ACC TRAINING STATEMENT

COCATS 4 Task Force 5: Training in Echocardiography

Endorsed by the American Society of Echocardiography

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1. INTRODUCTION

1.1. Document Development Process

1.1.1. Writing Committee Organization. The writing committee was selected to represent the American College of Cardiology (ACC) and American Society of Echocardiography (ASE) and included a cardiovascular training program director, an echocardiography training program director, early-career echocardiography experts, highly experienced specialists practicing in both the academic and community-based practice settings, and physicians experienced in defining and applying training standards according to the 6 general competency domains promulgated by the Accreditation Council for Graduate Medical Education (ACGME) and American Board of Medical Specialties (ABMS) and endorsed by the American Board of Internal Medicine (ABIM). The ACC determined that relationships with industry or other entities were not relevant to the creation of this general cardiovascular training statement. Employment and affiliation details for authors and peer reviewers are provided in Appendixes 1 and 2, respectively, along with disclosure reporting categories. Comprehensive disclosure information for all authors, including relationships with industry and other entities, is available as an online supplement to this document.

1.1.2. Document Development and Approval. The writing committee developed the document, approved it for review by individuals selected by the ACC and ASE, and addressed the reviewers' comments. The document was revised and posted for public comment from December 20, 2014, to January 6, 2015. Authors addressed the additional comments from the public to complete the document. The final document was approved by the Task Force, COCATS Steering Committee, and ACC Competency Management Committee; ratified by the ACC Board of Trustees in March, 2015; and endorsed by the ASE. This document is considered current until the ACC Competency Management Committee revises or withdraws it.

1.2. Background and Scope

Echocardiography is the most widely used and readily available imaging technique for assessing cardiovascular anatomy and function.

Clinical application of ultrasound encompasses M-mode, 2-dimensional (2D), 3-dimensional (3D), pulsed, tissue, and continuous-wave Doppler and color-flow imaging. Echocardiography noninvasively provides diagnostic and prognostic information concerning cardiovascular anatomy, function (i.e., ejection fraction), hemodynamic variables (i.e., gradient or pressure), and flow disturbances by means of pulsed, continuous-wave, and color-flow Doppler imaging. Moreover, these cardiovascular parameters can be assessed at rest, as well as during conditions of increased hemodynamic demand such as exercise.

The Task Force was charged with updating previously-published standards for training clinical adult cardiovascular fellows on the basis of changes in the field since 2008 and as part of a broader effort to establish consistent training criteria across all aspects of cardiology. The changes herein address the necessary balance between the development of increasingly specialized and sophisticated echocardiographic techniques and the need to provide a broad and complete training experience within a 3-year fellowship period. The Task Force also updated previously published standards to address the evolving framework of competency-based medical education described by the ACGME Outcomes Project and the 6 general competencies endorsed by the ACGME and ABMS. The background and overarching principles governing fellowship training are provided in the COCATS 4 Introduction, and readers should become familiar with this foundation before considering the details of training in a subdiscipline like echocardiography. The Steering Committee and Task Force recognize that implementation of these changes in training requirements will occur incrementally over time.

For most areas of adult cardiovascular medicine, 3 levels of training are delineated:

- **Level I training**, the basic training required for trainees to become competent consultants, is required by all fellows in cardiology and can be accomplished as part of a standard 3-year training program in cardiology. For echocardiography, Level I training is defined as an introductory or early level of competency in performing and interpreting transthoracic echocardiography (TTE) that is achieved during fellowship training but not sufficient to provide independent interpretation of results.
- **Level II training** refers to the additional training in 1 or more areas that enables some cardiovascular specialists to perform or interpret specific diagnostic tests and procedures or to render more specialized care for patients and conditions. This level of training is recognized for those areas in which an accepted instrument or benchmark, such as a qualifying examination, is available to measure specific knowledge, skills, or competence. Level II training in selected areas may be achieved by trainees during the standard 3-year cardiovascular fellowship, depending on their career goals and use of elective rotations. Level II training in echocardiography is required to provide independent interpretation of echocardiograms.
- **Level III training** usually requires additional experience beyond the standard 3-year cardiology fellowship to acquire specialized knowledge and competencies in performing, interpreting, and training others to perform specific procedures or render advanced, specialized care at a high level of skill and are defined by competency components and outcome metrics. The skills and experience achieved during Level III training prepare the trainee to perform and interpret complex studies in special populations, engage in research, direct an academic echocardiography laboratory, and train others in advanced aspects of echocardiography. These advanced competencies are usually not covered during the general cardiology fellowship, but require additional training during which they are integrated with training in other imaging modalities. For selected fellows wishing to attain advanced competencies in echocardiography, training beyond Level II can be achieved either during the standard 3-year fellowship (for those individuals seeking dedicated Level III training focused on echocardiography) or during an additional period of training beyond the standard 3-year fellowship for those desiring advanced echocardiography competency as part of multimodality imaging training. Fellows pursuing this advanced training during the 3-year fellowship will devote all available elective time to echocardiography, precluding acquisition of Level II competency in any other imaging modality. In both pathways, Level III training in echocardiography should take place in laboratories with Level III–trained faculty and with the necessary infrastructure to provide the advanced training experience. Level III training is described here in relatively broad terms to provide context for trainees. The additional exposure and requirements for Level III training will be addressed in a subsequent, separately published Advanced Training Statement.

The numbers of cases, procedures, and experiences recommended are based on published guidelines, competency statements, and the opinions of the members of the writing group. It is assumed that training is directed by appropriately-trained mentors in an ACGME–accredited program and that satisfactory completion of training is documented by the program director. The number and types of encounters and the duration of training required for each level of training are summarized in Section 4.

2. GENERAL STANDARDS

Optimal training in echocardiography relies on the interplay between the learner and the educational environment. Success depends on the background, abilities, and commitment of the trainee; the volume and variety of cases; the effectiveness of faculty; and the educational culture of the laboratory. The current trend to introduce the fundamental principles, indications, applications, and limitations of echocardiography into the education of medical students and residents is encouraged and will facilitate subsequent mastery of this discipline. In particular, experience at an early stage with hand-carried ultrasound (HCU) enhances the learning process and facilitates an understanding of cardiovascular anatomy and hemodynamics.

2.1. Faculty

The echocardiographic laboratory in which training of cardiovascular fellows is undertaken should be under the direct supervision of a full-time qualified director (or directors) who has achieved Level III training.[1,2] Participation of additional full- or part-time faculty provides a diversity of experience and is highly desirable. Exposure by the trainee to faculty and sonographers with different strengths and interests ensures a range of experience and a broader base of knowledge.

2.2. Facilities and Equipment

To provide acceptable fellowship training in echocardiography, a laboratory must have equipment capable of providing comprehensive TTE and transesophageal echocardiography (TEE), including M-mode and 2D and 3D imaging, pulsed and continuous-wave Doppler echocardiography, tissue Doppler, stress echocardiography, and color-flow imaging. The laboratory environment should offer a broad range of clinical material. The laboratory should conform to continuing quality improvement guidelines[3] and ideally perform at least 2,000 echocardiographic studies per year to give the fellow an appropriate variety of experience. Accreditation of the laboratory through an organization such as the Intersocietal Accreditation Commission for Echocardiography (IAC Echocardiography) is strongly encouraged. Intraprocedural (including intraoperative) echocardiography and an exposure to adults with structural and congenital heart disease should be available.