



Echocardiography: Guidelines for Chamber Quantification

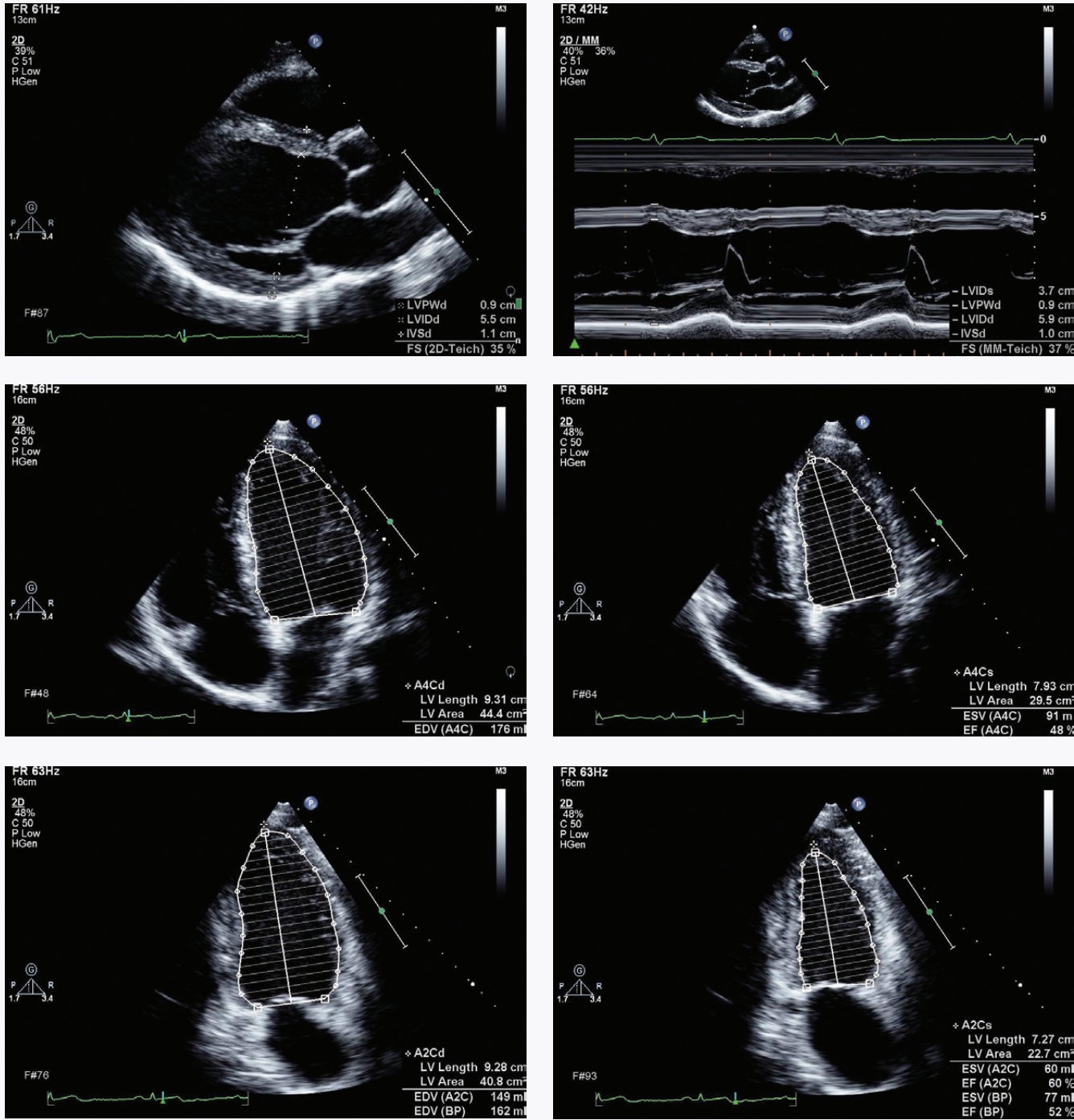
British Society of Echocardiography Education Committee

Navroz Masani (Chair), Gill Wharton (Lead Author), Jane Allen, John Chambers, Jane Graham, Richard Jones, Bushra Rana, Richard Steeds

Left ventricular size, mass & function

	Normal	Mild	Moderate	Severe
LV wall thickness				
IVSd / PWd (cm)	0.6–1.2	1.3–1.5	1.6–1.9	≥2.0
LV dimension, women				
LVIDd (cm)	3.9–5.3	5.4–5.7	5.8–6.1	≥6.2
LVIDd / BSA (cm/m ²)	2.4–3.2	3.3–3.4	3.5–3.7	≥3.8
LV dimension, men				
LVIDd (cm)	4.2–5.9	6.0–6.3	6.4–6.8	≥6.9
LVIDd / BSA (cm/m ²)	2.2–3.1	3.2–3.4	3.5–3.6	≥3.7
LV volume, women				
LV diastolic volume (ml)	56–104	105–117	118–130	≥131
LV systolic volume (ml)	19–49	50–59	60–69	≥70
LV volume, men				
LV diastolic volume (ml)	67–155	156–178	179–201	≥202
LV systolic volume (ml)	22–58	59–70	71–82	≥83
LV volume index				
LV diastolic volume/BSA (ml/m ²)	35–75	76–86	87–96	≥97
LV systolic volume/BSA (ml/m ²)	12–30	31–36	37–42	≥43
LV function				
Fractional shortening (%)	25–43	20–24	15–19	<15
Ejection fraction (%) EF by Biplane Simpson's method*	≥55	45–54	36–44	≤35
LV mass, women				
LV mass (g)	66–150	151–171	172–182	>182
LV mass / BSA (g/m ²)	44–88	89–100	101–112	>112
LV mass, men				
LV mass (g)	96–200	201–227	228–254	>254
LV mass / BSA (g/m ²)	50–102	103–116	117–130	>130

*Please see explanatory note



Left ventricular diastolic function

	Normal	Mild	Moderate	Severe
		↓ Relaxation	↓ Relaxation ↓ Compliance ↑ LVEDP	↓ Relaxation ↓ Compliance ↑↑ LVEDP
	Abnormal relaxation	Pseudo-Normal	Restrictive filling	
LV inflow Doppler				
E/A ratio	1–2	<1	1–2	>2
IVRT (ms)	50–100	>100	50–100	<50
DT (ms)	150–200	>200	150–200	<150
Pulmonary venous Doppler				
PV _s /PV _d	PV _s > PV _d	PV _s > PV _d	PV _s < PV _d	PV _s << PVD
PVa (m/s)	<0.35	<0.35	≥0.35	≥0.35
a _{dur} –A _{dur} (ms)	<20	<20	≥20	≥20
Mitral annular tissue Doppler				
E _m /A _m	1–2	<1	<1	<<1
E/E _m (septum)	<8	-	>15	-
E/E _m (lateral)	<10	-	>10	-

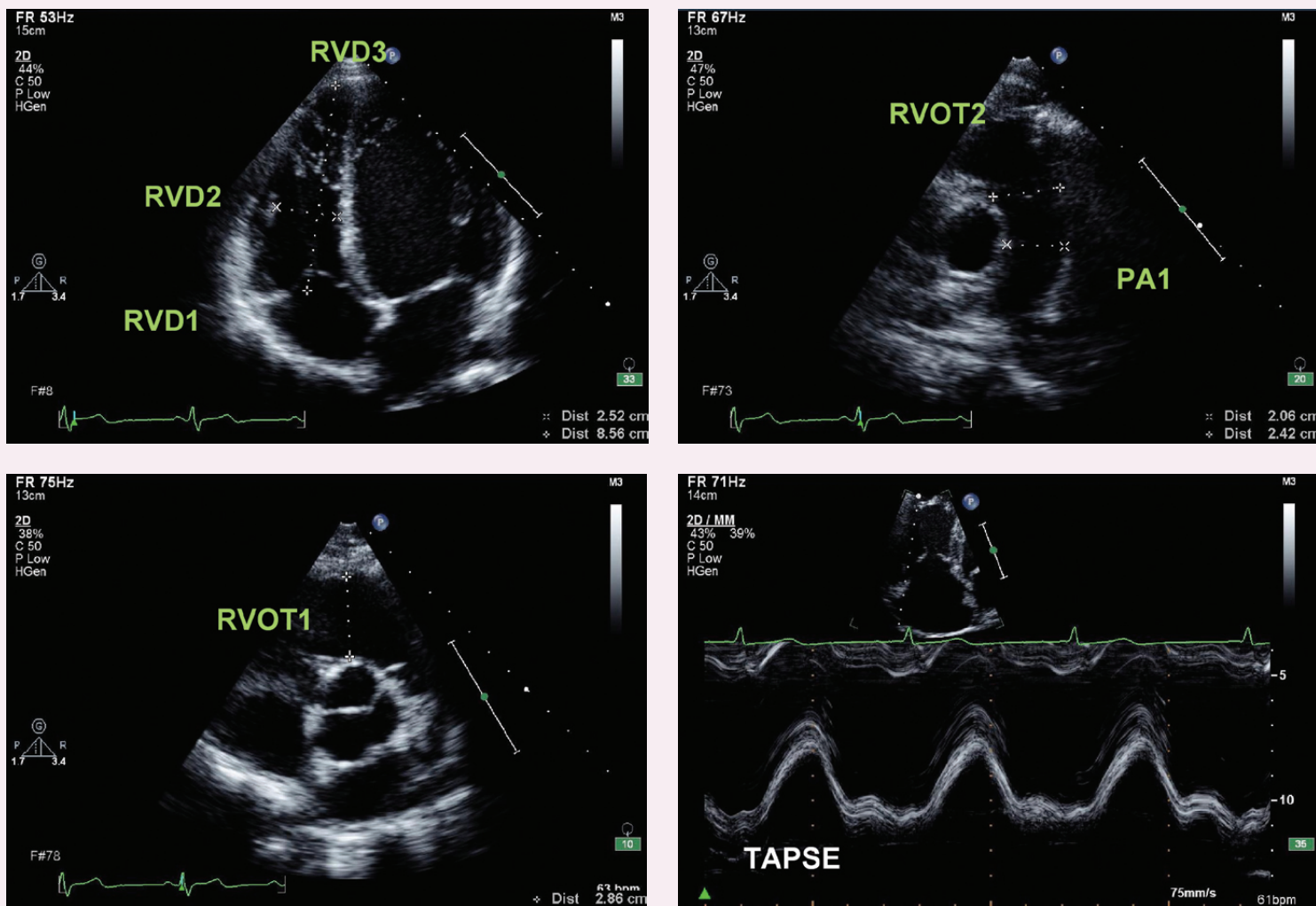
Left atrial size

	Normal	Mild	Moderate	Severe
LA size, women				
LA diameter (cm)	2.7–3.8	3.9–4.2	4.3–4.6	≥4.7
LA volume (ml)	22–52	53–62	63–72	≥73
LA size, men				
LA diameter (cm)	3.0–4.0	4.1–4.6	4.7–5.2	≥5.3
LA volume (ml)	18–58	59–68	69–78	≥79
LA size, index				
LA diameter (cm/m ²)	1.5–2.3	2.4–2.6	2.7–2.9	≥3.0
LA volume (ml/m ²)	16–28	29–33	34–39	≥40



Right ventricular size & function

	Abnormal
RV dimensions (apical 4 chamber)	
Basal RV diameter (RVD1) (cm)	>4.2
Mid RV diameter (RVD2) (cm)	>3.5
Base to apex length (RVD3) (cm)	>8.6
RVOT diameters (parasternal SAX)	
RVOT at AV level (RVOT1) (cm)	>3.5
RVOT at PV annulus (RVOT2) (cm)	>2.7
PA diameter (parasternal SAX)	
Main PA (PA1) (cm)	>2.2
RV area	
RV diastolic area (cm ²)	>25
RV systolic area (cm ²)	>14
RV function	
Fractional area change (%)	>35
TAPSE	>16



Right atrial pressure

	0–5mmHg	5–10	10–15	15–20	>20
IVC					
size (cm)	<1.5	1.5–2.5	1.5–2.5	>2.5	>2.5
Respiratory/sniff variation	collapse	↓ >50%	↓ <50%	↓ <50%	No change
Other					
RA size	normal	normal	↑	↑↑	↑↑
Hepatic vein size				↑	↑↑

Explanatory note & references

These guidelines have been developed by the Education Committee of the British Society of Echocardiography. They have been adapted from the international recommendations and guidelines referenced below. Where there are differences between published values, or there is a lack of clear evidence, recommended values have been developed on the basis of consensus opinion. **It is vital that echocardiographic measurements are made using standard, correct techniques and that all values are reported and interpreted in clinical context.**

Chamber Quantification
Adapted from:
Recommendations for Chamber Quantification: A Report from the American Society of Echocardiography's Guidelines and Standards Committee and the Chamber Quantification Writing Group. Developed in Conjunction with the European Association of Echocardiography, a Branch of the European Society of Cardiology.
Lang RM et al. *J Am Soc Echocardiogr* 2005; **18**:1440–1463
Right Ventricular Function

Adapted from:
Guidelines for the Echocardiographic Assessment of the Right Heart in Adults: A Report from the ASE Endorsed by the EAE, and the CSE. Rudski, LG, et al. *J Am Soc Echocardiogr* 2010; **23**:685–713.