" pattern = volume intolerance

Pulmonary Gen Abdomen preset 6 locations - upper, mid, and lower on left and right (CLIP x6) Evaluation for B lines Rating - (0) = absent, (1 zone) = scattered, (>2 zones) = diffuse

Internal Jugular veins (IJ) Linear probe, decrease depth to 5cm Measure at HOB 0 degrees and then HOB 90 degrees Only need one side