Rev Esp Cardiol. 2016;69(7):644–646

Editorial

# Echocardiography Outside the Cardiology Setting. Position Paper and Recommendations of the Spanish Society of Cardiology

## Ecocardiografía fuera del ámbito de la cardiología. Posición y recomendaciones de la Sociedad Española de Cardiología

Joaquín Barba Cosials[a,*] and Leopoldo Pérez de Isla[b]

[a] Departamento de Cardiología y Cirugía Cardiaca, Clínica Universidad de Navarra, Pamplona, Navarra, Spain
[b] Servicio de Cardiología, Hospital Clínico San Carlos, Departamento Medicina, Facultad de Medicina, Universidad Complutense de Madrid, Madrid, Spain

*Article history:*
Available online 24 May 2016

In 2014, the Spanish Society of Cardiology (SEC), through its Working Group on Cardiac Imaging, drew up a set of guidelines for the proper use of echocardiographic systems outside the cardiology setting.[1] This important document was issued in response to the introduction of echocardiography as an extension of physical examinations, performed by physicians other than cardiologists using small devices. This practice arouses increasing interest among this group of specialists and, in a controlled, standardized setting, opens up exciting opportunities for improving diagnostics.[2] Thus, we considered it appropriate to summarize, in the following paragraphs, the reasons for preparing this document and the essential elements in its contents.

Through the coordination and consensus building among scientific societies, different specialties, such as anesthesiology and intensive care medicine, have established laid the foundations for the correct, appropriate, and reasonable use of ultrasound in their respective specialties. For this purpose, they have provided recommendations for training specialists in the application of the technique, taking as a basis the recommendations for its use in the cardiology setting, in agreement with other societies.[3,4] For its part, in 2011, the SEC published the *Libro Blanco*, or White Paper, of the Working Group on Cardiac Imaging, which offers a number of recommendations for training in echocardiography for use outside the cardiology setting.[5]

Although the guidelines for training in echocardiography were clearly established by different working groups several years ago,[6] 2 circumstances make this setting truly special and different. First, the use of small ultrasound devices makes the technique more or less an extension of and complement to physical examination. Second, the possibility of using the technique in the examination of other organs and systems involves its extension to a number of widely differing objectives. The performance of these examinations in emergency or urgent situations at the patient's bedside, aimed at solving a given problem with a specific diagnosis, has led to a type of study referred to as focused cardiac ultrasound (FoCUS) or the "echoscopic heart examination".

In both situations, the level of competence must be the same, requiring the provision of a number of recommendations facilitating the proper use and correct acquisition of the skills necessary to perform echocardiography to this end. We consider this to be essential in order that the specialists who carry out studies of this type receive the necessary training and proficiency. Thus, the failure to comply with the proposed guidelines or achieve those skills should nullify any diagnostic decision. Moreover, according to this document and taking into account all the possible health care and legal implications, the SEC will not consider valid any study performed by noncardiologists who do not meet the training requirements established by the clinical practice guidelines and the standards set by scientific societies in the cardiovascular setting.

The European Society of Cardiology (ESC)[7] has established a simple classification for the different types of echocardiographic systems according to their size, functions, and applications. On the basis of the degree of portability, the ESC distinguishes 4 types of machines, including portable and pocket-size devices, the latter being smaller and offering fewer features. In the strict sense of the term, they are not echocardiographic systems, and they usually offer only 2-dimensional images and, in some cases, a fixed Doppler color box. Devices of this type should be used only as screening tools or to complement physical examinations, and in no case should these studies be considered a substitute for a complete echocardiogram. In this respect, one of the most important aspects of this document is that it makes it very clear that, with these systems and this type of training, what are performed are echoscopic heart examinations, not echocardiographic studies. Regardless of the technical specifications for the device, echocardiographic studies should be carried out exclusively by specialists with the level of training demanded by the guidelines of the SEC and the ESC and in accordance with the corresponding scientific societies.

The indications for echoscopic studies, or extended cardiac examinations, have been defined in several position statements.[8] They include screening in emergency departments, use in cardiology clinics, first evaluation in ambulances, screening programs, screening of candidates for a complete echocardiographic study, teaching, and semiquantitative evaluation of

* Corresponding author: Departamento de Cardiología y Cirugía Cardiaca, Clínica Universidad de Navarra, Avda. Pío XII 36, 31008 Pamplona, Navarra, Spain.
*E-mail address:* jbarba@unav.es (J. Barba Cosials).

http://dx.doi.org/10.1016/j.rec.2016.04.013

extravascular lung water. Another consideration is that studies performed for this purpose, by definition, are not accompanied by a report of the findings—which are not always recorded—and cannot be synchronized with the electrocardiogram (they only record a time that is not synchronized with the electrocardiogram), and the devices do not feature pulsed wave or continuous wave Doppler. Moreover, only linear measurements are possible and the measurements that are usually included in a conventional echocardiographic study cannot be performed. Finally, the duration is usually shorter and there is no formal register of the examination. Therefore, because the report that is customarily provided in echocardiography is not issued,[9] to enable the proper use of the information obtained, the findings of the study should be included in the medical record, together with the results of the physical examination.[8] Furthermore, as mentioned above, there is no requirement for compliance with the recommendations for image acquisition and storage that is usually demanded for an echocardiographic study.[10]

It is very important that we take into consideration the serious limitations of these studies when compared with standard echocardiographic examinations. In most cases, the system is usually technically inferior, which, in addition to the lack of experience, limited proficiency, and lack of specific specialization of the operators, is the main factor determining the usefulness of the technique. In addition, the conditions under which the study is performed are not the most favorable because of the emergency situation, the position, time pressure, etc. Some of the most relevant findings, such as regional wall motion abnormalities in acute coronary syndrome, are difficult to detect and require a great deal of training and experience. The combination of these factors can result in suboptimal studies, with frequent errors and high rates of under- or overdiagnosis.[11]

All the considerations made with regard to studies of this type indicate that patients with abnormal findings, nondiagnostic results, or studies showing evidence of cardiac disease should undergo a complete echocardiographic examination as soon as possible,[12] or be referred to an expert for the interpretation of the images. In this respect, the possibility of storing and transmitting digital images means that images acquired by professionals other than cardiologists can be sent to cardiac imaging systems in cardiology departments to be evaluated by specialists. This allows a separation between acquisition of images and their interpretation and reporting.

Another general recommendation implies that all the operators involved in studies of this type maintain a constant relationship and quality assurance with the echocardiography laboratories connected to their institutions, thus establishing networks of supervised cardiac imaging. In this regard, the SEC and other societies have proposed standards for accreditation and recommendations concerning adequate training in this area. Different levels of competence were defined to achieve the necessary quality in the performance of echocardiographic studies.[5] This resulted in the establishment of 3 levels of training:

- Level I is that required of all physicians specialized in cardiology, and recommends the performance of 200 supervised Doppler echocardiographic studies. This level of training qualifies the physician to carry out and interpret studies under supervision. It is important to keep in mind that the only training program for medical specialists that includes the performance of echocardiography is that of cardiology.
- Level II builds on the preceding level with 3 more months of training, an additional 200 Doppler echocardiographic studies (for a total of 400), the supervised performance and interpretation of 30 transesophageal echocardiographic studies, and 30 complete stress echocardiographic studies. This level grants full competence to the physician, who is thus qualified to decide on the need for an echocardiographic study, perform it, and interpret it.
- Finally, level III involves an additional 6-month rotation and qualifies the physician to head an echocardiography laboratory and provide training at levels I and II.

Likewise, the Working Group on Cardiac Imaging of the SEC has established an accreditation committee composed of experts in advanced echocardiography that sets the minimum requirements and standard procedures for the theoretical qualifying tests necessary to achieve this level of accreditation. Although the training and level of proficiency required for internists, generalists, and specialists in cardiology are in the process of being established, in recent years, specific training is advocated.[8,13,14] This recommendation statement sets the bases for the performance of, interpretation of, and training in studies of this type in terms of the knowledge, proficiency, and activity necessary to these specialists.

One essential point is the setting in which training is to be carried out. It is agreed that the proper place for teaching and learning echocardiographic techniques is the echocardiography laboratory of an established cardiac imaging unit.[5] Noncardiologists who undertake studies of this type should at least have had level I training in echocardiography, as proposed by the American Society of Echocardiography.[6] Supervision and evaluation by recognized experts accredited by the SEC are recommended if the physician performing the examination has not reached this level of training and proficiency.

Concerning the level of general training, the performance of studies of this type requires, among other things, an adequate understanding of the principles of ultrasounds and echocardiography, as well as of cardiovascular anatomy, physiology, and pathophysiology. Likewise, operators carrying out these examinations should be able to estimate the functional status of the left and right ventricles, detect valve disease and pericardial effusion, and identify at least any serious lesions on the basis of their hemodynamic impact.[10] They must also be capable of participating in certain procedures in given situations. In short, the training necessary to qualify professionals to carry out echoscopic heart examinations includes the completion of a theoretical program covering the abovementioned aspects and a practical program in an echocardiography laboratory.[14] In addition, once the training period is over, it is recommended that these specialists remain in contact with the echocardiography laboratories of cardiac imaging units. This will allow them to consult with these laboratories or transmit images that pose diagnostic problems, as an aid in deciding which patients should undergo standard echocardiography. Finally, the achievement of these aims should be facilitated by participation in training-related activities, such as courses, workshops, and seminars accredited by the SEC, which in no case will substitute for training at the level required for the performance of examinations.[14] For this purpose, the SEC, through its Working Group on Cardiac Imaging, promotes the development of accredited training-related activities, periods of time spent in echocardiography laboratories, and the creation of an accreditation program for the use of pocket-size echocardiographic devices by specialists other than cardiologists, with its corresponding system of theoretical and practical evaluation.

Given the importance of this examination modality and the interest that it arouses, in the next few years, it could be considered that this type of training syllabus should be introduced into the training programs for medical residents in the different specialties, with no detriment to the instruction they receive in this respect while working toward their medical degrees.

This document concludes with some final recommendations of great interest, which can be summarized as follows:

1. Studies performed by specialists other than cardiologists opens up broad diagnostic opportunities, but do not provide a complete echocardiographic diagnosis and cannot be considered as echocardiographic studies, but rather as echoscopic heart examinations.
2. Patients will be informed that an echoscopic heart examination is not a substitute for a complete echocardiographic study.
3. The indication for this study should be limited to the detection of cardiac conditions that are clearly specified in these recommendations.
4. The evaluation of these studies should be included as a part of the physical examination. In no case will an echocardiographic report based on these examinations be issued.
5. It is recommended that all operators, with the exception of cardiology specialists, undergo a specific training and proficiency program accredited, in the case of Spain, by the SEC or the ESC.
6. Only those operators who have followed a training program accredited by the corresponding scientific society should be qualified and accredited to perform echoscopic heart examinations.
7. Any patient in whom the study is inconclusive, or leads to the detection of abnormal or unclear findings or to a diagnosis of heart disease, should undergo a standard echocardiographic examination or request an appointment with an expert in the performance of this test.
8. Operators who participate in studies of this type should maintain relationships with echocardiography laboratories related to their institutions for supervision and quality assurance.

On the basis of these recommendations, the SEC and its Working Group on Cardiac Imaging are open to collaborating in the training and accreditation of interested professionals and their respective societies, as it has done previously.

The purpose of mechanisms that regulate training and accreditation is to achieve something that is of the utmost importance: the assurance that the physician who performs the study has the necessary proficiency to carry out the tasks involved. Accreditation in any activity, particularly in echocardiography, is a process that is often underrated, but is extraordinarily important, since it is a mechanism for protecting the population from unsuitable practices or from operators who do not possess the necessary knowledge or skills to perform the tests. Thus, the SEC issued this document to offer an important recommendation. Echocardiographic studies that have not been performed in accordance with the quality and accreditation criteria demanded by this society should not be considered valid. This should serve as a safeguard for the quality of care and the greatest benefit for the patient.[15]

## CONFLICTS OF INTEREST

None declared.

## REFERENCES


1. Barba J, Gómez de Diego JJ, Evangelista A, Lauradogoitia E, Aguilar R, Zamorano JL, et al. La ecocardiografía fuera del ámbito de la cardiología: recomendaciones de la Sociedad Española de Cardiología para un uso adecuado de los equipos de ecocardiografía de bolsillo. Madrid: Sociedad Española de Cardiología; 2014 [accessed 4 Apr 2016]. Available at: http://www.secardiologia.es/publicaciones/catalogo/protocolos/5919-recomendaciones-sec-para-el-uso-de-equipos-de-ecocardiografia-de-bolsillo
2. Lucas BP, Candotti C, Margeta B, Kumapley R, Asmar A, Franco-Sadud R, et al. Hand-carried echocardiography by hospitalists: a randomized trial. Am J Med. 2011;124:764–74.
3. Grupo de trabajo conjunto de la Sección de Ecocardiografía de la Sociedad Española de Cardiología y de la Sección de Cirugía Cardiotorácica de la Sociedad Española de Anestesiología, Reanimación y Terapéutica del, Dolor., Ecocardiografía transesofágica intraoperatoria: recomendaciones para la formación del, anestesiólogo. Rev Esp Cardiol. 2000;53:1380–3.
4. García Fernández MA, Carreras F, Salvador A, Casaldáliga J, Evangelista A. Normas para la correcta formación en ecocardiografía. Recomendaciones de la Sección de Registros Gráficos y Ecocardiografía de la Sociedad Española de Cardiología. Rev Esp Cardiol. 1997;50Supl5:2–7.
5. Aguilar RJ, Paré JC, editors. Libro blanco de la Sección de Imagen Cardiaca de la Sociedad Española de Cardiología.. Madrid: Sociedad Española de Cardiología; 2011.
6. Ryan T, Armstrong W, Khandheria B. Task Force 4: training in echocardiography. Endorsed by the American Society of Echocardiography. J Am Coll Cardiol. 2008;51:361–7.
7. Sicari R, Galdesiri M, Voigt JU, Habib G, Zamorano JL, Lancellotti P, et al. The use of pocket-size imaging devices: a position statement of the European Association of Echocardiography. Eur J Echocardiogr. 2011;12:85–7.
8. Neskovic AN, Edvarsen T, Galderisi M, Garbi M, Gullace G, Jurcut R, et al. Focus cardiac ultrasound: the European Association of Cardiovascular Imaging viewpoint. Eur Heart J Cardiovasc Imaging. 2014;15:956–60.
9. Lang RM, Badano LP, Mor-Avi V, Afilalo J, Armstrong A, Ernande L, et al. Recommendations for cardiac chamber quantification by echocardiography in adults: an update from the American Society of Echocardiography and the European Association of Cardiovascular Imaging. J Am Soc Echocardiogr. 2015;28:1–39.
10. Evangelista A, Flachskampf F, Lancellotti P, Badano L, Aguilar R, Monaghan M, et al. European Association Echocardiography recommendations for standardization of performance, digital storage and reporting of echocardiographic studies. Eur J Echocardiogr. 2008;9:438–48.
11. Mjølstad OC, Andersen GN, Dalen H, Graven T, Skjetne K, Kleinau JO, et al. Feasibility and reliability of point-of-care pocket-size echocardiography performed by medical residents. Eur Heart J Cardiovasc Imaging. 2013;14:1195–202.
12. Via G, Hussain A, Wells M, Reardon R, ElBarbary M, Noble VE, et al. International Liaison Committee on Focused Cardiac UltraSound (ILC-FoCUS) for the International Conference on Focused Cardiac UltraSound (IC-FoCUS). International evidence-based recommendations for focused cardiac ultrasound. J Am Soc Echocardiogr. 2014;27:683e1-33.
13. Gullace G, Demichelli G, Monte I, Colonna P, Carerj S, Caso P, et al. Reclassification of echocardiography according to the appropriateness of use, function-and competence-based profiles and application. J Cardiovasc Echocardiography. 2012;22:91–8.
14. Pelliccia F, Palmiero P, Maiello M, Losi MA. Italian Chapter of the International Society of Cardiovascular Ultrasound expert consensus document on training requirements for noncardiologists using hand-carried ultrasound devices. Echocardiography. 2012;29:745–50.
15. López-Sendón J, González-Juanatey JR, Pinto F, Cuenca Castillo J, Badimón L, Dalmau R, et al. Indicadores de calidad en cardiología. Principales indicadores para medir la calidad de los resultados (indicadores de resultados) y parámetros de calidad relacionados con mejores resultados en la práctica clínica (indicadores de práctica asistencial). INCARDIO (Indicadores de Calidad en Unidades Asistenciales del Área del Corazón): Declaración de posicionamiento de consenso de SEC/SECTCV. Rev Esp Cardiol. 2015;68:976–1005.