

The Hidden Financial Drain of "Normal" Echoes

Early HF Detection and the Limitations of Echo

Early HF is a **hemodynamic disease** that Echo may lack sensitivity to detect

Resting Echo Misses a Large Fraction of True HFpEF

- Echo detects only 34–60% of invasively confirmed HFpEF
- 40–66% false negatives vs catheterization~33% labeled “normal” by ASE criteria despite confirmed HFpEF
- Among “normal/Grade 1”:
>60% have elevated PCWP ≥15 mmHg

Implication

Structural/diastolic grading lags underlying hemodynamics

Stress Echo Improves Sensitivity, but Falls Short

- Sensitivity ↑ to ~90% but:
 - Specificity drops to ~71%
 - Overall discrimination weak (C-stat ~0.65)
- In mild disease (Grade 1 DD):
~90% false-negative rate with stress criteria

Implication

Even “optimized” echo fails in early disease where decisions matter

Echo Parameters may not Reflect LVEDP

- E/e' correlation with LVEDP:
 $r \approx 0.56$ (modest)
- Diagnostic accuracy: AUC 0.5–0.7 (low) for most parameters
- Best-case (LAVI, E/e'): 0.7–0.9 (moderate)

Implication

Echo precision lacks reliable measurement for early detection

Hemodynamics Reveal Disease Earlier Than Imaging

- ~1/3 of HFpEF patients have normal resting pressures with abnormalities only with exertion
- Early HFpEF often presents as:
 - “Unexplained dyspnea”
 - Normal echo + elevated LVEDP

Implication

Echo appears “normal” precisely when intervention opportunity is highest

Echo Is Not Like a Lab Test

Image quality, operator dependence, and inter-reader variation create signal noise that quantitative lab assays do not have

Patient Factors

- Body habitus (obesity, BMI < 18)
- Severe lung disease (COPD, emphysema, hyperinflation)
- Positioning limits (Inability to lie flat, post-op, immobile)
- Chest wall, rib spacing, breast tissue, breast implant, prior surgery

Acoustic windows degrade

before any measurement is taken

Equipment and Scanner

- Vendor and platform differences (e.g., Philips, GE, Siemens)
- Transducer frequency and harmonic vs fundamental imaging
- Default presets and image optimization settings
- Doppler angle, gain, and depth selection

5 to 10 %

cross-vendor measurement bias on identical patients

Sonographer Acquisition

- View completeness and off-axis acquisition
- Cycle selection, breath-hold, respiratory artifact
- Doppler sample volume placement and angle correction
- Operator experience and protocol adherence

~15 %

of TTEs technically suboptimal or non-diagnostic

Reader Interpretation

- LVEF: inter-reader CV 5 to 10% (visual estimation worse)
- Measurements are dependent on image quality
- LV mass: 10 to 15% inter-reader variability
- Diastolic grading discordance ~25 to 30%
- Wall motion scoring is partly subjective

Subjective layer

on top of an already noisy acquisition

Implication

Two echoes on the same patient in the same week can return different measurements and different impressions. Echo signal noise dwarfs the analytical clinical value of a CBC or BMP. PCPs should use caution treating echo numbers like quantitative lab results.

Three Ways the Echo Workflow Fails the Patient

The Devil is on the Details

1 The Borderline Report, But Without Context

Echo measurements that fall in between clearly normal and clearly abnormal.

The reader hedges with language like 'may represent,' 'consider clinical correlation,' or 'versus age-related changes.' The diagnostic call gets transferred from the imaging expert back to the PCP, who is not the imaging expert

2 Normal On Top, Disease Underneath

The conclusion at the top of the report says 'within normal limits.' The measurements underneath may tell a different story.

Taken together, the numbers buried in the body of the report may meet AHA/ACC criteria for structural heart disease. The reader does not assess against this criteria specified and instead the reader works from ASE imaging criteria which differ.

3 The Guideline That Isn't Fully Applied

The newest cardiology guidelines specify exactly what to do at specific biomarker and imaging thresholds, but conflict with others.

In real practice, the same numbers in the same kind of patient lead to different next steps depending on which managing provider, which imaging center performed the test, and reader who interpreted it. The thresholds become a suggestion, not a rule.

HOW THIS TRANSLATES IN CARE

Two managing providers reading the same report take different action. Same patient. Different outcome.

The patient is told their heart is 'fine' when the report itself contains the signals that could have triggered management changes.

Care varies by clinician, not by patient. Identical patients end up on different therapy paths.

Three different failure modes....Same outcome.

Missed signals from the image, the interpretation, and management. The workflow does not catch it.

The Echo Report a PCP Receives

A typical echo report packages technical and interpretive uncertainty into language that sounds definitive. Example of Six signals that drive PCP variability in how the same report gets acted on.

TRANSTHORACIC ECHOCARDIOGRAM | General Medical Center | 06/04/2026

PATIENT DOE, JANE M. | 67F | HTN, CKD2, T2DM | exertional dyspnea **BP** 146/84 **HR** 74 NSR

IMAGE QUALITY: Adequate. Subcostal limited by body habitus; suprasternal suboptimal.

KEY MEASUREMENTS

Parameter	Value	Reference
LVEF	63 %	≥ 54 (Female)
LVMI	109 g/m ²	43 to 95 (Female)
RWT	0.53	≤ 0.42
LAVI	33 mL/m ²	≤ 34
E/A	0.72	0.8 to 2.0
Septal e'	5.3 cm/s	≥ 7
E/e' septal	12.5	< 15
E/e' average	10.2	< 14
TR vel / RVSP	2.6 m/s / 30 mmHg	≤ 2.8 / ≤ 35

READER IMPRESSIONS

Mildly to moderately increased LV wall thickness with concentric geometry. Findings may represent concentric remodeling versus mild concentric hypertrophy; correlation with BP history suggested.

Mitral inflow consistent with impaired relaxation. May represent age-related changes versus early Grade I diastolic dysfunction. Resting Doppler has limited sensitivity for filling pressures.

CONCLUSION

Not diagnostic of overt hypertensive heart disease but not entirely normal for age. Clinical correlation with BP trends, NT-proBNP, and symptom trajectory recommended. Consider diastolic stress echo or invasive hemodynamics if exertional dyspnea persists.

SIGNALS THAT DRIVE PCP VARIABILITY



Image quality flagged 'Adequate'

Not 'good.' Quietly tells the report reader measurements are less reliable. The PCP may not see this nuance.



Abnormal values without diagnosis

LVMI, RWT, and LAVI are flagged outside reference range. No syndrome label is applied. The PCP gets numbers, not a diagnosis.



LAVI interpreted against ASE Standards

The 2022 ACC/AHA HF Guidelines recommend a cutoff for 29 mL/m². The ASE Standards for echo have not adopted this and most readers still use 34 mL/m² as the abnormal cutoff.



E/e' technically 'in range'

Septal E/e' 12.5 sits at the edge. Resting E/e' correlates only modestly with LVEDP (r ~0.56). False reassurance is the failure mode. Diastolic dysfunction and HFpEF are suboptimal characterized by echo until later in disease.



'Versus' language defers the call

'Concentric remodeling versus hypertrophy.' 'Age-related versus early dysfunction.' Diagnostic responsibility transfers back to the PCP.



Recommendation hedges

'Clinical correlation,' 'consider stress echo if symptoms persist.' Action threshold is set by the PCP, not the report.

When ‘No Findings’ Still Has Findings

Echos describe structure and function. They do not diagnose heart failure. The signals that meet ACC/AHA Stage B HF criteria get buried under a ‘normal’ label.

TRANSTHORACIC ECHOCARDIOGRAM | General Medical Center | 06/04/2026

PATIENT DOE, JANE M. | 67F | HTN, CKD3, T2DM | HF evaluation **BP** 146/84 **HR** 74 NSR

ORDER (per referring PCP) “Assess for structural heart disease given multiple risk factors — T2D, HTN, and CKD..” No specific assessment requested.

KEY MEASUREMENTS		
Parameter	Value	Reference
LVEF	62 %	≥ 54 (Female)
IVSd / LVPWd	1.1 / 1.0 cm ⓘ	0.6 to 0.9 (Female)
LV mass index	97 g/m² ⓘ	43 to 95 (Female)
RWT	0.41	≤ 0.42
LAVI	35 mL/m² ⓘ	≤ 34
GLS (avg)	-19 %	≤ -18 to -20
Septal e'	7 cm/s	≥ 7
E/e' average	14.2	< 15
Aortic / mitral regurgitation	none / none	none to trace

READER IMPRESSIONS

Normal LV chamber size and systolic function. No significant valvular disease. Normal estimated PA pressure. Mild mitral annular calcification noted.

CONCLUSION

Overall within normal limits for age. No clinically significant echocardiographic findings

The conclusion says ‘within normal limits.’ The measurements underneath may tell a different story that is supportive of elevated filling pressure and early-stage heart failure.

- WHAT IS ACTUALLY THERE ...but often gets missed**
- **LV hypertrophy (mild)** IVSd 1.1 / LVPWd 1.0, LVMI 97 g/m², RWT 0.44
 - **Left atrial enlargement** LAVI 30 mL/m² (above ACC criteria, below ASE)

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