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LETTER TO THE EDITOR

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Introduction

Pulmonary hypertension (PH) is a life-threatening cardiovascular disorder characterised by elevated pulmonary arterial pressure, leading to progressive right ventricular dysfunction, right heart failure, and increased morbidity and mortality [1]. PH can be classified into five groups: pulmonary arterial hypertension, PH due to left heart disease, PH associated with lung diseases, chronic thromboembolic PH, and PH with unclear or multifactorial mechanisms [2,3]. Given the complexity and variable clinical presentation of the disease, early and accurate diagnosis is crucial to optimising patient outcomes.

Echocardiography is a cornerstone non-invasive diagnostic tool for evaluating cardiac structure and function in PH patients, irrespective of the aetiology. It allows for the estimation of pulmonary artery pressure, assessment of right ventricular morphology and function, and identification of secondary PH signs such as interventricular septal flattening and right atrial (RA) enlargement [4]. Echocardiography is widely used as a first-line screening modality due to its broad accessibility, cost-effectiveness, and utility in monitoring disease progression over time, although right heart catheterisation is required to establish a PH diagnosis [5].

This survey expands upon the previous expert consensus document on echocardiography in PH issued by the Belgian Society of Cardiology, which provided practical recommendations for evaluating PH and its impact on the right heart chambers [6]. That consensus underlined the necessity of a standardised echocardiographic approach to improve diagnostic accuracy, guide risk stratification, and support treatment planning. Despite these guidelines, substantial inter-institutional variability persists in the application of echocardiographic parameters.

Study objectives

This survey aims to identify which echocardiographic parameters are routinely used for diagnosing PH across various healthcare settings and assess whether these practices are aligned with international recommendations [2]. The study examines the frequency of use of key parameters such as tricuspid regurgitation velocity (TRV), right ventricular (RV) function, systolic pulmonary artery pressure (sPAP), RA size, and other validated indices, including the RV/LV (left ventricle) basal diameter ratio, interventricular septal flattening, TAPSE (Tricuspid Annular Plane Systolic Excursion)/sPAP ratio, RVOT (right ventricular outflow tract) acceleration time, early diastolic pulmonary regurgitation velocity, pulmonary artery (PA) diameter, inferior vena cava (IVC) diameter, and RA end-systolic area (Figure 1). The survey further investigates variations in echocardiographic practice based on institutional protocols, availability of resources, and clinician expertise. By comparing the results with expert recommendations, the study seeks to identify practice gaps, support discussions on standardising echocardiographic protocols, reinforce physician education, and improve integration of echocardiographic findings into comprehensive PH management.

Methodology

This study utilised a cross-sectional survey design involving 57 cardiologists from various healthcare institutions, including 19 from university hospitals and 37 from general hospitals. The survey was conducted over a 7-week period, from 25 September to 12 November 2024. Participants were recruited *via* professional medical networks and invited to complete an online questionnaire focused on echocardiographic assessment practices for PH. The questionnaire was designed to capture detailed insights into the most frequently used echocardiographic parameters and their adherence to internationally accepted diagnostic criteria [7]. The survey data included the frequency and context of parameter usage, inter-institutional variations, and barriers to guideline implementation. Statistical analyses were conducted to compare the survey results with prior expert consensus guidelines and to highlight current trends in clinical practice. The study provides a comprehensive overview of current echocardiographic strategies in PH assessment and identifies areas where standardisation and educational interventions may be beneficial. Descriptive statistics were used to report the findings.

Study results

Echocardiographic evaluation of PH focused primarily on the RV, PA, RA, and IVC. Nearly all participating physicians assessed the RV, utilising key markers such as TRV >2.8 m/s, RV/LV basal diameter ratio >1.0, and interventricular septal flattening (LV eccentricity index >1.1 in systole and/or diastole). However, only 50% of clinicians evaluated RVOT acceleration time and the TAPSE/sPAP ratio, despite their strong diagnostic relevance (Figure 2) [8].

The PA was evaluated by 91% of respondents, with measurements of PA diameter (>25 mm) and early diastolic pulmonary regurgitation velocity (>2.2 m/s) commonly included. Nonetheless, 40–50% of cardiologists did not consistently assess these parameters, despite their

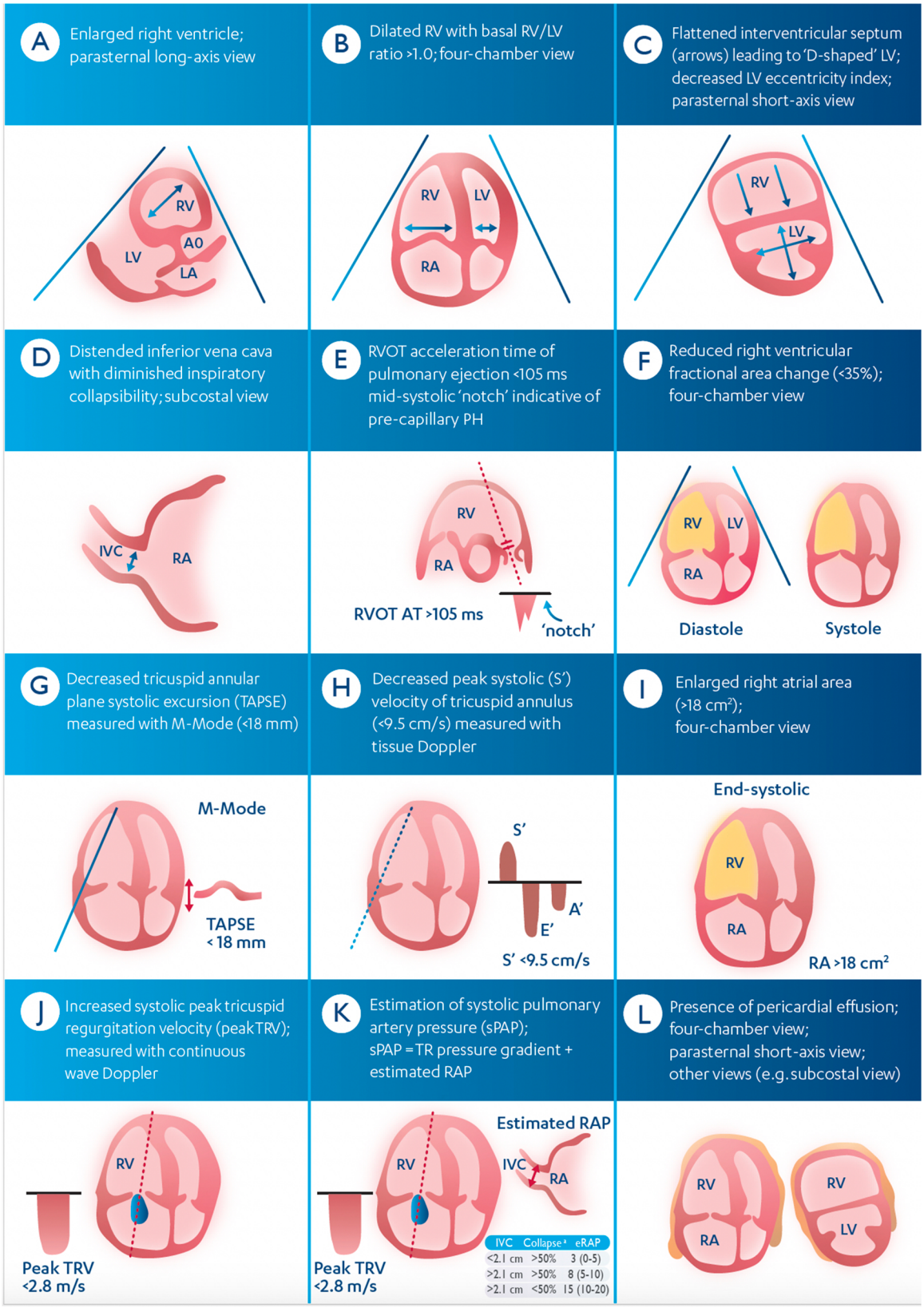

Figure 1. Echocardiography pictogram of parameters for PH.

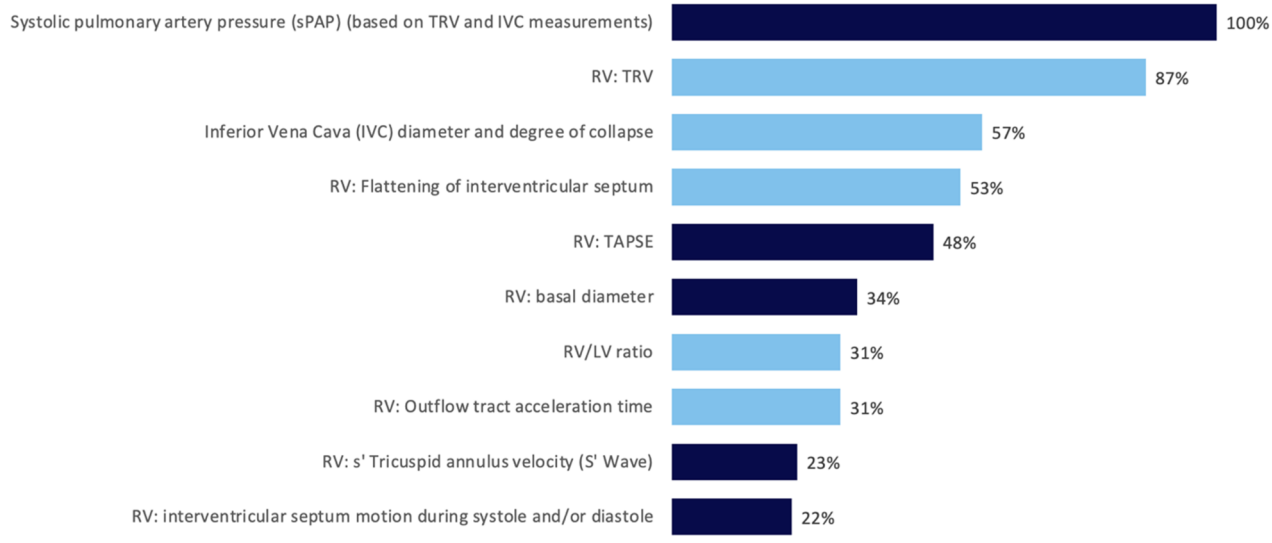

Figure 2. Most important parameters for screening for PH prioritised by physicians.

association with PH severity [9]. The RA was examined by 81% of participants, though fewer than 60% measured its end-systolic area (>18 cm^2), an important marker of right heart pressure overload [10].

The IVC was assessed by 82%, focusing on diameter (>21 mm) and inspiratory collapsibility, which correlate with elevated right atrial pressure and have strong prognostic value [11]. Notably, the LV and left atrium were significantly under-assessed, with only 33% of cardiologists examining them, despite the diagnostic utility of the RV/LV basal diameter ratio [12].

The study's median cut-off values aligned with European Society of Cardiology guidelines: TRV at 2.8 m/s (range: 2–3.5 m/s), PA diameter at 25 mm (range: 17–35 mm), and TAPSE/sPAP ratio at 0.55 mm/mmHg (range: 0.35–20 mm/mmHg), supporting their continued clinical use [2].

Key findings and literature comparison

The survey findings are consistent with current literature, indicating that the RV, RA, PA, and IVC are the most frequently examined structures in PH echocardiographic evaluations [2]. Nevertheless, key parameters such as RVOT acceleration time, TAPSE/sPAP ratio, pulmonary valve regurgitation velocity, PA diameter, RV/LV ratio, and RA area are less frequently utilised in clinical settings, despite their validated diagnostic value [12].

Furthermore, the left heart chambers are often overlooked, despite their contribution to differential diagnosis and risk stratification. Although many of these parameters are known to be clinically relevant, less emphasis is placed on PA diameter, pulmonary regurgitation velocity, and the TAPSE/sPAP ratio in routine practice.

Most clinicians pursued further diagnostic work-up upon identifying a high probability of PH, while 15% referred patients directly to PH specialists.

Multiple studies have emphasised the importance of consistent echocardiographic evaluation, as variability in measurement and interpretation can result in misdiagnosis or diagnostic delay [7,12]. Enhancing training and reinforcing adherence to updated guidelines may improve diagnostic precision and facilitate timely therapeutic decisions.

Future research should explore the application of advanced imaging techniques, such as strain imaging, three-dimensional echocardiography, and artificial intelligence-driven automated analyses, to boost diagnostic accuracy and reliability [13–15]. The development of international registries, data-sharing initiatives, and structured training programs will be critical to advancing diagnostic consistency and ensuring the global adoption of best practices in echocardiographic PH assessment.

Limitations

This study has several limitations. First, the survey relied on self-reported practices, which may be subject to reporting bias or discrepancies between stated and actual clinical behaviour. Second, the sample size, though representative of diverse institutions, remains limited and geographically restricted to Belgium, potentially limiting generalisability. Third, the survey did not assess the technical quality or reproducibility of echocardiographic measurements, which may further influence diagnostic accuracy. Finally, the absence of outcome correlation limits its interpretation of how echocardiographic variability impacts patient prognosis or treatment pathways.

Conclusion

Echocardiography remains a critical tool in the diagnosis and management of pulmonary hypertension. However, significant variability in echocardiographic practices persists across healthcare institutions. This study underscores the need for standardised protocols to ensure comprehensive and consistent evaluation. Addressing current practice gaps through targeted physician training and implementation of updated guidelines can improve diagnostic accuracy and optimise patient care.

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Disclosure statement

No potential conflict of interest was reported by the author(s).

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