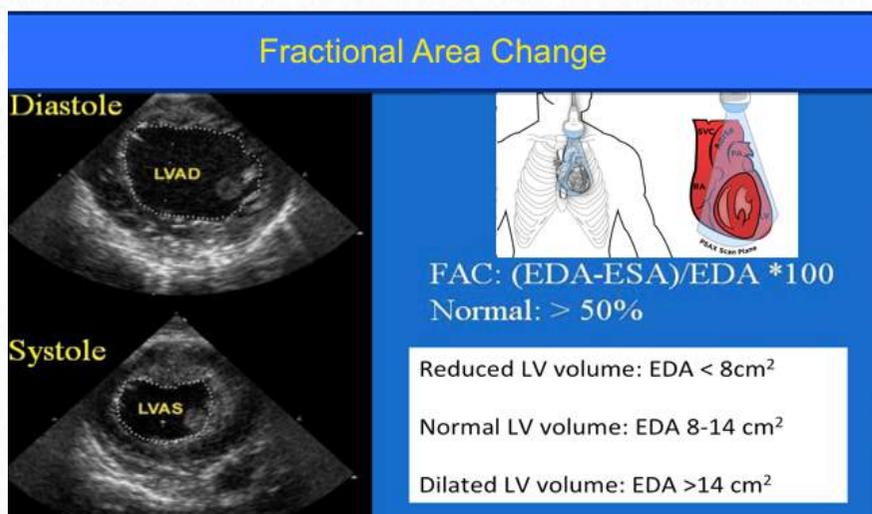


B. LEFT VENTRICLE END DIASTOLIC DIAMETER (LVEDD)

The diameter and/or the area of the left ventricle at the end of diastole represents the filling of the left heart and can indicate the patient's filling status. Using the measure or caliber feature, one can assess the diameter of the IVC in either a standard 2-D image or an M-mode image. The views used to obtain these measurements are the same views that will be used for further evaluation of cardiac function. Similar to IVC collapsibility, it is important to realize that even though this modality can help predict left ventricle volume, it does not indicate volume responsiveness. See the table at the end of this chapter for the relationship between LV diameter and LV area. In addition to measuring LV diastolic diameter or area to determine LV volume, these views can also be used to assess cardiac contractility by measuring the change in the diameter of the LV from diastole to systole. A left ventricular end diastolic diameter of less than 3.5 cm is a crude marker of a severely hypovolemic state. This change in area is called **fractional area change (FAC)** and indicates myocardial contractility (see table below).



Additionally, these views are useful in identifying the mechanism of shock:

- 1. Cardiogenic shock:** Increased LV area/diameter and a decreased FAC (from decreased contractility)
- 2. Hypovolemic shock:** Decreased LV area/diameter (from decreased preload) and an increased or normal FAC

- 3. Vasogenic shock:** Normal LV area/diameter and an increased or normal FAC (from low SVR state)

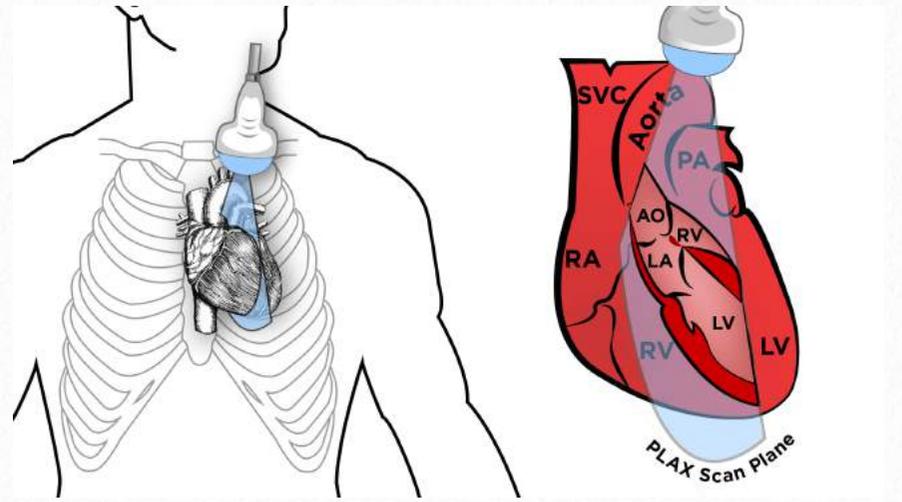
Methods of LVED Diameter Acquisition

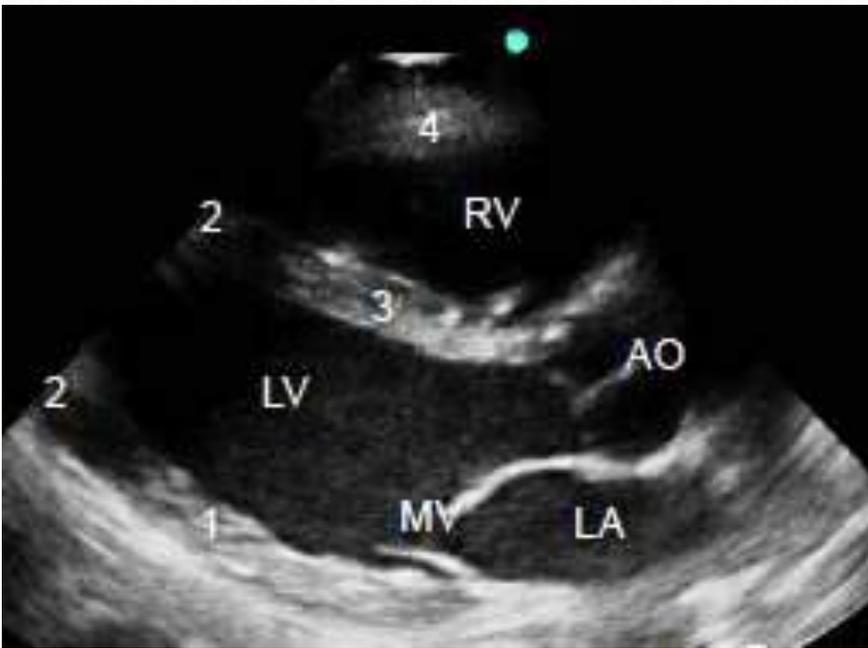
Patient Position: Left-Lateral with L arm extended

Probe Type: Phased array cardiac probe (small footprint/low frequency)

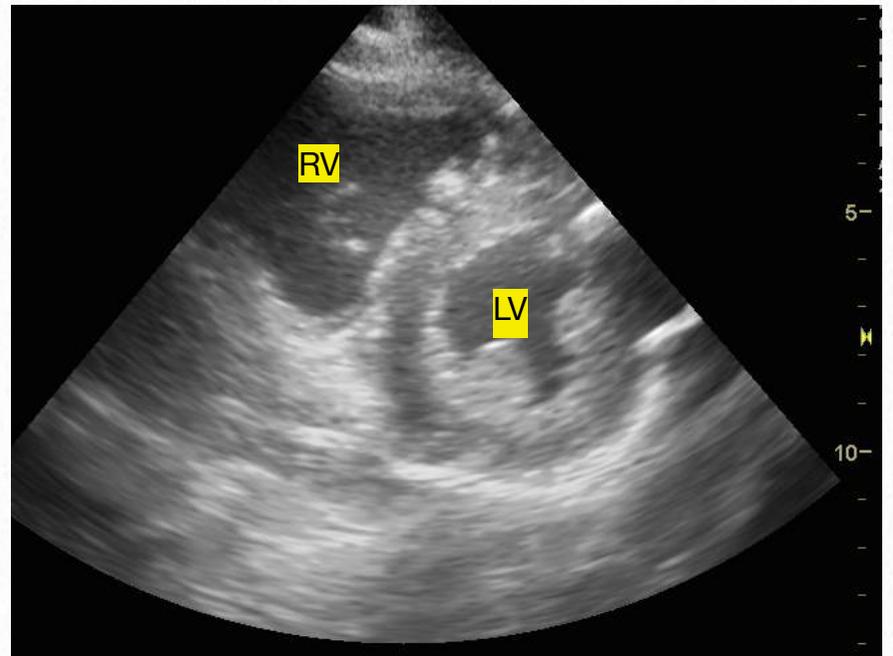
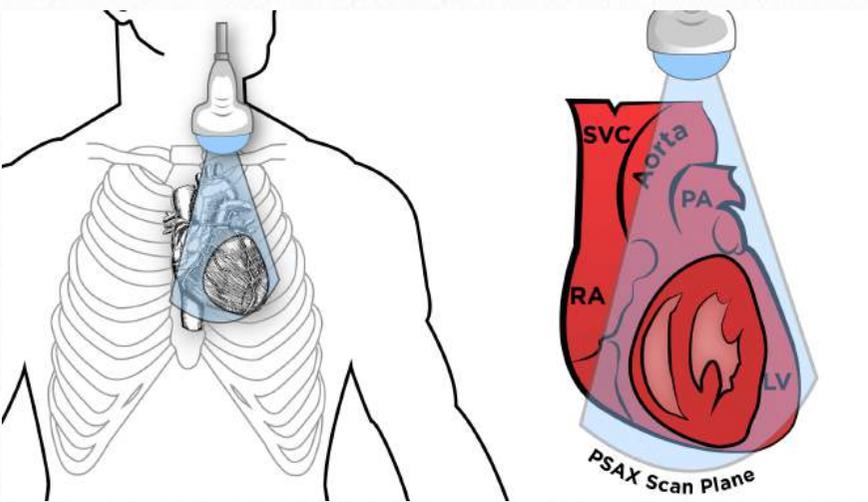
Probe Position: 10 o'clock or towards right shoulder.

Left parasternal long axis view: 3rd-4th interspace just lateral to the left of the patient's sternum with the index roughly at the 10 o'clock position, or aiming at the right shoulder (indicator shown in green).





Left parasternal short axis view: 3rd-4th interspace just lateral to the left of the patient's sternum with the index marker approximately at the 2 o'clock position or aiming towards the patient's left shoulder (90 degrees to LAX view). Also, remember that you must adjust the angle to get a good view of the mid-papillary level of the ventricle. Aiming towards the head will show the mitral valve followed by the aortic valve, and towards the feet will show the LV apex. Finally, you can verify that a good cross section is obtained by making sure the two papillary muscles are equal in size.



LVED Diameter Analysis

The diameter/area of the LV in end diastole relates to the filling of the left ventricle. Using the measure or caliber feature one can assess the diameter and area of the LV in end diastole in either a standard 2-D image or an M-mode image.

LV End Diastolic Diameter under 4cm suggests reduced stroke volume. However, it is important to realize that even though this modality can help predict left ventricle volume, it does not indicate volume responsiveness.

	Diastole	Systole
Cardiac Shock – decreased contractility, dilated left ventricular end-diastolic & end-systolic diameters, + RWMA		
Hypovolemic Shock – increased contractility, REDUCED left ventricular end-diastolic diameter (LVIDd)		
Vasogenic Shock (Low SVR) - increased contractility, NORMAL LVIDd		

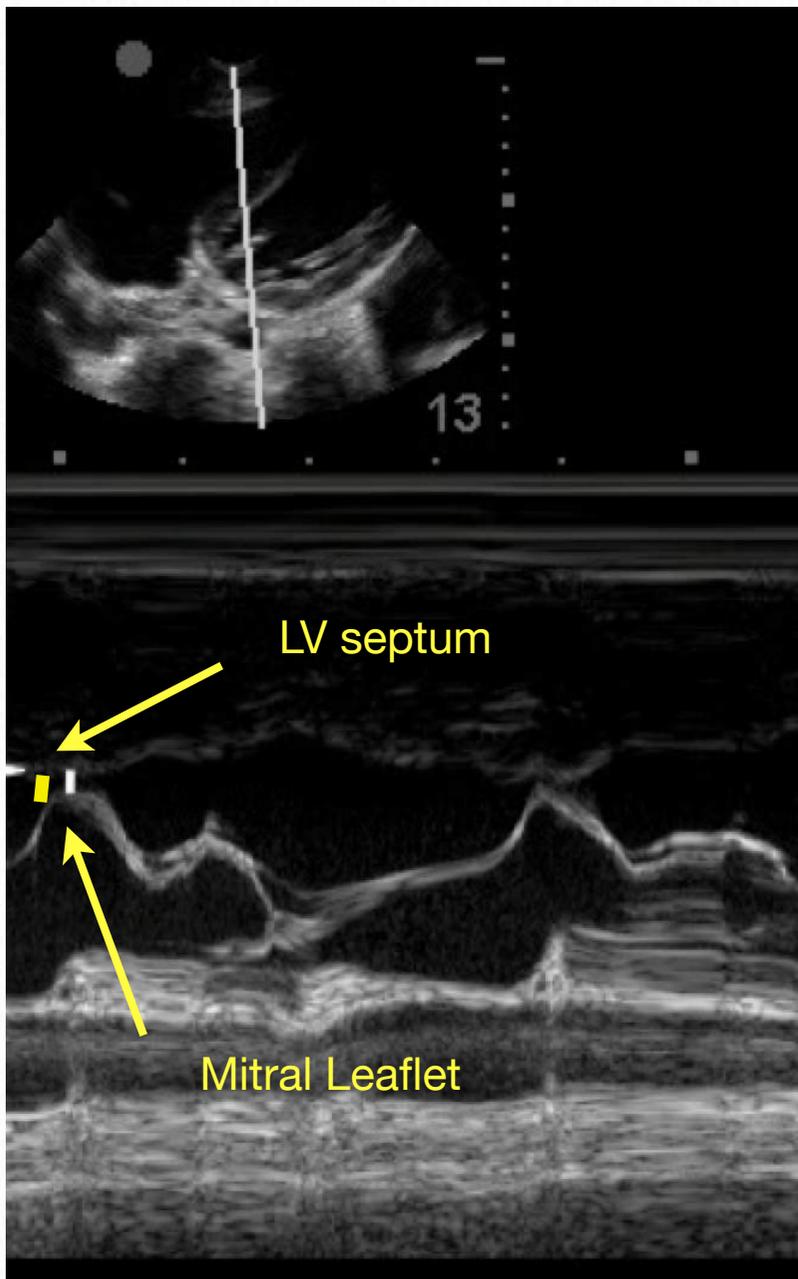
	Women				Men			
	Reference range	Mildly abnormal	Moderately abnormal	Severely abnormal	Reference range	Mildly abnormal	Moderately abnormal	Severely abnormal
LV dimension								
LV diastolic diameter	3.9-5.3	5.4-5.7	5.8-6.1	≥6.2	4.2-5.9	6.0-6.3	6.4-6.8	≥6.9
LV diastolic diameter/BSA, cm/m ²	2.4-3.2	3.3-3.4	3.5-3.7	≥3.8	2.2-3.1	3.2-3.4	3.5-3.6	≥3.7
LV diastolic diameter/height, cm/m	2.5-3.2	3.3-3.4	3.5-3.6	≥3.7	2.4-3.3	3.4-3.5	3.6-3.7	≥3.8
LV volume								
LV diastolic volume, mL	56-104	105-117	118-130	≥131	67-155	156-178	179-201	≥201

E-Point Septal Separation (EPSS)

EPSS is a measurement obtained using M-mode echocardiography of the heart in the parasternal long-axis (PSLA) view through the LV septum and anterior mitral valve leaflet.

This measurement (in mm) represents the distance from the anterior septal endocardium to the maximum early opening point of the anterior mitral leaflet during early diastole and correlates with ejection fraction. An increased EPSS is specific for decreased ejection fraction. A normal EPSS is 6 mm or less which correlates with a normal EF, between 6 mm and 12 mm correlates with a low-normal EF, and any measurement above 12 mm correlates with a low EF.

Normal EPSS



Abnormal EPSS

