Recalibrating the Barometer: Echocardiography in Diastolic Dysfunction and the Era of New Algorithms

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Diastolic dysfunction (DD) remains a diagnostic challenge, not for lack of available parameters, but because uncertainty emerges when complex physiology is reduced to static labels in echocardiographic reports. In clinical practice, physicians are often less concerned with the specific grade of DD and more interested in its prognostic implications and in whether increased filling pressures may explain dyspnea, guide further investigation, and support therapeutic decisions. It is precisely in this variable, mean left atrial pressure (MLAP) and left ventricular (LV) filling pressure (LVFP), that echocardiography must be most pragmatic, minimizing the number of "indeterminate" reports and offering an operational conclusion grounded in integrated physiology.[1-4]

The structured reasoning that supports this goal began with the 2009 American Society of Echocardiography/European Association of Echocardiography guideline on the evaluation of LV diastolic function,[1] a landmark document that organized modern thinking on diastole, established a shared language for key pathophysiological mechanisms, and systematized the interpretation of echocardiographic parameters. Beyond its conceptual value, it reinforced a critical principle for echocardiography laboratories: the assessment of diastole must translate into a clinically meaningful message, particularly when heart failure with preserved ejection fraction (HFpEF) is suspected.

The 2016 update of the guideline represented another important step by simplifying and improving the reproducibility of multiparametric assessment, focusing on widely available variables suitable for routine use.[2] In practice, however, the post-2016 experience revealed a persistent issue: in the real world, especially among patients with HFpEF, a substantial proportion of studies continued to be classified as having "indeterminate" diastolic function. While methodologically honest, this result is often clinically insufficient.[2-4]

The study by Lababidi et al.[3] represents a pragmatic turning point. In a multicenter cohort validated against invasive hemodynamics, they proposed a stepwise echocardiographic algorithm to estimate LVFP. The first stage relies on highly feasible measurements, while the second stage resolves discordance or incomplete data using additional parameters supported by strong pathophysiological rationale. Its editorial relevance is direct: the algorithm was designed to reduce the proportion of "indeterminate" cases and improve diagnostic accuracy (from 80% to 86% in patients with HFpEF) in determining LVFP.[3]

Following the publication of Lababidi et al.,[3] the 2025 guideline "recalibrates the barometer" by incorporating these proposed algorithms into a structured strategy for diastolic evaluation and HFpEF diagnosis.[4] This update not only refines the accuracy of DD classification but also improves the identification of increased LVFP, significantly reducing the proportion of cases classified as indeterminate.[4] These algorithms apply to patients in sinus rhythm and without mitral valve conditions that distort the assessment of relaxation and LVFP, such as mitral stenosis of any degree and moderate or severe mitral regurgitation or mitral annular calcification.

However, the 2025 guideline presents two key figures (Figures 2 and 3 of that document[4]) that, at a superficial reading, may appear to compete with one another and therefore generate operational uncertainty. In general terms, Figure 2 of that guideline evaluates the presence of DD, whereas Figure 3 classifies findings based on the estimated MLAP.[4] When interpreted as alternative pathways rather than complementary steps, they may perpetuate uncertainty and lead to conflicting results.

In this context, the letter by Assef & Nishida[5] gains practical relevance. They propose integrating these figures sequentially, redefining Figure 2 as Algorithm 1 (steps for diagnosing DD) and Figure 3 as Algorithm 2 (grading DD and estimating MLAP), both presented in Figure 1 of this Editorial, with clearer transition rules and tie-breaking criteria.[5] This integrated use facilitates interpretation and reduces the likelihood of misclassification. The editorial response from the guideline authors, by clarifying issues related to interpretation and applicability, further contributes to harmonizing understanding and reducing variability in the use of these tools.[6]

In practice, this integration has two immediate consequences. First, it preserves a core set of widely feasible measurements (transmitral Doppler, e′ velocities, E/e′ ratio, and pulmonary pressure estimation) as the initial decision-making step, while directing the use of additional parameters with strong pathophysiological rationale when needed. Second, so-called advanced parameters are placed in their proper role: not as technological embellishments, but as tools to resolve discordance and bring the report closer to the central clinical question, increased versus non-increased LVFP.[4,5]

Beyond workflow reorganization, the 2025 guideline incorporates two messages that directly reflect daily clinical practice. The first is the recognition of left atrial reservoir strain as an additional variable for diastolic assessment, particularly in populations with preserved ejection fraction, in whom the range

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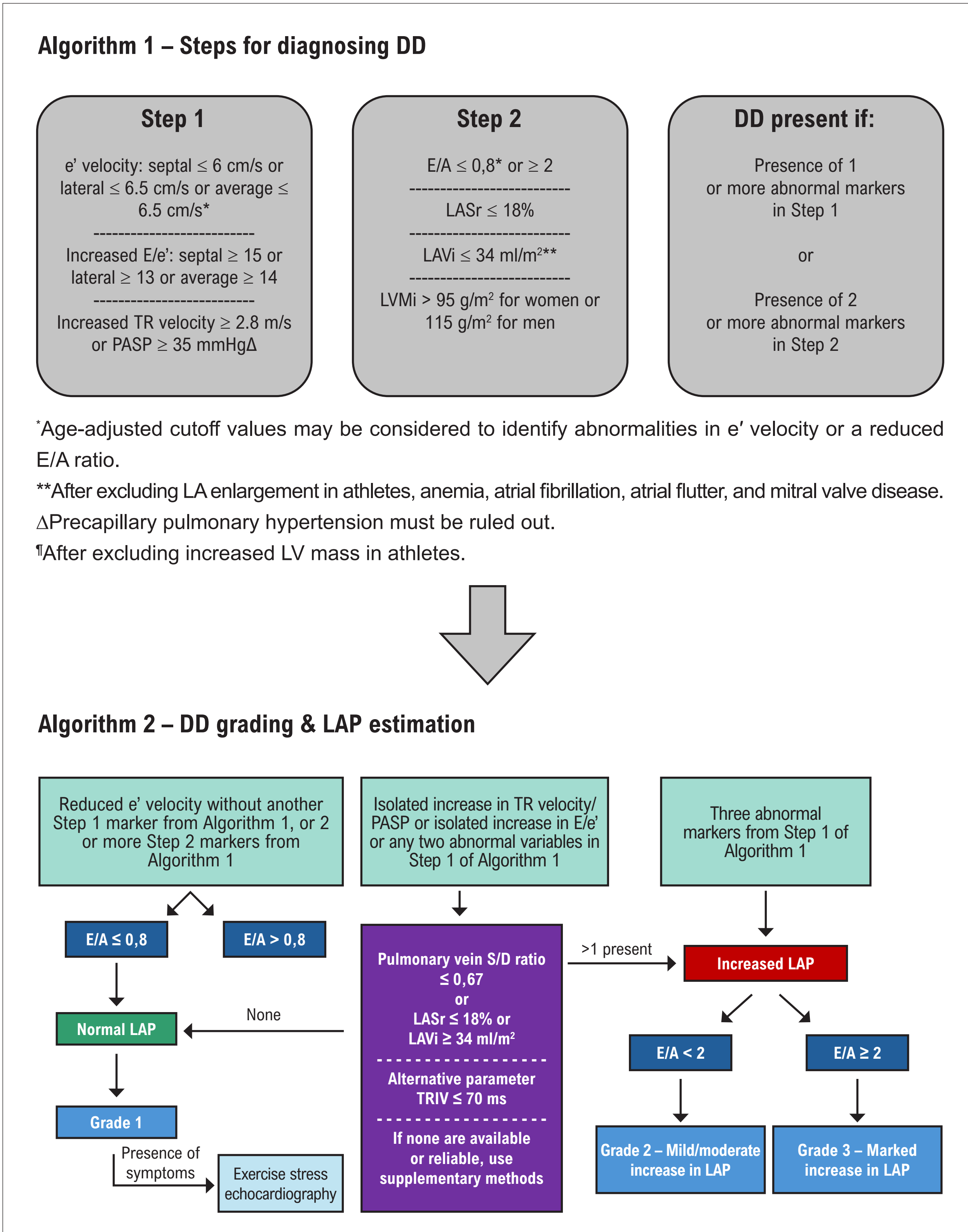

Figure 1 – *Integrated algorithm for DD (adapted from Assef & Nishida5 with permission). DD: diastolic dysfunction; IVRT: isovolumic relaxation time; LA: left atrium; LAP: LA pressure; LASr: LA strain, reservoir phase; LAVi: LA volume index; LV: left ventricle; LVMi: LV mass index; S/D: systolic-to-diastolic; PASP: pulmonary artery systolic pressure; TR: tricuspid regurgitation.*

of normality is broad and load dependence requires greater interpretative sophistication.[4,7] The second is the reinforcement that mitral annular tissue Doppler e′ velocities should be interpreted in the context of age, acknowledging the physiological decline in relaxation associated with aging.[4] Together, these incorporations move in the same direction: reducing false conflicts among variables and increasing the likelihood of a coherent conclusion when the clinical picture is suggestive.[4-7]

Furthermore, the renewed role of pulmonary vein Doppler is consistent with the historical evolution of the field. As early as 2009, this parameter played a relevant role in inferring LVFP and distinguishing filling patterns.[1] By repositioning it as a tie-breaking variable, contemporary algorithms restore its ability to appropriately reduce the diagnostic gray zone.[1,5]

Integration with clinical algorithms represents the next step in reducing attribution errors in patients with multifactorial dyspnea. Approaches such as H_2FPEF help estimate pretest probability and identify those who may benefit from additional investigation.[8] Complementarily, the HFA-PEFF algorithm organizes diagnostic probability and guides decisions regarding functional testing or invasive hemodynamic assessment.[9]

Finally, improved diagnostic precision has an unavoidable practical consequence: HFpEF now has therapies that modify outcomes. Without turning this Editorial into a therapeutic review, it is important to recognize that trials such as EMPEROR-Preserved (empagliflozin) and DELIVER (dapagliflozin) established SGLT2 inhibitors as beneficial interventions in patients with HFpEF.[10,11] The more consistent the diagnosis of an HFpEF phenotype, the more appropriate the application of evidence-based treatment strategies.

In summary, "recalibrating the barometer" in DD means recovering what the 2009 guideline[1] conceptually organized, recognizing what the 2016 guideline[2] simplified, and applying what the 2025 guideline[4] operationalized: a stepwise, integrated, purpose-driven approach to classifying diastolic function and estimating MLAP.[3-7] New diastolic algorithms enable a clinically actionable conclusion, anchored in physiology, regarding the likelihood of increased LVFP. By sequentially integrating diastolic function classification with LVFP estimation, as proposed by Assef & Nishida,[5] inconsistencies observed in recent guidelines are substantially reduced, and echocardiographic reporting gains greater coherence and robustness, particularly when interpreted within the patient's clinical context.

Erratum

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In the Editorial "Recalibrating the Barometer: Echocardiography in Diastolic Dysfunction and the Era of New Algorithms," DOI: https://doi.org/10.36660/abcimg.20260004i, published in the journal Arquivos Brasileiros de Cardiologia: Imagem Cardiovascular, Arq Bras Cardiol: Imagem cardiovasc. 2026;39(1):e20260004, on page 2, in Figure 1, replace the line "iVAE ≤ 34 mL/m²" with "iVAE ≥ 34 mL/m²".

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