

## Editorial



# The Scope of Clinical Applications of Handheld Echocardiography

Eun Kyoung Kim , MD, PhD

Division of Cardiology, Department of Medicine, Heart Vascular Stroke Institute, Samsung Medical Center, Sungkyunkwan University School of Medicine, Seoul, Korea



► See the article “Handheld Echocardiography in a Clinical Practice Scenario: Concordances Compared to Standard Echocardiographic Reports” in volume 30 on page 25.

**Received:** Jun 30, 2021  
**Accepted:** Jul 12, 2021  
**Published online:** Jul 26, 2021

### Address for Correspondence:

**Eun Kyoung Kim, MD, PhD**  
Division of Cardiology, Department of  
Medicine, Heart Vascular Stroke Institute,  
Samsung Medical Center, Sungkyunkwan  
University School of Medicine, 81, Irwon-ro,  
Gangnam-gu, Seoul 06351, Korea.  
Email: ekbobi.kim@samsung.com

Copyright © 2022 Korean Society of  
Echocardiography

This is an Open Access article distributed  
under the terms of the Creative Commons  
Attribution Non-Commercial License (<https://creativecommons.org/licenses/by-nc/4.0/>)  
which permits unrestricted non-commercial  
use, distribution, and reproduction in any  
medium, provided the original work is properly  
cited.

### ORCID iDs

Eun Kyoung Kim   
<https://orcid.org/0000-0002-7653-3503>

### Conflict of Interest

The author has no financial conflicts of  
interest.

Handheld echocardiographic devices (HHEs) are useful for rapidly assessing cardiac function and addressing specific cardiac-focused problems with the following advantages: 1) they are easier to use, 2) they provide easy implementation for bedside and outpatient clinics, and 3) they have relatively lower cost compared to conventional echocardiography. In addition, such devices have the potential for screening and surveillance during physical examinations such as abnormal auscultation. Recently, a pocket-sized transducer has been combined with a wireless and app-based platform. With this miniaturization of echo devices over the past two decades, variable models of HHEs have become widely and readily available with a variety of clinical uses. The diagnostic accuracy of HHEs is insufficient to replace high-end echocardiography systems with high frame rates and complex measurements techniques.<sup>1)</sup> However, it is clear that for assessment of specific diagnostic targets such as ventricle enlargement, systolic dysfunction, hypertrophy, pericardial effusion, and right atrial pressure elevation, HHEs outperform physical examinations and lead to reduced use of other types of imaging examinations as well.<sup>2-4)</sup> Therefore it is important to be familiar with the diagnostic performance and accuracy of handheld evaluation, especially regarding the heart and causable disease spectrum.

In this issue of *Journal of Cardiovascular Imaging*, Blume et al.<sup>5)</sup> investigated the usefulness of a particular HHE in real-world clinical practice by comparing it with standard transthoracic echocardiography. They demonstrated that this HHE had a favorable comparison with standard echocardiography regarding brief evaluation of left/right ventricle size, systolic function, presence of regional wall motion abnormality, and valve stenosis. However, the diagnostic accuracy for the evaluation of atrium or right-sided valves using their device was modest. They showed similar results with previous data using variable handheld devices.<sup>6)</sup> Although it is difficult to draw a clear scope of clinical applications of this HHE from the data given (because the study population was too small and most measurements were assessed visually), this study is meaningful to prospectively confirming the application of HHEs in real-world practice.

Several studies have shown that there is a favorable comparison between HHEs and standard echocardiography in variable targets. The overall diagnostic metrics are similarly high (sensitivity 95%, specificity 83%), and are even higher for patients with underlying

co-morbidities (sensitivity 98% and specificity 89%).<sup>741)</sup> Although the above data were highly heterogeneous and tested in different settings with different cohorts, the clinical usefulness as a focused cardiac evaluation tool has been consistently shown. The diagnostic performance of valvular regurgitation using HHEs was consistently limited considering previous data. It will be helpful for clinical practice when HHEs are used to evaluate specific diagnostic targets while ensuring high accuracy. Considering the increasing needs and adoption of HHEs, it is time to update the appropriate use guidelines, including the scope of practice, training systems, and reporting protocols for HHEs.<sup>12)</sup> In addition, future investigations on whether HHE systems improve clinical outcomes are needed to evaluate their full potential.

## REFERENCES

1. Pathan F, Narula J, Marwick TH. Handheld echocardiography. In: Solomon SD, Wu JC, Gillam LD, editors. *Essential Echocardiography*. New York, NY: Elsevier, Inc; 2019. p.447-55.
2. Alherbish A, Priestap F, Arntfield R. The introduction of basic critical care echocardiography reduces the use of diagnostic echocardiography in the intensive care unit. *J Crit Care* 2015;30:1419.e7-11.  
[PUBMED](#) | [CROSSREF](#)
3. Oks M, Clevlen KL, Cardenas-Garcia J, et al. The effect of point-of-care ultrasonography on imaging studies in the medical ICU: a comparative study. *Chest* 2014;146:1574-7.  
[PUBMED](#) | [CROSSREF](#)
4. Zieleskiewicz L, Muller L, Lakhil K, et al. Point-of-care ultrasound in intensive care units: assessment of 1073 procedures in a multicentric, prospective, observational study. *Intensive Care Med* 2015;41:1638-47.  
[PUBMED](#) | [CROSSREF](#)
5. Blume GG, Lechinewski LD, Vieira IP, et al. Handheld echocardiography in a clinical practice scenario: concordances compared to standard echocardiographic reports. *J Cardiovasc Imaging* 2022;30:25-34.  
[CROSSREF](#)
6. Chamsi-Pasha MA, Sengupta PP, Zoghbi WA. Handheld echocardiography: current state and future perspectives. *Circulation* 2017;136:2178-88.  
[PUBMED](#) | [CROSSREF](#)
7. Gulić TG, Makuc J, Prosen G, Dinevski D. Pocket-size imaging device as a screening tool for aortic stenosis. *Wien Klin Wochenschr* 2016;128:348-53.  
[PUBMED](#) | [CROSSREF](#)
8. Furukawa A, Abe Y, Ito M, et al. Prediction of aortic stenosis-related events in patients with systolic ejection murmur using pocket-sized echocardiography. *J Cardiol* 2017;69:189-94.  
[PUBMED](#) | [CROSSREF](#)
9. Kitada R, Fukuda S, Watanabe H, et al. Diagnostic accuracy and cost-effectiveness of a pocket-sized transthoracic echocardiographic imaging device. *Clin Cardiol* 2013;36:603-10.  
[PUBMED](#) | [CROSSREF](#)
10. Breithardt OA. Hand-held ultrasound-the real stethoscope. *Eur Heart J Cardiovasc Imaging* 2015;16:471-2.  
[PUBMED](#) | [CROSSREF](#)
11. Prinz C, Voigt JU. Diagnostic accuracy of a hand-held ultrasound scanner in routine patients referred for echocardiography. *J Am Soc Echocardiogr* 2011;24:111-6.  
[PUBMED](#) | [CROSSREF](#)
12. Spencer KT, Kimura BJ, Korcarz CE, Pellikka PA, Rahko PS, Siegel RJ. Focused cardiac ultrasound: recommendations from the American Society of Echocardiography. *J Am Soc Echocardiogr* 2013;26:567-81.  
[PUBMED](#) | [CROSSREF](#)