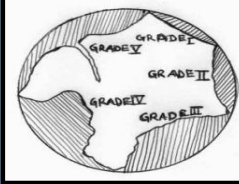


	e'	E/A	E velocity	E Decel. time	IVRT
Normal	>8	E>A	70-120 cm/s	160-240ms	80-100ms
Impaired relaxation	≤8	E<A	Decreased	>240ms	>110ms
Pseudo-normal	≤8	E>A	70-120 cm/s	160-240ms	80-100ms
Restrictive	≤8	E>A	Increased	<160ms	<80ms

LV diastolic function

Atria (4Ch, AV SAX) @ end LV systole L.Ventricle LV EDD LV ESD LV EDA LV Sept	Normal <2.3cm/m ² BSA 39 ± 6mm 47 ± 4mm 33 ± 5mm 12cm ² <11mm	Moderate 45 – 50 mm 15 – 19 mm	Severe >50 mm >20 cm ² >20 mm	Great Vessels: MOE asc SAX – PA, Ao, SVC, CO from PA; Desc Ao-atheroma, dissection, IABP, pleural spaces; CWD – if AI Aortic atheroma: Grading I) Minimal intimal thickening < 3mm II) Extensive thickening < 5mm III) Sessile atheroma IV) Atheroma protruding into lumen V) Mobile protruding atheroma			
Aortic Valve: Cusps, calcification, coronary arteries, AVA – 2-4 cm ² ; Colour doppler for AI; CWD - velocity gradient, VTI, SV, CO, AVA (continuity equation); PHT of AI, AV Ann: 19 mm LAX (14 – 26), LVOT: 20 mm LAX (18 – 22) Sinus: 28 mm (21 – 35); STJcn: 24 mm (17 – 34); Asc Ao: 28 mm (21 – 34) Desc Ao: 20 mm (13 – 30)				Mitral Valve: Leaflet - excursion, thickening, doming, restriction, calcification, vegetations, prolapse, flail; MVA (4-6 cm ²) Annulus dia – (N-2.6 – 3.3) at LAX/4Ch/COM Chordae – ruptured, redundant; Pap muscle – integrity/function Colour doppler – MR; PWD – gradient; PHT, LV diast. Func, VTI; MV Ann /ES/ COM 35 mm (28 – 44)			
AV Stenosis AV Area(cm ²) PG (mm of Hg) Mean gradient	Mild 1.1 – 1.9 <2.5 mmHg <20	Moderate 0.75 - 1 25 - 75 20 - 50	Severe < 0.75 >75 mmHg >50	MV Stenosis MV Area(cm ²) Mean Grad. PHT (msec)	Mild 1.5 – 2 <6 <150	Moderate 1.0 – 1.5 6 – 12 150 – 200 ms	Severe < 1.0 > 12 > 220 ms
AV Incompetence Perry Index (%) Distal arch retro flow PHT (msec) Jet length (Regurg. Vol (mls)) Regurg frac. (%)	Mild <30 Early diast. >500 <45 <30	Moderate 30-60 Early/mid 300-500 45- 60 30 – 55	Severe > 60 Holodiast. <300 Hits opp wall >60 >55	MV Incompetence: Jet area cm ² Vena contracta R O Area (cm ²) Pulm Vein S wave R _{PISA} (Nyq: 30cm/s) (Regurg. Vol (mls)) (Regurg. frac%)	Mild 0.5 – 4 0.1-0.3 cm <0.3 S>D 30 – 45 <25	Moderate 4 – 8 0.3 – 0.5 cm 0.3 – 0.4 Blunting 45 – 60 25 – 55	Severe > 8 > 0.5 cm > 0.4 Reversing > 1cm > 60 > 55
Tricuspid Valve: TV stenosis: grad > 6mm of Hg(severe), TV (CSA): 5 – 8 cm ² TV annulus 28mm(20 - 40) 4ChES				LV Function Fract Shortening = 25 – 45% Fract Area Ch. = 45 – 64% Ejection Fraction - 55 – 75 % dp/dt >1000mmHg Global function: SAX, FAC; Simpsons (4Ch); M-mode FS, MAPSE			
TV Incompetence CWD Jet density Jet area (cm ²) Vena contracta (mm) Hepatic venous flow	Mild Soft <5 Syst. doming	Moderate More dense 5 – 10 Syst. blunting	Severe Very dense >10 >7 Syst.reversal	LA: size(D <5cm), thrombus, Vegetation; LAA thrombus LUPV-PWD, PV A velocity >25 = LAP >12			
Pulmonary Valve: Main PA: 18mm (15 - 21); PV. Area: 3.5 – 4.5 cm ² ; Annulus: 20mm(17 – 23); Pulmonary stenosis: gradient >60mm (severe) Pulmonary Incompetence Features of moderate to severe PR: RA & RV dilatation (EDD > 2.6 cm), TR- RV impairment				RA: size, Eustachian valve, chiari network, ASD, coronary sinus			
RV dimensions: MOE 4Ch RV EDD RV EDACm ² (of LV) RV FAC (SAX/4Ch) RV wall	Normal < 3.3 <28 (≤2/3) 60-32% < 5mm ED	Moderate 3.8-4.2 (2/3 – 1) 18-24%	Severe >4.4 (>1) ≤ 17%	RV Function: Size, septum, function - Normal, hypokinetic, akinetic, dyskinetic. TAPSE > 20 mm (4Ch)			

Some useful equations:

1) Modified Bernoulli equation: Pressure gradient = $4(V_2^2 - V_1^2) = 4V_2^2$ (if V_1 is close to or < 1m/sec)	6) $RVSP = 4 \times (V_{max} TR)^2 + RAP$ PASP = RVSP in absence of RVOT obstruction
2) Continuity equation: (LVOT and AV) $AV_{area} \times VTI_{AV} = LVOT_{area} \times VTI_{LVOT}$	7) LVEDP from AI jet $LVEDP = Diastolic\ arterial\ BP - 4 \times (End\ diastolic\ velocity\ AI)^2$
3) Mitral Valve area = 220/Pressure half time	8) LAP from MR jet $LAP = Systolic\ arterial\ pressure - 4 \times (V_{max} MR)^2$
4) PISA $Flow = 2\pi r_{max}^2 \times V_{alias}$ Regurgitant orifice area $\times V_{max} = 2\pi r_{max}^2 \times V_{alias}$	9) Regurgitant fraction: Mitral RF% = (mitral SV – aortic SV)/mitral SV Aortic RF% = (aortic SV – mitral SV)/aortic SV
5) dp/dt (MR jet) = 32mmHg $\times 1000/\Delta t$ (Δt = time taken for MR jet velocity to reach 1 to 3 m/sec)	10) Q_p/Q_s (shunt ratio) = $SV(Q_p\ site)/SV(Q_s\ site) \dots$ (SV = VTI \times orifice area)