

## SUGGESTED PROTOCOL FOR TTX ECHOCARDIOGRAPHY

This is a suggested protocol for the acquisition of images and measurements for a standard transthoracic exam. It is expected that additional images will be required based on the pathology being imaged. Individual laboratories should develop their own protocol and all sonographers should adhere to the same protocol to allow easy comparison of studies. Students are not expected to follow this protocol but it may be used as a guide.

VIEW	Clips (still frames / cine-loops)
Parasternal LAX	<b>PLAX LV:</b>
	2D deep view
	2D standard view
	M-mode AV (no measurement)*
	M-mode MV (no measurement)*
	M-mode LV (no measurement)*
	2D LV measurement – ED (with dynamic clip prior)
	2D LV measurement - ES
	AV zoom – 2 beat cine-loop
	LVOT diameter measurement x 2
	Aortic root measurement (SofV + STJ)
	AV CFI
	Ascending aorta (higher rib space)
	Ascending aorta measurement
	Ascending aorta CFI (to fill lumen)
	MV zoom
	MV CFI
	<b>RVIN:</b>
	2D
TV CFI	
CWD – TR (attempt routinely; measure if parallel) <sup>!</sup>	
<b>RVOT:</b>	
2D	
RVOT / main PA / branch PA CFI (may require 2 clips)	
RVOT PWD	
PV/PA CWD (+ PR CWD PR if present)	

\*2015 ASE Recommendations for Chamber Quantification discourage M-mode measurements of the AV and LV. M-mode measurements should only be attempted if required by your laboratory and these values should always be cross-checked with 2D measurements. M-mode traces (without measurements) are very useful for valve / wall motion analysis (particularly in some pathology states).

! Spectral Doppler measurements should be averaged over 2 consecutive cycles (sinus); 3-5 cycles in AF

<b>Parasternal SAX view</b>	<b>AV level:</b> 2D overview
	AV zoom
	AV CFI
	TV 2D
	TV CFI
	TV CWD (measure if parallel) – consider para-apical view also
	PV/PA 2D
	PV CFI (+/- extra clip for branches)
	RVOT PWD (PLAX or PSAX - view with best alignment)
	PV/PA CWD (+ PR CWD if present)
	IAS 2D zoom
	IAS CFI zoom
	<b>MV level:</b> MV 2D (recommend with zoom)
	MV CFI (recommend with zoom - may require multiple clips if MR present)
	<b>PSAX pap muscle level 2D</b>
	<b>PSAX LV apex (+/- apical SAX)</b>

<b>Apical 4-ch view</b>	2D overview
	LA volume measurement (lab preference whether zoom used)
	RA volume measurement (lab preference whether zoom used)
	2D focussed LV (2 beat cineloop)
	Simpson's EDV trace %
	Simpson's ESV trace %
	2D RV focussed view
	RV size – focussed view (base +/- mid +/- length)
	TV annulus DTI S' – apical view with best alignment
	TV annulus TAPSE - – apical view with best alignment (+/- RVFAC, if suitable)
	MV zoom
	MV CFI
	MR CWD (if MR)
	PWD MV inflow #
	MV annulus TDI septal e' #
	MV annulus TDI lateral e' #
	PWD pulmonary veins # (this may not be required in every study but is good to perform whilst you are learning for practice)
	TV CFI
	TV CWD (+/- RV modified view for improved alignment)

% Students are strongly encouraged to perform Simpson's traces *during* the study so that consideration of values for error-checking purposes can occur at the time of the study

# Diastolic function parameters should be performed consecutively for ease of interpretation

<b>Apical 5-ch view</b>	2D overview
	AV zoom
	LVOT/AV CFI
	PWD LVOT - VTI <sup>§</sup>
	CWD AV - VTI <sup>§</sup>

§ additional or alternative to ALAX view

<b>Apical 2-ch view</b>	2D overview
	LA volume measurement (lab preference whether zoom used)
	MV CFI (+/- zoom)
	2D focussed LV (2 beat cine-loop)
	Simpson's EDV trace
	Simpson's ESV trace

<b>Apical LAX view</b>	2D overview
	MV CFI (+/- zoom)
	LVOT/AV CFI (+/- zoom)
	2D focussed LV (2 beat cine-loop)
	+/- TV imaging

<b>Non-imaging probe<sup>^</sup></b>	AV signal from apex
	Any other relevant pathology

<sup>^</sup> Students are strongly encouraged to use the non-imaging probe in all patients. This skill requires frequent practice and once proficient, does not take a lot of additional time.

<b>Subcostal 4-ch view</b>	2D overview
	2D RV zoom
	2D IAS zoom
	IAS CFI (+/- IVS CFI)

<b>Subcostal SAX view</b>	2D overview
	2D zoom IAS
	IAS CFI
	2D LV, MV as necessary
	IVC / HV (multi-beat for respiratory response)
	IVC measurements for RAp estimation
	Abdo aorta (+/- CFI and PWD)

<b>Suprasternal notch</b>	2D overview
	CFI descending aorta
	PWD descending aorta
	CWD descending aorta
	Aortic arch measurement (if ascending aorta dilated, or otherwise required)

<b>Additional clips</b>	<b>Lab-directed (as per lab-specific protocol)</b> Advanced imaging including 3D, GLS, contrast
	<b>Pathologies</b> Additional clips will be required depending on the pathology being interrogated (e.g., RSE 2D ascending aortic measurement in AS, HTN, aortopathy).
	<b>Report pages</b> Clip all report pages (calculations and measurements) at end of study for easy review of measurements / error-checking
	<b>Non-imaging probe</b> should be used from apical, SSN, RSE and RSCL in all AS and AVR patients. Non-imaging probe should be used for other pathologies, as req'd.