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| Position | Images | Measurements | Tips |
| Apical 4 Ch | - 2D | Simpson’s biplane (LV 4Ch and 2Ch) |  |
| RV Focused view– 2D, color over TV - PW through TV to E, A- CW through TV for TR | TR jet for RVSpTV annulus diameter | Color scale 70-80 |
| Narrow to LV – PV view- 2D, color over PV- PW within PV | Pulmonary Vein S, D and A | Increase depth to see PVColor scale 50-60 |
| Narrow to LV – MV view- 2D, color over MV- PW at the tips of MV leaflets- CW to interrogate MR if present - CW through mid-cavity if flow acceleration on color Doppler | MV E and A, E/A ratioMV annulus diameter | Color scale 70-80 |
| Open LVOT (clockwise rotation)- 2D, color of LV- PW at intersection of inflow and outflow  | IVRT | Color scale 70-80Decrease sweep speed to measure IVRT |
| Apical 5 Ch | - 2D, color over LVOT- PW with sample volume at hinge points of the aortic valve- CW through the LVOT | LV VTI, HR | Keep angle parallel to the LVOT for accurate VTI |
| Apical 4 Ch | -2D, TDI |  |  |
| Narrow sector width to septum- 2D, TDI- PW just below MV annulus in the wall of septum | Septal E’, A’, S’ | Ideal frame rate > 200 fps |
| Narrow sector width to LV wall- 2D, TDI- PW just below MV annulus in the wall of LV lateral wall | LV E’, A’, S’ | Ideal frame rate > 200 fps |
| Narrow sector width to RV wall- 2D, TDI- PW just below TV annulus in the wall of RV lateral wall | RV E’, A’, S’ | Ideal frame rate > 200 fps |
| Narrow sector to TV annulus- 2D, TDI- m-mode at TV annulus | TAPSE | Cursor perpendicular to tricuspid annulus |
| VSD sweep- Narrow to septum and sweep with color from anterior to posterior- PW & CW of VSD if applicable |  | Color scale 45-60 |

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| Apical LV 2 Ch | - 2D, color mitral valve- 2D, TDI |  |  |
| Narrow sector to anterior wall- 2D, TDI- PW just below MV annulus in the wall of LV anterior wall |  | Ideal frame rate > 200 fps |
| Narrow sector to inferior wall- 2D, TDI- PW just below MV annulus in the wall of LV inferior wall |  | Ideal frame rate > 200 fps |
| Apical LV3 Ch | - 2D, color over MV, LVOT- 2D, TDI |  |  |
| Narrow sector to posterior wall- 2D, TDI- PW just below MV annulus in the wall of LV posterior wall |  | Ideal frame rate > 200 fps |
| Apical RV 3Ch | - 2D | RV FAC |  |
| - color over TV- CW through TV for TR | RVSp by TR jet | Color scale 70-80 |
| - 2D, color over PA- PW at the level of PA leaflets- CW through the PA |  |  |
| PS Long Axis - LV | - 2D- mmode through LV at tips of MV leaflets | LVID, LVIS, FSRVID, IVSd and PWd FS & EF by mmode | M-mode perpendicular to the septal wall |
| Narrow Sector width to Ao- zoom of Ao annulus- mmode through Ao and LA | Ao annulus diameterLA:Ao ratio | Measure diameter at hinge points of the aortic valve |
| - color over Ao, MV |  | Color scale 60-70 |
| VSD sweep- Color sweep of ventricular septum from PA to TV; 2 sweeps (base, apex) may be required for full septum- PW & CW of VSD if applicable |  | Color scale 45-60 |
| PS Long Axis - PA | - 2D, color over PA- PW at the level of the PA leaflets- CW  | RVET:PAAT ratioRV VTIPA annulus diameter | PW parallel to the direction of PA flow |
| PS Long Axis - RV | - 2D, color over RV- CW through TR | RVSp by TR jet | Color scale 70-80 |
| SVC view | - Identify line tip position if line in place [rotate counter clockwise, angle medially] | Position of PICC if applicable | Moving the arm or flushing the line may aid identification of tip |
| PS Short Axis – Ao level | - 2D- 2D and color images of coronary artery origins |  | Ensure all 3 valves are openingUse coronary mode, may require counter clockwise rotation to optimize view. |
| Narrow to RV- 2D, color - CW through TR | RVSp by TR jet | Color scale 70-80 |
| Narrow to PA- 2D, color- PW at the level of the PA leaflets | RVET:PAAT ratio | Color scale 70-80 |
| - 2D at the level of the MV leaflets- 2D at the papillary muscles- mmode through the tips of MV leaflets- 2D at the apex | LVID, LVIS, FSRV:LV area ratio at tip of MV leaflets [PH]Eccentricity index | M-mode perpendicular to the LV wall at the tips of MV leaflets |
| VSD sweep- Narrow to posterior septum at the base and sweep with color to the apex- Narrow to the anterior septum at the base and sweep with color to the apex- PW & CW of VSD if applicable |  | Color scale 45-60 |
| SSN, High PS | Aortic arch branching- 2D, color sweep to document arch branching |  | Color scale 50-60 |
| LSVC sweep- 2D, color sweep to document presence/absence of left SVC |  | Color scale 50-60 |
| Arch Images- 2D, color of aortic arch- preductal PW- 2D, color of descending aorta- postductal PW, add CW if turbulence or aliasing | Add aortic arch measurements if qualitatively small | Color scale 70-80Ensure 3 proximal branches are visible to definitively identify aortic arch |
| PDA Images- 2D, color sweep (starting at arch and sweeping towards PA)- PW at the narrowest point of DA- CW if PW is aliasing | Size of DAPmean/Pmax DA | Lower color scale to 50-60 if evidence of high PVR to assess for low velocity R – L DA shunt |
| Branch PA images- 2D, color of branch Pas- PW through each PA branch- add CW if turbulence or aliasing | LPA and RPA diameter | If ductal Doppler not straight angle, can angle posterior from branch PA view for alternate DA view |
| Pulmonary Veins- 2D, color of “crab view”- Isolate each pulmonary vein with 2D and color- PW of each vein |  | Color scale of 30-50Ensure both 2D and color images to document drainage of each PV into LA |

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| Subcostal View | SVC View- 2D, color- PW within the SVC- 2D and color sweep from bicaval position to apex with color box positioned over the ventricular septum- 2D and color sweep from a long axis position with the color box positioned over the ventricular septum |  | Color scale of 45-60Ensure visualization of crossing outflow tracts & branch PAs branching from the most anterior vessel arising from the RV |
| Atrial Septum- 2D, color sweep of atrial septum- focused 2D and color image of PFO/ASD if applicable- PW at ASD/PFO | Size of ASD/PFO | Color scale of 40-60 |
| IVC Sagittal View- IVC/hepatic vein 2D, color- PW hepatic vein | Position of UVC or lower limb PICC if applicable | Color scale of 40-60 |
| Aorta sagittal View- Celiac artery 2D, color- PW celiac artery- SMA 2D, color- PW SMA |  | May need to move down towards umbilicus to straighten PW angle |
| Abdominal Situs- 2D and color sweep documenting the position of the IVC in relation to the aorta and the direction of the apex |  |  |
| Brain | - 2D, color of MCA- PW MCA |  | Probe at 3 O’clock between angle of eye and ear |

**GENERAL TIPS**

* Anatomic review should be completed by a pediatric cardiologist in a timely fashion. Concurrent structural and TnECHO reports should be completed for all first studies [per clinical algorithm]
* All CW and PW Doppler measurements should be parallel to the line of flow. Measurements which are out of alignment underestimate the measured velocity and lead to inaccurate calculations
* TDI measurements should be parallel to the wall in question with a sample volume just below the level of the annulus and a sample volume of 2mm
* Always save a 2D and color image prior to a Doppler to demonstrate the appropriate imaging plane has been identified. Measurements from off-axis or malaligned images may not be accurate.
* Supplemental images of brain, bladder may be considered as adjunctive images in acutely ill infants