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ACC Revised Recommendations for Training in Adult Cardiovascular Medicine Core Cardiology Training II (COCATS 2) (Revision of the 1995 COCATS Training Statement)

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INTRODUCTION

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In 1995, guidelines for training in adult cardiovascular medicine were published as an outgrowth of a consensus statement emanating from the Core Cardiology Training Symposium (COCATS) held at Heart House, Bethesda, Maryland, June 27 to 28, 1994 (1). Since publication of the proceedings of that consensus conference in the *Journal of the American College of Cardiology*, the term "COCATS" has been used when referring to the American College of Cardiology training guidelines for fellowship programs. Since the first COCATS document was published in 1995, significant advances have been made in cardiovascular science, and new technologies have emerged. This necessitated a revision to these training guidelines.

The current revision was accomplished by the formation of small task forces that included representatives from the subspecialty societies where appropriate. These task forces reviewed the 1995 COCATS task force reports and made revisions, additions, and deletions based on data from the literature and their expert opinion. Major changes were most often related to maturing of either new subspecialty areas in cardiology or the emergence of new technology into accepted practice. Numbers of procedures to be performed, interpreted, or both were made consistent with volume recommendations found in the American College of Cardiology (ACC)/American Heart Association (AHA) practice guidelines, ACC/AHA/American College of Physicians-American Society of Internal Medicine (ACP-ASIM) clinical competence statements, or other relevant consensus documents.

The Task Force reports were peer reviewed by the following ACC committees: Cardiac Catheterization and Intervention Committee (Task Force 3); Echocardiography Committee (Task Force 4); Cardiovascular Imaging Committee (Task Force 5); Clinical Electrophysiology Committee (Task Force 6); Clinical Research Committee (Task Force 7); Heart Failure and Transplant Committee (Task Force 8); Congenital Heart Disease and Pediatric Cardiology Committee (Task Force 9); Prevention of Cardiovascular Disease Committee (Task Force 10); Peripheral Vascular Committee (Task Force 11); Cardiovascular Imaging Committee (Task Force 12), as well as 5 members of the ACC Board of Governors and 10 training directors. Several organizations also reviewed the document including the American Heart Association (entire document); Society for Cardiac Angiography and Interventions (Task Force 3); American Society of Echocardiography (Task Force 4); American Society of Nuclear Cardiology (Task Force 5); North American Society of Pacing and Electrophysiology (Task Force 6); Heart Failure Society (Task Force 8); Society of Vascular Medicine and Biology (Task Force 11); and the Society of Cardiac Magnetic Resonance (Task Force 12).

The American Board of Internal Medicine (ABIM) subspecialty board on cardiovascular disease still requires 3 years of cardiology fellowship training. An additional year of training is required by the ABIM to sit for the certification examinations for added qualification in clinical cardiac electrophysiology and interventional cardiology. As outlined in this document, additional years of training are also recommended for those trainees who desire advanced expertise in specialized areas, those who want dedicated time for basic and/or clinical research training, or both. Throughout this revision of COCATS, recommendations for such advanced training experiences are proposed relative to the discipline of cardiovascular medicine being addressed.

In the 1995 COCATS guidelines, 10 task force reports pertaining to overall training in clinical cardiology (Task Force 1) and training in specific specialized areas of cardiovascular medicine (e.g., echocardiography, nuclear cardiology, cardiac catheterization, and electrophysiology) were presented. In this revised document, 2 additional task force reports are published. These are entitled "Training in Vascular Medicine and Peripheral Catheter-Based Interventions" and "Training in Cardiovascular Magnetic Resonance." The vascular medicine task force report emphasizes that cardiologists must have adequate basic training in vascular medicine to acquire a sufficient knowledge base to care for the many patients with peripheral vascular disease. The highest level of training in this area is focused on the acquisition of skills for catheter-based vascular interventions. A career track in vascular medicine for cardiology trainees is outlined in detail. The other new task force report relates the significant advances that have been made in the application of magnetic resonance imaging to cardiac and vascular diseases.

Many of the original 10 task force reports have been substantially revised in accordance with advances in those particular training disciplines. The need for a clinical core of 24 months with a minimum of 9 months in nonlaboratory clinical practice activities is sustained in the report from Task Force 1, which deals with overall training in clinical cardiology. The importance of active participation in research activities is again emphasized in this COCATS revision, and the Task Force 7 report outlines various approaches that can be pursued to fulfill this important academic training requirement for cardiology trainees. The

need for core training in long-standing procedural techniques, such as electrocardiography, ambulatory monitoring, and conventional stress testing, is clearly defined, and volumes of tests that must be performed and/or interpreted to achieve competence are again given.

Training in interventional cardiology as described in the Task Force 3 report is now limited to formal training programs in the United States that satisfy the basic standards developed by the American Council for Graduate Medical Education (ACGME) and are accredited by ACGME. These criteria must be met for candidates to be eligible to take the examination to obtain the certificate of added qualification in interventional cardiology from the ABIM (effective July 1, 2002). This Level 3 training must be achieved during a fourth year of dedicated fellowship experience. As described in the Task Force 4 report, which deals with training in echocardiography, exposure to transesophageal echocardiography and other special ultrasound procedures can commence with trainees undergoing Level 2 training. The task force members stated, however, that to become fully competent to perform these techniques independently, the completion of Level 2 training, as well as the supervised performance of the required number of special studies, is necessary. Guidelines for training in myocardial contrast echocardiography are now dealt with in detail in the revised echocardiography guidelines report by the task force. With respect to nuclear cardiology training guidelines in the Task Force 5 report, the importance of becoming knowledgeable in gated single-photon emission computed tomographic imaging is emphasized. With respect to cardiac electrophysiology, new guidelines are introduced regarding training for programming of all types of bradycardia pacing systems and implantable cardioverter-defibrillators (ICDs) and follow-up of patients with these devices. Training in heart failure and transplantation as outlined in the Task Force 8 report has been revised relative to the 1995 report. Recommendations for Level 1 training now include a minimum of 1 month of rotation on a dedicated heart failure service or incorporation of the 1 month in the non-laboratory months of training in those programs that have no separate heart failure service. Level 2 training in heart failure is now designated to encompass a total of 6 months. Details are described in the task force report.

As with the original document (1), in these revised training guidelines, fellow and trainee are used interchangeably, as are cardiovascular medicine and cardiology. Although numbers of procedures that should be completed to achieve levels of training are provided, the mere accomplishment of such numbers of procedures is not synonymous with excellence in their performance and interpretation. It is vital to the excellence of a training program that dedicated faculty members be available to supervise and critique performance and interpretation of procedures.

Throughout these task force reports, training is suggested at three levels:

Level 1—Basic training required of all trainees to be competent consultant cardiologists.

Level 2—Additional training in one or more specialized areas that enables the cardiologist to perform or interpret (or both) specific procedures at an intermediate skill level or engage in rendering cardiovascular care in specialized areas.

Level 3—Advanced training in a specialized area that enables a cardiologist to perform, interpret, and train others to perform and interpret specific procedures at a high skill level.

Appendix 1 of the Task Force 1 report is included herein to summarize the requirements for the various training programs. Please refer to the individual task force reports for more detailed information.

The ever-expanding knowledge base in basic cardiovascular science and cardiovascular medicine requires that all training programs have a rich assortment of didactic offerings for fellows. Case-based conferences, such as the traditional catheterization laboratory conference, are vital to train fellows and to develop their skills in evidence-based decision-making. Self-learning needs to be emphasized, and Internet-based, online educational programs, many of which are interactive, will play a greater role in a fellow's overall learning experience during fellowship and after training. Such didactic activities are outlined throughout the task force reports.

To view the complete COCATS recommendations, please visit the ACC Web site at http://www.acc.org/clinical/training/adult.htm. These recommendations are considered current unless the ACC revises or withdraws them from publication.

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REFERENCE

1. COCATS Guidelines. Guidelines for Training in Adult Cardiovascular Medicine, Core Cardiology Training Symposium June 27–28, 1994. American College of Cardiology. J Am Coll Cardiol 1995;25:1–34.

APPENDIX

Task Force	Area	Level	Minimal Number of Procedures	Cumulative Duration of Training (mo)	Cumulative Number of Procedures
1	Clinical cardiology	1		36	
2	Electrocardiography	1	500 to 3,500*#		3,500
		2			greater than 3,500
	Ambulatory monitoring	1	150*		150
		2	75		225
	Exercise testing	1	200*		200
		2	100		300
3	Diagnostic catheterization	1	100	4	100
		2	200	8	300
	Interventional catheterization	3	250	20	550
4	Echocardiography	1	150	3	150
		2	150	6	300
		3	450	12	750
5	Nuclear cardiology	1	80 hours	2	80 hours
		2	300 cases	6 to 8	300+ cases
		3	600 cases	18 to 20	600+ cases
6	Electrophysiology, pacing, and arrhythmias	1		2	
		2		6	
		3	150	24	150+ cases
7	Research	1		6 to 12†	
		2		24	
		3		24 to 36	
8	Heart failure and transplantation	1		1†§	
		2		6	
		3		12	
9	Congenital heart disease	1		Core lectures†	
		2		12	
		3		24	40 Cath 300 TTE 50 TEE
	Preventive cardiology	1		1†§	
		2		6 to 12	
		3		12	
11	Vascular medicine and peripheral catheter-based intervention	1		2*	
	Vascular Medicine Specialist	2		14¶	400+ noninvasive cases**
	Peripheral Vascular Intervention	3		20††	160+§§
	Vascular Medicine Specialist plus Vascular Intervention	3		34‡‡	
12	Cardiovascular magnetic resonance imaging	1		1‡	50
		2		3 to 6	150
		3		12	350

*Can be taken throughout the training program.
#The committee strongly recommends that cardiologists achieve Level 2 training in ECG interpretation.
†Can be taken as part of 9 months of required nonlaboratory clinical practice rotation.
‡Can be taken as part of 6 months of noninvasive imaging rotation.
§It is assumed that trainees will obtain additional training in heart failure and preventive cardiology beyond the 1-month core training as part of the experience during other clinical months, such as consult services and CCU.
¶2 months of vascular medicine as defined by Level 1, plus 12 months of Level 2 training. Level 2 training is not a prerequisite for Level 3 training but is intended for individuals who want to become a vascular medicine specialist.
**In addition, observing 25 peripheral angiograms and 25 peripheral interventions
††Including 2 months of vascular medicine training as defined by Level 1, 8 months of diagnostic catheterization training, and 12 months of interventional lab training. Interventional training for Level 3 requires a 4th year. The 12 months of Level 2 training are not required for this interventional training year.
‡‡Including 2 months of Level 1 and 12 months of Level 2 vascular medicine training, 8 months of diagnostic catheterization training, and 12 months of interventional lab training.
§§Including 100 diagnostic peripheral angiograms, 50 peripheral interventions, and 10 thrombolysis/thrombectomies.
Cath = catheterization; TEE = transesophageal echocardiography; and TTE = transthoracic echocardiography.