

# Focused Cardiac Ultrasound: Recommendations from the American Society of Echocardiography

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## 1. WHY IS A GUIDELINE NEEDED?

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The value of ultrasound as a diagnostic cardiac modality is in many respects unparalleled. It is more portable and less expensive compared with other imaging modalities (computed tomography, magnetic resonance imaging, nuclear perfusion imaging). Unlike methods that expose patients to radiation, there are no known adverse effects of ultrasound used at diagnostic imaging intensities, which allows safe, serial evaluation of patients. Echocardiography permits rapid assessment of cardiac size, structure, function, and hemodynamics. Ultrasound images are evaluated in real time, which allows rapid diagnostic interpretation in a wide variety of settings, such as the outpatient clinic, inpatient ward, critical care unit, emergency department, operating room, remote clinic, and cardiac catheterization laboratory. Cardiac ultrasound is used across the entire spectrum of patient care from in utero to the frail elderly patient. Echocardiography is sensitive and specific for a broad range of clinical disorders, which allows evaluation of a wide variety of parameters with well-documented prognostic utility. In an effort to increase the value of echocardiography even further, platforms have been developed that incorporated advanced imaging capabilities (three-dimensional [3D], strain imaging) and complex algorithms for quantitative analysis.

Equally important to the technical performance of this modality is the training of the clinicians who use it. Even before images are

### Abbreviations

**ADHF** = Acutely decompensated heart failure

**ASE** = American Society of Echocardiography

**CPT** = Center for Medicare Service's Current Procedural Terminology

**DICOM** = Digital Imaging and Communications in Medicine

**eFCU** = Expert FCU

**EKG** = Electrocardiographic

**FCU** = Focused cardiac ultrasound

**ICU** = Intensive care unit

**IVC** = Inferior vena cava

**LA** = Left atrium

**LV** = Left ventricle

**LVH** = Left ventricle hypertrophy

**LVSD** = LV systolic dysfunction

**RA** = Right atrium

**RV** = Right ventricle

**TTE** = Transthoracic echocardiography

**2D** = Two-dimensional

**3D** = Three-dimensional

acquired, physicians who perform echocardiography need to be knowledgeable about the appropriate uses of the technique.<sup>1</sup> Accurate clinical use of cardiac ultrasound is completely dependent on users who are trained in image acquisition, analysis, and interpretation. Given the extensive expertise required for accurate use, guidelines have been established for the knowledge base, practical experience, and continued maintenance of competency for echocardiographic image acquisition.<sup>2-4</sup> Image analysis, interpretation, and reporting require extensive training. Recommendations for these also exist.<sup>2,4,5</sup> In addition, there are comprehensive guidelines that incorporate extensive recommendations for echocardiographic use in clinical practice.<sup>6-12</sup> The expertise required to use advanced platforms and the extensive training required to appropriately analyze and interpret transthoracic images have traditionally only been fulfilled by specialists in cardiovascular medicine.

Two major developments have changed the practice of cardiac ultrasound:

- Development of small ultrasound

platforms. These devices have significantly fewer features and capabilities, which make them easier to operate. Despite their small size, they have proven diagnostic utility when used by physicians with comprehensive echocardiographic training.<sup>13-20</sup> Simplified operation and substantially smaller size and cost have opened their potential use to nontraditional cardiac ultrasound users. However, the easier operation of small devices does not obviate the need for training to acquire and interpret cardiac images.

- Physicians from diverse specialties have become interested in having access to the diagnostic value of cardiac ultrasound in clinical settings relevant to their scope of practice. This has led to the concept of focused use of cardiac ultrasound. The hypothesis is that nontraditional users, who have less training in cardiac image acquisition and interpretation compared with those trained in echocardiography, can learn to acquire and interpret cardiac ultrasound images as an adjunct to their physical examination assessment.

It is important to maintain excellence in the practice of echocardiography, a discipline that requires significant training and knowledge of guidelines for acquisition, analysis, and interpretation, while enabling ultrasound to be used as a tool by nonechocardiographers to augment their clinical assessments traditionally based on physical examination alone. It is recognized that there is a broad continuum of imaging and interpretive expertise among physicians with cardiac ultrasound training. Some users may understand more advanced imaging acquisition, analysis, and interpretation. However, as in most areas

of medicine, specific thresholds of expertise need to be defined. This is critical to providing excellent patient care by holding physicians accountable to practice within their scope of expertise as well as setting expectations for the practitioner, referring physician, and patient. The current document distinguishes the emerging field of focused cardiac ultrasound (FCU) as a bedside adjunct to the physical examination and echocardiography. Defining the distinctions between these techniques will allow practitioners to realize the utility of FCU and yet maintain the value of echocardiography. This guideline will not address ultrasound imaging outside of the cardiovascular system or nontransthoracic ultrasound modalities (ie, transesophageal echocardiography). This guideline is specific to cardiac imaging in the adult.

## 2. DEFINITIONS

### a. What is FCU?

**FCU is a focused examination of the cardiovascular system performed by a physician by using ultrasound as an adjunct to the physical examination to recognize specific ultrasonic signs that represent a narrow list of potential diagnoses in specific clinical settings.**

### b. Terminology

There are a variety of terms that have been used to describe a focused ultrasound of the heart. The importance of defining the nomenclature is the recognition that these procedures are distinct from the practice of echocardiography, as outlined in section 3. The American Society of Echocardiography (ASE) recommends the use of the term "focused cardiac ultrasound," but recognizes that other terms are in use (Table 1). The literature also contains hybrid terms that should be avoided because the expectations of the examination, equipment used, expertise in image acquisition, and proficiency in data analysis and interpretation are unclear if these terms are used. Such terms include "focused echocardiography," "hand-held echocardiography," "hand-carried echocardiography," "point of care echocardiography," and "directed echocardiography." The appropriate terminology for echocardiography has previously been established and includes "complete" or "comprehensive" echocardiography and "limited" echocardiography.

## 3. DIFFERENTIATION OF FCU AND "LIMITED TRANSTHORACIC ECHOCARDIOGRAPHY (TTE)"

The technical requirements for equipment, expertise for image acquisition, and the knowledge base for image analysis and interpretation have been well defined for echocardiography. This permits the appropriate and safe use of echocardiography in an unlimited number of clinical scenarios and permits its users to have a very broad scope of practice. Because of equipment capability, image acquisition training, image interpretation training, and image interpretation knowledge base, the practitioner of FCU will have a scope of practice that is restricted to the equipment and skill set that he or she possesses. The scope of practice may be a specific patient population or a clinical setting. The specific clinical question to be addressed and the cardiac abnormalities that can be ruled in or out with the focused examination will be narrow. The difference between the limited

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